

UNIVERSITY OF OKLAHOMA
GRADUATE COLLEGE

THE TRANSBOUNDARY MOVEMENT OF HAZARDOUS AND OTHER WASTE,
AND INTERNATIONAL INEQUALITY: AN ANALYSIS USING BASEL
CONVENTION, YEAR 2000 DATA

A DISSERTATION
SUBMITTED TO THE GRADUATE FACULTY
in partial fulfillment of the requirements for the
degree of
Doctor of Philosophy

By
JESSE W. FUCHS
Norman, Oklahoma
2007

UMI Number: 3263356



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CONVENTION, YEAR 2000 DATA

A DISSERTATION APPROVED FOR THE
DEPARTMENT OF SOCIOLOGY

BY

Dr. Thomas Burns, Chair

Dr. Craig St. John

Dr. Loretta Bass

Dr. Wilbur Scott

Dr. David H. Ray

ACKNOWLEDGEMENTS

I would like to acknowledge the professional guidance of my committee members: Thomas Burns, Craig St. John, Loretta Bass, Wilbur Scott, and David Ray. I thank each and every one of you for your patience and advice given throughout the years I have been in this program. I would like to especially thank Thomas Burns for his advice, insightful suggestions, encouragement, and understanding as a teacher and committee chair. I offer my sincere thanks to Craig St. John for his advice, intellectual stimulation, and contribution as a teacher and committee member. Thank you, Wilbur Scott, for providing special encouragement and mentoring, especially during the early years I was in the program. My successful completion of this program owes much to the things you contributed. Loretta Bass, thanks for continually being a stimulating teacher that always seemed available for advice and questions. Thank you very much.

I would like to thank Scott Frey for his valuable tip on using Basel Convention transboundary waste data for this research. I would also like to thank Leslie Gillies for all the time she took from her busy schedule to aid me with software applications and departmental protocol. I very much want to thank Marilyn Fleer for all the typing, editing and proofing she provided for me over the last decade. Marilyn, you are a very good and dear friend. Thanks, Debra Hensley-Luczycki for your help multiple times in obtaining the necessary committee member signatures.

I would also like to thank fellow classmates Dennis Brewster, Nicholas Dean, Robert Bentley, M'Lu Chang, Rebecca Nees-Powell and numerous other classmates for their friendship and encouragement. A offer a special thanks to Jinkee Acuero-Fuchs for her editing, proofing and patience with me during this project. Thank you all very much.

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ABSTRACT

While there is a growing body of literature examining social causes of environmental outcomes, there has been a dearth of quantitative analysis examining the movement of hazardous waste across national boundaries from a global perspective. In an attempt to shed light on this vital but relatively neglected realm, this study examines data collected in conjunction with the Basel Convention on the international flows of hazardous waste among countries (n=99) in the year 2000. The study examines characteristics of destination countries (n=52) as well as countries of origin (n=96) along several dimensions. Predictor variables were drawn from a number of perspectives including sociology, economics, geography, demography, network analysis, and human ecology. Multivariate statistical analysis indicates that while the higher the level of biohazard, the more likely a shipment is to travel from a richer to a poorer nation, nations tend to ship waste to nations that are proximal to them geographically. The classic world-system framework positing a core, semi-periphery and periphery is not particularly useful in explaining the findings in this study. However, the study does support a modified world-system theoretical framework, in which richer countries within a region tend to export waste to somewhat poorer countries in that same region (many of which may be in the same tier of the world-system). An ancillary finding is that, while in theory, the total amount of waste exported by all countries should equal the amount imported by all countries, there were some discrepancies in the numbers. The aggregate amount of waste reported imported by destination countries was greater by almost 42% than the aggregate amount of waste reported shipped by originating countries. The work has a number of sociological, ecological and international policy-related implications.

CHAPTER I

INTRODUCTION

1. Problems Associated with Transboundary Waste

A commonly expressed attitude of the general public towards the location of waste processing and waste disposal facilities is: NIMBY or "Not in my back yard". As important as proper waste disposal is to any society, no one appears to want one of these facilities adjacent to where they live and work. By the mid-1980's, an established body of research and accompanying literature existed within the United States concerning the health implications of populations being adjacent to the production and disposal of hazardous waste and the tendency for these types of facilities to be located more often near lower economic and ethnic minority communities (Szasz and Meuser 1997).

Particularly within the last few decades, a growing interest has developed in the international transboundary movement of hazardous waste (Asante-Duah and Nagy 1998). Areas of interest include location of polluting industries in producing countries and exportation of hazardous products from them. There are concerns, for example, that exportation of hazardous waste has an inequitable distribution of costs and benefits during the industrialization of developing countries (Stretton 1976; Geisler 1977; Ives 1985).

A number of major problems are associated with transboundary movement of waste. Even modern transportation systems and high tech disposal facilities have a potential for failure, however small that risk may be, with subsequent disasters for populations living nearby (Buttel 1987; Covello and Frey 1990). Developing countries often do not have the technological expertise available for the handling and disposal of

hazardous and other waste (Adedibu 1988; Blowers 1996; Asante-Duah and Nagy 1998; Ayotamuno and Gobo 2004; Fobil, Carboo and Armah 2005). Furthermore, developing countries often do not have the technological infrastructure, laws, and administrative rules in place necessary for the appropriate handling and disposal of their own waste, let alone for additional imported waste (Wilson and Balkau 1990; Strohm 1991; Chung and Poon 2001; Nunan and Satterthwaite 2001; Payet and Obura 2004). Finally, health issues are often related to environmental problems that frequently accompany the exportation of pollution to developing countries (Adeola 1998), such as: asbestos in construction materials and methyl isocyanate from manufacturing waste that escapes from landfills and diminishes children's health in Southeast Asian countries (Suk et al. 2003); arsenic, cadmium, dioxins, and heavy metal pollution that degrades the general state of health of the populations of Eastern and Central European countries (Carpenter, Cikrt and Suk 1999); leakage from hazardous waste in landfills that and deteriorates the health of adjacent residents in India (Misra and Pandey 2004); pollution and infant mortality in less developed countries (Burns, Kentor and Jorgenson 2002); and toxic waste dumping and health issues in Lebanon (Jurdi 2002).

2. Responses to Transboundary Waste Problems

Governmental and public policy responses to problems associated with domestic waste generation, transportation, and disposal include such measures as initiating and passing legislation, and promulgating administrative rules regulating this internal movement of waste and waste disposal (Third World Network 1989; Biggs 1994). Responses have arisen on the international level as to the problems associated with the transboundary movement of hazardous and other waste as well. A number of bilateral

agreements, regional treaties, and international treaties, which regulate this type of waste movement have been established and ratified. (Kummer 1992, Allen 1995, Krueger 1999a). The Council of the Organization for the Economic Cooperation and Development (OECD) first adopted rules regulating the international transboundary movement of waste, seconded by a set of rules adopted by the European Economic Community (EEC) (Handley 1989; Wynne 1989; Thornton 1991). The Basel, Lome IV, and Bamako conventions on international transboundary waste followed rapidly the adoption of these two sets of rules OECD (Kummer 1992; Donald 1992; Biggs 1994; Puckett 1994; Hongkyum 1998).

By far, the most extensive international treaty or regime regulating waste in both regulatory comprehensiveness and number of countries agreeing and ratifying the terms of the treaty is the 1989 Basel Convention (Hilz and Radka 1990). In 1989, 116 countries and the European Economic Community (EEC) ratified the Basel Convention agreement that regulates the terms under which the movement of transboundary waste takes place and provides provisions for tracking the movement of this waste when it occurs (Biggs 1994). The United States, one of the world's largest waste generating nations, has signed but not yet ratified, the treaty. Many of the developing countries that are original signatories to the treaty have yet to ratify other, more recently passed, amendments to the agreement (Krueger 1999a). A more extensive discussion of the international regulation of transboundary waste takes place in Chapter II, Section 4, of this report.

3. Transboundary Waste Research Objectives

Currently a large and well established body of literature exist concerning the transboundary movement of hazardous and other waste and the potential and real

problems associated with it, namely an unequal distribution of the costs and benefits from this often called "waste trade" (Galli 1987; World Resources Institute 1988; Faber 1989). Until now, little, if any, quantitative comparative research that is international in scope has been done on the movement of transboundary waste due to a lack of data documenting the types and amounts of waste involved in this movement. The comprehensive records collected and archived annually under the multination ratified terms of the Basel Convention now allow for conducting this type and scope of research.

I have three objectives in this research that utilize the above mentioned international transboundary movement of waste data collected by the Basel Convention (Secretariat of the Basel Convention 2006a, 2006b, 2006c, 2006d). The first objective is to examine and determine the characteristics of both transboundary waste sending and waste receiving countries as they relate to the ***amount*** of waste that is shipped or received. The second objective is to determine what country characteristics effect the economic level movement of waste shipments. The third objective is to determine quantitatively if the more ***hazardous portion*** of the waste has a transboundary movement from sending countries that have characteristics of higher levels of development relative to receiving countries that have characteristics of lower levels of development.

Given the large established body of research and accompanying literature on environmental injustice within the United States, many written incidental accounts and the results of qualitative studies on international transboundary movement of hazardous and other waste indicate that an analogous environmental injustice is occurring on the international level. The theoretical approach indicated by these to properly guide a quantitative analysis on the various kinds and types of waste and their international

transboundary movement is the world-systems perspective (Wallerstein 1974; Chirot and Hall 1982; Chirot 1994; Chase-Dunn 1995, 1999). In the last three decades, the world-systems perspective has been both useful and productive in research designed to understand world trade both in raw materials and in manufactured goods. Furthermore, this theoretical perspective has been useful in achieving an understanding of the movement of economic capital, social capital, and labor within and between countries (Smith and White 1992; Kentor 2000; Kick and Davis 2001). More importantly, the world-systems perspective has proved useful and productive in research involving environmental issues and associated problems (Smith 1994; Burns, Davis and Kick 1997; Adeola 1998; Jorgenson and Burns 2004). Therefore, the world-systems perspective is ideal for use in directing this international comparative research on the transboundary movement of hazardous and other waste. Additional details of the theoretical ramifications of the world-systems perspective, as applied to understanding the transboundary movement of hazardous and other waste, will be discussed in a later section of this dissertation.

4. Summary of the Introduction

In summary, I have three objectives in this research on the international transboundary movement of hazardous and other waste. The first objective is to ascertain and explore the characteristics of transboundary waste sending and receiving countries as they correlate with the amounts of waste shipped or received. The second objective is to determine what country characteristics effect the economic level movement of waste shipments. The third objective is to determine quantitatively the question of whether the more hazardous portion of waste has a transboundary movement to countries with

characteristics of lower levels of development, more than to countries with characteristics of higher levels of development. The data used in this research are the Basel Convention export and import nation reports of hazardous and other waste, for the year 2000. The theoretical approach used in this research is the world-systems perspective. The world-system perspective points out that rich nations have the advantage in traditional trade with poorer nations. I am proposing that this tendency for the rich nation having the advantage in traditional trade will also extend to the so-call trash trade.

CHAPTER II

REVIEW OF THE LITERATURE

1. History of Transboundary Waste Research

Much has been written about the transboundary movement of hazardous and other waste during the last three decades. The problem with previous research is that it is qualitative in nature, being made up almost entirely of case studies or accounts and lists of incidents. A scarcity of quantitative research exists on the international transboundary movement of waste. Using data on international transboundary waste as collected by the Basel Convention in their annual records of member nation import and export shipment amounts and frequencies (Secretariat of the Basel Convention 2006a, 2006b, 2006c, 2006d), this research will address the deficiency of quantitative research on this topic.

The reference section of Asante-Duah and Nagy's (1998) book on the subject listed over 70 sources devoted to the topic of transboundary movement of hazardous and other waste. Even more has been written since this book was published. Why has so much attention and concern been spent on this subject? The reasons for this are related to the potentially inequitable implications of this movement or the "hazardous waste trade", as some have labeled this exchange and the problems associated with it (Shin and Strohm 1993; Frey 1998a). Even in well-developed countries with modern transportation systems and the latest technologically advanced disposal systems, a potential for failure exists with consequential disasters for populations living in adjacent areas (Buttel 1987; Covello and Frey 1990). The potential for failure is even greater when the waste movement is from highly developed countries to developing countries (Gbadegesin 2001).

As outlined in the introduction, developing countries often do not have the technological expertise available for the handling and disposal of hazardous and other waste (Asante-Duah and Nagy 1998; Ayotamuno and Gobo 2004; Fobil et al. 2005). Furthermore, developing countries often do not have the technological infrastructure, laws, and administrative rules in place that are necessary for the appropriate handling and disposal of their own waste, even without the additional imported waste (Strohm 1991; Chung and Poon 2001; Payet and Obura 2004). Finally, health issues are often related to environmental problems that frequently accompany exportation of pollution to developing countries (Carpenter, Cikrt and Suk 1999; Adeola 1998).

Beginning in the 1970's and continuing until today, researchers and world development theorists expressed concern about the inequitable distribution of the costs and benefits of industrialization in developing countries (Agarwal 1997; Burns, Kick, Murray and Murray 1994; Burns, Kentor, and Jorgenson 2002). The location of polluting industries, the exportation of hazardous products, and the exportation of hazardous waste to developing countries was also a concern (Stretton 1976; Geisler 1977; Ives 1985; Galli 1987; World Resources Institute 1998; Faber 1989). By the mid-1980s, an established body of research and associated literature already existed on environmental injustice within the United States (Szasy and Meuser 1997). This research indicates that within the U. S., hazardous waste facilities and air polluting industrial facilities were disproportionately sited near the residences of minorities and lower socio-economic citizens (Berry and Caris 1977; Bullard 1983; US GAO 1983; United Church of Christ, Commission for Racial Justice 1987; Adeola 1994, 1995, 2000a; Goldman 1996).

However in the mid-1980's, two incidents occurred that made international media

headlines, bringing the transboundary movement of hazardous waste and other waste to the public's attention and spurring an avalanche of research and literature. The first incident was the 1986 voyage of the waste ship *Khian Sea* (Gourlay 1992; Vallette and Spalding 1990; Foster 1994). Loaded with a cargo of Philadelphia incinerator ash, its original destination was Haiti. No nation, including Haiti, would grant docking permits. The second incident was the shipment of European hazardous waste in 1987 by an Italian waste firm to a little known village in Koko, Nigeria (Moyers 1990; Gourlay 1992; Olsen and Princen 1994) that sickened the proprietor of the property where it was stored. These and several other incidents not only captured general public attention, but also stimulated environmental groups to research the extent of the hazardous waste trade. Research findings concerning the phenomenon's implications led to the passing of legislation by national governments and the convening of international conventions of countries in order to design treaties directed at regulating and controlling the hazardous waste trade (Halter 1987; Vallette and Spalding 1990; Moyers 1990; Hofrienter 1993; Tsai 1999).

The Council of the Organization for the Economic Cooperation and Development (OECD) first adopted rules regulating the international transboundary movement of waste between OECD member countries and from OECD countries to non-OECD countries (Kummer 1992; Biggs 1994). The European Economic Community (EEC) also recognized that all EEC countries were not equally advanced technologically to handle hazardous waste (Wynne 1989; Thornton 1991). Therefore, they soon followed the OECD in adopting legislation and administrative rules regulating the transboundary movement of waste between member nations (Handley 1989; Allen 1995; Asante-Duah and Nagy 1998).

2. Nature of Transboundary Waste

One difficulty with measuring, researching, and regulating the transboundary movement of hazardous waste is associated with **defining** hazardous waste (Leonard 1988; Thornton 1991; Kazmierczyk 1995). Different countries define hazardous waste differently, which leads to loopholes in hazardous waste regulation (Schmidt 1999; Krueger 1999b). The latter was an issue that countries attending international toxic waste conventions found necessary to address (Olsen 1975; Hilz 1992; Allen 1995; Asante-Dauh 1998). Until there is an internationally accepted definition of hazardous waste, researchers will continue to have problems in measuring the volume of the hazardous waste trade. In this report, the definition I use for hazardous waste is the one designated in the articles of the Basel Convention.

Until the time when there is an international agreement on the definition of toxic waste, some researchers have suggested and used operational definitions. Cutter (1993:2) defines “hazards” as “threats to people and things of value.” Gourlay (1992:21) defines waste as “things we do not want or which we have failed to use”. Gourlay (with a caveat that the harmless/harmful destination changes over time) suggests using the World Resources Institute’s (1988:314) definition of hazardous waste: “waste known to contain potentially harmful substances”. Galli (1987) defines “hazardous” as being banned or restricted for domestic use. Other researchers maintain that waste should be viewed as substances to be recycled or reused (Clapp 1994; Louka 1994; Socolow 1997) or that the term “waste management” is an oxymoron when associated with the hazardous waste trade (Moyers 1990; Hofrichter 1993) because developing countries often do not have either the technological expertise or the modern infrastructures necessary to handle either

their own or imported hazardous waste (Bello 1992; Logan 1992; Carpenter, Cikrt and Suk 1999; Marcotullio 2003; Post and Baud. 2004).

A large problem inherent in transboundary waste movement, or trade in hazardous waste, is the global direction of the movement and the inequitable distribution of the costs and benefits (Logan 1992; Miller 1993; Simon 2000; Adeola 2000b). Although most of this trade moves between developed countries, much of it also moves from developed to developing countries (Postel 1987; Bello 1992; Jasenoff 1994; Rogge and Darkwa 1996). The waste trade has the same inherent inequalities that developed/developing country exchanges often have (Moyers 1990; Vallette and Spalding 1990; Hofrichter 1993; Frey 1998b). Amounts and concentrations of industrial wastes, as currently generated by modern factories relocated in developing countries, or as shipped to developing countries from factories in developed countries, cannot be recycled by the traditionally used natural environmental systems in these locations at a rate that avoids the waste becoming toxic (O'Connor 1989). Developing countries often do not have adequate infrastructures for waste disposal facilities to handle their own waste as well as imported waste (Wilson and Balkau 1990; Chung and Poon 2001; Nunan and Satterthwaite 2001; Payet and Obura 2004) or lack the proper technological expertise to handle and properly dispose of waste (Adedibu 1988; Blowers 1996; Asante-Duah and Nagy 1998; Ayotamuno and Gobo 2004; Fobil et al. 2005). Improper handling and disposal of waste may lead to health problems. Improper handling and disposal of waste and associated health problems are particularly acute in developing countries, primarily because of these same infrastructure problems (Adeola 1998; Carpenter, Cikrt and Suk 1999; Jurdi 2002; Suk et al. 2003; Misra and Pandey 2004).

Most researchers and writers on the transboundary movement of hazardous waste address the movement of “solid” waste. Others address the movement of solid waste and include such things as the transboundary movement of air pollution (White 1991; Hekimian 1995; Alario 1995; Renner 1996; Redclift and Sage 1998), hazardous products (Castleman and Navarro 1987; Albers and Gelb 1991; Frey 1995a; Rogge and Darkwa 1996), and the relocation by transnational corporations (TNC’s) of the hazardous waste producing industry to developing countries (Gedicks 1993; Broad and Caranagh 1994; Gadgil and Guha 1995; Davies and Rattso 1996; Akwesasne Task Force 1997).

Researchers and writers gave six reasons for the transboundary movement of hazardous and other waste and the relocation of the hazardous waste producing industry: 1) Increased production of hazardous waste in developed countries; 2) Decreased disposal capacity in developed countries; 3) Increased cost of disposal in developed countries; 4) Increased awareness of the risk associated with hazardous waste; 5) Increased regulation in developed countries, and last, 6) The desperate need for hard currency in developing countries (Rose 1989; Foster 1994; Frey 1995b, 1998a). Other writers and researchers that attribute one or more of the above six reasons for increasing transboundary wastes are Handley (1989), Hiltz and Radka (1990), Strohm (1991), and Crooks (1993).

The specific amounts of waste generated annually by developed countries are unknown (Biggs 1994), resulting in widely ranging estimates of country and amounts of global waste generated. Allen (1995) estimates the mid-1990’s European Union’s (EU) annual production of waste to be over 2 billion tons. Data from the US Environmental Protection Agency indicate that by the end of the 1990’s the United States’ annual

generation of solid waste was about 270 million tons (Krueger 1999b). Other researchers estimate that developed countries produce 90 – 95% of the world's total volume of waste (Clapp 1994; Frey 1998a) and that the total amount of waste these countries produce is growing (Strohm 1991; Foster 1994).

Following the above increases of production of waste in developed countries came decreased disposal capacity and increased cost (Rose 1989). Asante-Duah and Nagy (1998) report that in the United States between 1976 and 1991 the cost of landfill disposal of waste went from less than \$10 to more than \$250 per metric ton, with the cost of incineration going from about \$50 per metric ton to over \$2600 per metric ton. During this same period, the cost of waste disposal in Europe, where landfill disposal of toxic waste was still legal, was reported to be somewhat lower, but exhibited similar increases.

As one might suspect, increased awareness of the risk of hazardous waste and increased regulation appear to move hand-in-hand in developed countries (Asante-Duah and Nagy 1998; Frey 1998a). As media news stories bring public attention to the risk, NIMBY or “Not in my back yard” becomes a common citizen reaction to the proposed nearby location of waste producing and waste disposal facilities (Strohm 1991; Szasz and Meuser 1997). Steady increases in restrictions and regulations on the handling and disposal of hazardous waste have been the rule in almost every developed country since the mid-1970s (Handley 1989; Wynne 1989; Foster 1994).

On the one hand, increased waste production, decreased waste disposal capacity, increased cost of waste disposal, increased awareness of the risk of hazardous waste, and increased regulation of the handling and disposal of waste are all factors compelling developed countries to export waste to developing countries. On the other hand,

mounting external debt and driving need for hard currency in developing countries makes it difficult for them to resist imports of developed country produced waste (Wynne 1989; Clapp 1994; Frey 1999a). The scope of the resulting international transboundary movement of waste will be discussed in the following section of this chapter.

3. Scope of Transboundary Waste

The scope of the legal transboundary movement of hazardous waste and other waste is difficult to ascertain, primarily due to countries having different definitions of hazardous waste. Estimates of the worldwide annual generation of waste generally range from 300 - 400 million metric tons (Krueger 1999a; Schmidt 1999), with some estimates substantially higher (Allen 1995) and with an estimated 10% of the total generated waste exported (Krueger 1999b).

Even more difficult to ascertain is the amount and scope of the illegal movement of hazardous waste, which by its very nature is undocumented, leading only to estimates of the trade. These estimates are made using data from the waste trade schemes that have been discovered (Ives 1985; Galli 1987; Moyers 1990; Gourlay 1992). Strohm (1991) estimates that over 5 million metric tons annually are illegally exported to Eastern European countries. A U.S. Government *International Crime Threat Assessment Report* (December 2000) estimates that illegal waste dumping around the world provides criminals with profits of \$10 - \$12 billion a year (Spivey 2004).

Wynne (1989) gives four reasons for the difficulty of monitoring and tabulating the legal trade in hazardous waste: 1) The different definitions of hazardous waste even among developed countries; 2) Customs officials have neither the time nor the expertise to check shipments; 3) Transnational Corporations (TNCs) that are increasingly using

brokers or middlemen between sources and destination as a way to be absolved of responsibility; and 4) Regulation that focuses on the end points of movement, not the source.

Greenpeace and many other environmental movement groups document the volume, value, origination, and destination of the waste trade (Third World Network 1989; Moyers 1990; Vallette and Spalding 1990). Between 1986 and 1990, 1000 attempts were documented to move hazardous waste from developed countries to countries in Africa, Asia, Latin America, and the Caribbean. Between 1986 and 1988, three million tons of hazardous wastes were successfully moved to these countries (Frey 1995a; 1995b). Kitt (1995) estimates that 98% of hazardous waste is generated in developed countries, and that the U.S. exported 139 thousand tons in 1990, with 68% going to Canada, and much of the rest going to developing countries. Clapp (1994) estimates that the world hazardous waste trade is 35-40 million tons per year, half of which goes to Organization for Economic Cooperation and Development (OECD) member countries, and 20% of which goes to non-member OECD Third World countries. Anyinam (1991) documents the hazardous waste trade between developed countries and African countries, noting the amount, value, origin, and destination. His account records deals that involved hundreds of millions of dollars. Puckett (1992) asserts that between 1986-1992, over 500 attempts were made to export 160 million tons of hazardous waste to over 78 Third World or Eastern and Central European countries. Of these, 5.2 million tons of waste were successfully exported and dumped. Asante-Dauh and Nagy (1998) list 21 developed countries as significant exporters of hazardous waste and 16 developing countries and the United Kingdom as significant importers of hazardous waste. Finally,

Greenpeace lists 36 countries as exporters and 122 countries as importers of hazardous waste in various waste trade schemes (Vallette and Spalding 1990).

Since the collapse of the Soviet Block, much of Europe's exports of hazardous waste have shifted to Eastern Europe. Several researchers have investigated this change, noting that the Soviets have also left a legacy of tens of thousands of industrial hazardous waste sites (Cezeaux 1991; Hofrichter 1993; Frey 1998b; Nunez-Muller 2000). A Federal Task Force commissioned to investigate Eastern European waste dump sites estimated that there were 30 thousand toxic dumpsites in what was East Germany, with other investigators estimating as many as 90 thousand toxic dumpsites in all of Eastern Europe (Cezeaux 1991).

Some researchers view air pollution as a form of hazardous waste movement since it respects no boundaries. A good source for estimates of world carbon dioxide emissions for fossil fuels and cement manufacturing for the years 1755-1995 is Lash, Speth, Topfer, and Wolfensohn (1998). As in the case with transboundary movement of hazardous solid waste, developed countries produce the most industrial air pollution with developing countries receiving a share of the cost much out of proportion to the air emissions they produce (Lucas 1992; Gedicks 1993; Barry and Sims 1994; Redclift and Sage 1998).

Soon after the mid-1980's proliferation of the publication of newspaper articles and that decade's upsurge of radio and television broadcasts focusing on the topic of international transboundary waste movement and associated problems, representatives of many nations in assorted places in various conventions with the directive to draft international regulation of waste movement (Hilz and Radka 1990; Gourlay 1992;

Donald 1992; Biggs 1994; Puckett 1994). The next section summarizes the results of international conventions convened to establish rules to regulate or ban this trade.

4. Regulation of Transboundary Waste

One of the reasons for the transboundary shipment of hazardous waste to developing countries was the increased cost of disposing of the waste in developed countries. Puckett (1994) compares the U. S. disposal cost of \$15 per ton in 1980 to the cost of \$250 per ton in 1989. The Third World Network (1989) estimated that the cost would eventually reach \$1,000 per ton in the U.S. This cost increase is reflected in the jump in export notifications received by the U.S. Environmental Protection Agency (EPA). The number of these notifications went from 12 in 1980 to 638 in 1988 (Biggs 1994). Since each application represents multiple shipments, the EPA estimates 4,000-5,000 shipments abroad in 1988. The EPA also estimated that they received notice of only 1/8 of the shipments.

As a result of the increasing export of hazardous waste, the Council of the Organization for Economic Cooperation and Development (OECD) and the European Economic Community (EEC) adopted the first rules for regulation of international trade in hazardous waste in 1984. These rules anticipated the first international convention on hazardous waste, the 1989 Basel Convention (Kummer 1992). Lome IV, Bamako, and other conventions soon followed (Puckett 1994; Hongkyum 1998).

The most extensive of these conventions, both in scope of regulation and in number of countries ratifying the rules of the conventions, was the 1989 Basel Convention (Hilz and Radka 1990; Biggs 1994). A central objective of the Basel Convention was to track the amount of hazardous and other waste moving transboundary

among countries with a focus on reducing flows from waste generating industrialized countries to less developed countries. Also, when the movement of transboundary waste occurred, the convention specified the terms under which it would be allowed and, thus, be recognized as legal. Besides achieving a consensus on what waste should be regulated, a major Basel Convention provision required that the treaty's signatories report any and all exported and imported waste that falls under the convention's definition of waste to be regulated. The specific provisions of this convention are outlined as follows.

One hundred-sixteen countries and the EEC ratified the terms of the 1989 Basel Convention. The terms of the convention provided the following six provisions: 1) The generation and transboundary movement of hazardous waste shall be reduced to a minimum; 2) Every state has the right to ban the import of hazardous waste; 3) A party to the agreement shall not export to a non-party unless a formal bilateral agreement is made with the non-party; 4) No exports shall be made without the written consent of the import country and any other country crossed in transit; and 5) No exports shall be made unless transportation is carried out in an environmentally safe manner. The final provision is: 6) any transboundary waste movement that does not conform to the provisions of this agreement shall be deemed illegal (Hilz and Radka 1990; Biggs 1994).

The 1989 Lome IV convention led to another agreement on trade in hazardous waste and was signed by the EEC, several African countries, the Pacific countries, and 15 Caribbean countries (Biggs 1994). The convention's provisions include: 1) The signatory countries agree to abide by the uniform rules for the movement of hazardous and radioactive waste, 2) All signatories shall prohibit the direct or indirect export of such waste to African, Caribbean, and Pacific States, and 3) The member states shall prohibit

the movement of these wastes into their territories (Puckett 1994; Hongkyum 1998).

The agreement reached in the convention of Bamako, Mali was adopted by all member states of the Organization of African States (OAS). It prohibits the importation of radioactive and hazardous waste to Africa (Gourlay 1992; Donald 1992; Biggs 1994). In order to regulate the transboundary movement of this waste, other bilateral agreements, regional treaties, and national legislation soon followed (Puckett 1994; Biggs 1994; U. S. Environmental Protection Agency 1998; Tsai 1999). Two of the reactions by transnational corporations (TNCs) to these increased regulations were relocation and/or export to developing countries for “recycling”.

5. Relocation of Waste Producing Industry

The relocation of transnational corporations’ (TNCs’) industry from developed countries to developing countries avoids both increasing environmental regulations and export restrictions and is a much-discussed issue (Gedicks 1993; Broad and Cavanagh 1994; Davies and Rattso 1996; Hurrell and Woods 1999). The problems associated with relocation are similar to those of transboundary waste. For example, the lack of technology and expertise in developing countries may not allow for the proper handling of hazardous waste output from the factories relocated to these countries (Castleman and Navarro 1987; Covello and Frey 1990; Foster 1994; Frey 1995a). Furthermore on a global level, the technology to produce waste probably outstrips the current technology to process it properly, even under the best of conditions (O’Connor 1989). When added to the inequality in terms of technology and regulation inherent in different countries, the results are potentially catastrophic.

One prime example of relocation and its consequences is the Maquiladores, or

free trade zones in Mexico (Johnson and Button 1994; Hurrell and Wood 1999). Under the provisions of a U.S.-Mexican agreement, TNC could build factories in Mexican-U.S. border zones and export their products to the U.S. duty free. Under other terms of the agreement, the TNC factories were supposed to send their waste to the U.S. for disposal (Rose 1989; Hurrell and Woods 1999). According to Johnson and Button (1994), although 86% of the hundreds of factories in the zone produced hazardous waste, only ten shipments of this waste were made in 1989. Hurrell and Woods record that by 1999, only 20 companies out of 1000 did so. Rose (1989) also documents cases of American shipments from the U.S. to the zones for illegal dumping, due to the high price of disposal in the U. S., which ranged from \$275 to \$425 per drum.

The consequences of the sequential environmental disaster of the area in and around the Maquiladores have meant health problems for people on both sides of the border because many Mexican rivers and streams run north into the U.S. (Barry and Sims 1994). Two examples of the consequences are that the rates for hepatitis for residents along these rivers and streams in Arizona are 20 times the U. S. average and the incidence of babies being born with immature, malformed brains in towns like Matamoros is 30 times the Mexican average.

As noted earlier with the transboundary movement of hazardous and other waste, another problem associated with the relocation of hazardous waste producing industry in developing countries is the lack of technological infrastructure to handle the waste (Covello and Frey 1990; Buttel 1997). This problem is compounded by inadequate sanitation systems that are already overtaxed due to bulging populations in the developing world's mega-cities (Alario 1992; Mueller 1995). O'Connor (1989)

additionally points out that industrial waste amounts and concentrations, as produced by modern industrialized processes and shipped from developed to developing countries, cannot be recycled by the traditionally used natural environmental systems in these locations at a rate that avoids the waste becoming toxic. The preceding three factors, added to the environmental degradation that often occurs during modernization in developing countries (Durie 1985 Chowdhry 1989; Bunker 1995; Stonich 1992; Kick, Burns, Davis Murray and Murray 1996; MacEwain 1996; Burns, Kentor, Jorgenson 2002), are a recipe for environmental disaster. Some of the worst industrial accidents (in the number of lives lost) occurred in developing countries (Mitchell and Cutter 1997). For the same three reasons enumerated above, relocation of industry to avoid hazardous waste regulation will also likely increase these incidents (Castleman and Navarro 1987; Covello and Frey 1990).

6. Theoretical Concerns for Transboundary Waste

Although it is not always apparent which, if any, theoretical perspective is guiding the writer or researcher on transboundary waste, upon reviewing the literature I was able to identify five theoretical perspectives: 1) the economic modernization theoretical perspective, 2) the demographic theoretical perspective, 3) the risk/benefit theoretical perspective, 4) O'Neill's theory of environmental regulation, and the 5) world-systems theoretical explanation of transboundary waste. The earliest of these theoretical perspectives that was used to explain transboundary waste is the economic modernization theoretical perspective.

Under the economic modernization theoretical perspective, the explanation for transboundary waste movement (or “waste trade” as this perspective prefers to label it) is

similar to explanations for ordinary trade (Rajendra and Green 1986). Some countries historically began industrialization at an earlier date, so are more advanced developmentally than those that began industrialization at a later date. According to the tenets of this perspective, waste trade can be totally understood by factors such as modernization, cultural norms, historical incidents, political and economic agreements, and other factors such as distance and economic size (Ley, Macauley and Salant 2000; Beukering and Janssen 2001; Marcotullio 2003). This perspective views any problems associated with transboundary waste that occur prior to all countries' achievement of full development as being temporary in nature. It looks for solutions to these “temporary problems” in domestic statutory regulation and international treaty regimes (Strohm 1991; Helm and Sprinz 2000; Fujita 2004). Transboundary movement of waste that is contrary to statutory regulation and international treaty agreement is viewed as a law enforcement problem (Krueger 1999a; Jurdi 2002; Spivey 2004).

A second theoretical perspective, the demographic theoretical perspective, is similar to the economic modernization perspective and is also used to explain transboundary waste movement in a similar fashion (Adedibu 1988; Leao, Bishop and Evans 2001). Under this theoretical perspective, transboundary waste and associated problems are thought to result from demographic factors, such as household size and composition, rapid development, population growth, population density, urbanization, land use, and the size of the economy (Johnstone and Labonne 2004; Payet and Obura 2004).

Another theoretical perspective that is used to explain transboundary waste is what I label the "risk/benefit perspective" (Buell 1998). Under this perspective, the

nation state is thought to be the primary agent for deciding whether to export or import waste with the amounts determined by factors such as the size of the economy and a risk versus benefit assessment of the exportation or importation of waste (Copeland 1989; Montgomery 1992; Paleologos and Lerche 2000).

A fourth theoretical perspective for transboundary waste is O'Neill's theory of environmental regulation, which explains the "waste trade" between rich countries. In this theory, it is a rich country's internal regulatory system that strictly determines the amount of waste that country imports (O'Neill 1997). Almost exclusively used to explain the movement of waste between industrialized or developed countries, this perspective explains the larger amounts of waste imported by countries such as Great Britain by their less restrictive legislative and administrative system. It portrays the smaller amounts of waste imported by countries such as France as being due to their legislative restrictive system, and it depicts the smaller amounts of waste imported by countries such as Japan as being due to their historical/cultural restrictive system (O'Neill 2000a; O'Neill 2000b).

As interesting as O'Neill's theory is, and as practical and productive as it may prove to be for future research on the transboundary movement of waste research, the theory as currently formulated addresses movement between industrialized or "rich countries". Therefore, this theoretical perspective would not be appropriate to investigate the movement of hazardous and other waste between industrialized and developing countries.

A fifth theory of explanation for the transboundary waste is the world-system perspective (Wallerstein 1974; Chirot and Hall 1982; 1986; Chirot 1994; Chase-Dunn 1995, 1999). This theoretical perspective is the one most commonly used to direct global

environmental research and as such has proved to be very productive (Kick et al. 1998; Burns, Kick and Davis 2003; Chase-Dunn and Jorgenson 2003a). This theoretical perspective is also useful in explaining transboundary waste (Burns, Davis and Kick 1997; Lofdahl 2002; Baud 2004) in that it is the only one of the five theoretical perspectives that explains economic level movement of hazardous and other waste and predicts that the more hazardous waste tends to move from higher developed to lower developed countries.

Under the world-system perspective, historically rooted geopolitical power/dependency connections and power/dependency relationships between industrialized countries and developing countries, some of which may have been their former colonies, explain the amount of waste exported and imported by various countries. The world-system, in its present day conception, is made up of a four-level hierarchy of decreasing development and dominancy/dependency countries, often labeled as core, semi-core, semi-periphery, and periphery, respectively (Kick 1987; Burns, Davis and Kick 1997).

The world-system theoretical perspective is the proper one to use in directing the type of research that is the focus of this paper because it directly addresses the problems associated with economic level movement of hazardous and other waste. The other four theoretical perspectives look at the problems associated with waste movement from higher developed to lower developed countries as being temporary, incidental, and as a matter properly addressed by international enforcement (modernization and demographic theoretical perspectives) a matter of risk assessment and level of risk preference with every country an equal agent in making this assessment and choice (risk/benefit

theoretical perspective) or a matter of a degree of internal regulation (O'Neill's rich nation theoretical perspective). In other words, the other four theoretical perspectives view the problems associated waste from with developed countries moving to developing countries as either non-existent, of minor importance, temporary in nature, and/or easily addressed by international regulation.

One of the three objectives of this research is determine quantitatively if under current extensive international regulation, such as the Basel Convention régime, the more hazardous waste tends to move to lower developed countries more than to higher developed countries. Therefore, the world-system theoretical perspective is the appropriate one to direct this research. Since the world-system theoretical perspective is the one that will direct this research, the tenets of this perspective are described and expounded in greater detail below.

7. The World-system Theoretical Perspective

Wallerstein's (1974, 1979, 1980, 1989) world-system theory posits that the world-system is a social system that has boundaries, structures, and member groups that interact in ongoing interstate competition and is characterized by an internalized or self-contained division of labor. Additionally, this theory posits that all the roles and functions necessary for maintaining this world-system are contained within this division of labor, having a degree of internal coherence necessary for forming a complete unit or a whole. Wallerstein argues that this world-system is the fundamental unit of analysis in which all other social processes should be analyzed, and that there are three fundamental types of world-systems: world-economies, world-empires, and mini-systems (Skocpol 1977).

According to Wallerstein, the world-system is composed of many different

states.¹ These states trade and war with each other in a process called the world-economy. If one state in a world-economy conquers or dominates the others, the new system that emerges is called a world-empire. Upon occasion, world-empires break apart or disintegrate. A group of interacting non-state groups comprise a mini-system. World-system theory was primarily formulated in order to explain the geneses and interrelation linkages of what is often called the first, second, and third worlds. Each of these three fundamental types of world-systems is thought to have played a part in the rise to supremacy of capitalism, industrialization, and the economical and political world of today.

In Wallerstein's opinion the modern world-system originated in Western Europe between the mid-Fifteenth and mid-Seventeenth centuries C. E. In this opening world-system period, capitalists needed markets, labor, and raw materials. The cyclically and ever expanding trade networks that these early capitalists created to fill their needs led to colonization in many areas of the world, with the colonial state's effort to maintain access to markets and control of the sources of labor and raw materials. The world-system obtained a fully global scope in the late Twentieth century.

Wallerstein uses "division of labor" to denote the forces of production of the world economy as an entirety or as a whole. The five dimensions of the division of labor are: core and periphery, semi-periphery, commodity chains, unequal exchange, and capital accumulation.

A central concept of the theory is the relationship between the core and the periphery. The core and the periphery are geographically and culturally distinct, with the core being capital-intensive and the periphery being labor-intensive. Neither can function

without the other. Underdevelopment is not seen as the result of having a late start, but as the result of the continuation and deepening of a historical relationship.

The semi-periphery is an original Wallerstein concept of a type of state that has both political and economic aspects. On the economic side, semi-periphery states are thought to be intermediate between core and periphery in terms of capital intensity, labor skills, and production processes, having dual trading with both by sending partially processed raw materials to the core and simple manufactured products to the periphery. On the political side, they are thought to serve as a buffer by repelling and absorbing some of the antagonism of the periphery against the core, thus stabilizing the world-system.

Countries are thought to occupy advantageous and disadvantageous positions that are globally similar to individuals' social strata positions within the countries. In this way core, semi-periphery, and periphery correspond to upper, middle, and lower classes within industrialized countries such as the United States. Core countries are heavily industrialized countries such as the United States, Canada, Japan, Australia, and the countries of Western Europe. Core countries import raw materials and export their manufactured products to countries in less industrialized areas of the world. Semi-periphery countries are partially industrialized countries like Mexico and Brazil. Semi-periphery countries have a dual trade of partially finished materials like raw lumber and petroleum products with the core and radios and textiles with the periphery. The periphery has little industrialization and depends predominately on income from exporting raw materials, usually and principally one type of crop or raw material, for example the case of aluminum bauxite for Jamaica, coffee for Ecuador, and the case of

bananas for Central American countries.

Another aspect of Wallerstein's division of labor is the idea of commodity chains. Commodity chains describe the production of goods as they move from raw materials in the periphery, and perhaps partially processed materials in the semi-periphery, to manufactured goods in the core. The capitalist world-economy is viewed as expanding over the years, encompassing areas once considered external. New production processes have developed and the areas in which some of this production takes place have shifted in the core and the periphery. Some simple manufacturing has now shifted to the periphery. The end product is considered not to matter, but the degree of skill and labor intensity that the production process requires is considered to be the determining key.

Unequal exchange is another aspect of Wallerstein's division of labor. Unequal exchange is conceived to be the processes or mechanisms by which the core/periphery relationship is reproduced. One of these is pricing in which raw materials are valued much less than the finished product, resulting in the systematic transfer of surplus from the periphery to the core. This increases the standard of living in the core, allowing higher wages, boosting resources for a better education, and increasing the pressure for technological advances. The end result is increased differentiation between the core and the periphery.

The final aspect of Wallerstein's division of labor is the process of capital accumulation that is similar to Marx's, except the process is on a worldwide basis and is involved with the transfer of surplus from the periphery to the core. Both wage labor and non-wage labor are thought to be essential to capitalism.

Wallerstein also views the world-system as having political attributes, embodied

in the structure of the international state system. One facet of the capitalist world-economy, the competitive system of states, allows capital to avoid political restrictions that might otherwise be imposed by other social forces. Three aspects of the state system are viewed as crucial: imperialism, hegemony, and class struggle.

Imperialism, in the context that Wallerstein uses it, refers to the domination of the weak periphery world regions and periphery states by the strong core states. Strong core states use various methods to accomplish this domination. Ruling classes in the core use states to distort markets in their favor, either by the use of force or by diplomacy, thus maintaining unequal exchange. The position of semi-periphery states is thought to lie between the core and periphery states in levels of power and degree of development.

Hegemony is a temporary condition where one core state out-does the rest. This is accomplished by the state's supremacy in production, commerce, and finance. Through these three factors, the hegemonic state is able to support the most powerful military. This condition is thought to have occurred three times: the first with the Dutch in the seventeenth century, by the British until World War II, and most recently by the United States in the Twentieth century.

The third and final aspect of the state system that is essential to the function of the world-system is the importance of the class struggle. The role of class struggle, both within and across state boundaries, is considered important to understanding the world-system (Bergesen and Bata 2002). Classes are thought to have alliances across state boundaries in order to protect surpluses remitted from the periphery, although they are also in competition for portions of these surpluses. States are thought of as mediators within the world-economy class struggle. Capital flight is one way of avoiding the

consequences of class struggle, such as the social forces generated against inequality within states.

In addition, the modern world-system political economy is characterized by regular long cyclic rhythms of expansion and stagnation and/or contraction. Wallerstein (1989) was not concerned with short-term business cycles, but was interested in the rhythmic long waves, such as those of 40 to 50 years known as Kondratieff cycles, and was especially interested in the even longer waves of approximately 300 years. These long cycles are thought to occur due to the separation of economics from the politics and the anarchy of the market. Periods of expansion come to an end when production outstrips the world's economic consumption ability and demand. Cyclic waves affect the zones of the world economy differentially. In periods of stagnation/contraction, the periphery and semi-periphery are hit harder than the core. The crises associated with these downturns produce secular trends initiated from changes made in order to permit a renewed capitalist expansion.

The above secular trends are conceived as self-reproducing and self-transforming aspects of the entire world-system, moving the system forward towards the limits of sustainability of the capitalist economic system. These secular trends are: expansion, commodification, mechanization, and bureaucratization. Through these four secular trends, the world-system transforms member nations and internal societies, converting and externalizing them from their origins in familial, tribal or feudal-based society to a comprehensive single capitalistic economic system, increasingly activated more by profit than from traditional motives.

Geographical expansion, the first of the four secular trends, is thought to be

essential to the transition from feudalism by making labor and commodities available from the Americas to Africa and parts of Eastern Europe, an expansion that has absorbed areas formerly controlled by mini-systems and world empires. It is also recognized as the most apparent of the secular trends of modern capitalism. Today the capitalist world-economy covers the entire globe.

The second secular trend, the conversion of everything from use value to exchange value is known as commodification. The commodification of land and labor through the sub-processes of land commercialization and the proletarianization of labor are thought to be the most critical factors. Land commercialization is almost complete, with only a few areas of the world remaining in the hands of tribal community groups. Proletarianization has much further to go in order to reach its limits with a degree of unpaid labor (like housework) in the core. In the periphery, low wages depend on the fact that the cost of reproducing the workforce depends on subsistence producers.

The third secular trend is mechanization of production, increasing industrialization in which production becomes more capital centered and less labor intensive. The core maintains its technological advantage through this trend.

The fourth and final secular trend is bureaucratization. Bureaucratization is thought to stabilize the system by increasing the ruling group's capacity to repress opposition, but to weaken their ability to control the bureaucrats. This secular trend is instrumental in strengthening organizational structures in the areas of both individuals and groups.

The world-system perspective has much to offer in understanding social stratification, both in the core and in the periphery. In the core, globalization increases

inequality by undermining labor organization with capital (factories) flight to the semi-periphery and to the periphery. Control of capital is retained in the core where its accumulation increases the standard of living, and generally increases the size of business organizations by enhancing their power to distort political processes in their favor. Labor organizations in the semi-periphery and periphery are kept incapable of being effective because of the continued threat of capital flight to other geographical areas, thus maintaining a wage structure, particularly in the periphery, that keeps individuals dependent on subsistence production in order to obtain the necessities for living. These processes maintain inequality in all three: the core, the semi-periphery, and the periphery.

Core countries are able to dominate periphery countries and many semi-periphery countries through inequitable trade, and also to dominate them politically, and sometimes militarily, because of their extreme wealth when compared to non-core countries. The core's trade with the non-core is inequitable because the core naturally places a value on manufactured goods that is much greater proportionately than for the value of raw materials. They dominate non-core countries politically through methods like holding key positions in the World Trade Organization, which sets the trade rules and settles trade disputes between countries.

Industrialized countries also tend to hold key positions in world financial organizations, such as the World Bank, allowing them to dictate internal changes in non-core countries, before they may receive financial aid or loan renewals. Core countries dominated non-core countries in the years before World War II by military conquest, forcing many non-developed areas of the world to become colonies in order to supply raw materials for core factories and to serve as markets for core manufactured goods.

Since World War II and the gaining of independence by these former colonies, industrialized countries have supported coups in situations where a developing country's leaders were not favorable to the core's unfair trading policies.

A fundamental component of world-system theory concerns the function that elites play in the core's domination of non-core countries. Elites hold political and bureaucratic positions within semi-periphery and periphery countries, and usually support the unfair trade exchange between developed and developing countries, and may become extremely wealthy by local, or even by developed countries' standards, by doing so. Combining this facet of the theory with the political and military core dominance discussed previously, one arrives at an explanation for the frequent changes of government in some developing countries. If the populations of developing countries force the elites out of positions in government and authority, either by election or revolution, this necessitates the core countries to support a follow-up change of government that reinstates elites favorable to them.

The world-system perspective helps to explain social differentiation in several ways. It shows that one must consider an individual's position within his country's social strata as well as his country's position within the world-system. People in an industrialized country, such as Sweden, have a much greater chance to move from the working class to a higher position through education and other avenues. A peon in the mines of Chile, or a banana plantation worker in El Salvador, have virtually no chance of moving from the social position in which they were born. On the other hand, if you were born to an elite family in one of the latter countries, you have a good chance of maintaining that position and status. In summary, there is a great deal of unequal

distribution of wealth within countries and also a great deal of difference in wealth between countries. Both of these factors have an effect on the amount of wealth and prestige held by an individual and the power he may exercise within his social system.

Modernization is a functionalism theory for development and industrialization. One component of this theory is that developing countries have the opportunity to learn technology by contact with developed countries and, by using core country examples, may someday accomplish industrialization. World-systems theory maintains that this will not happen because of the exploitive relationship between core and non-core countries and because developing countries today have nowhere to colonize in order to expedite their industrialization as core countries once did. How all of the above relates to transboundary waste research is explained as follows.

Wallerstein's (1989) original world-systems theory proposed a three-level hierarchy of political/economic and power/dependency positions in the world-system of core, semi-periphery and periphery level countries. However, the results of research conducted in recent decades indicates that a four-level hierarchy power/dependency model of core, semi-core, semi-periphery, and periphery countries might be more appropriate when examining environmental problems associated with modernization (Kick 1987; Burns, Davis and Kick 1997). For example, Burns, Kick, and Davis' (2006) exploration of the recursive exploitive nature of the core over the semi-core, the semi-core over the semi-periphery, and in turn, of the semi-periphery over the periphery in explaining global deforestation. Additionally, as previously noted in my "Review of the Literature", the European Economic Community (EEC) early on recognized that all EEC countries were not equally advanced technologically, economically, and developmentally

in their ability to handle hazardous waste (Wynne 1989; Thornton 1991). Consequently, they adopted legislation and administrative rules regulating transboundary movement of waste between member nations (Handley 1989; Allen 1995; Asante-Duah and Nagy 1998).

Thus, given the usefulness of the above outlined four-level power/dependency level relationship of countries in researching and understanding environmental problems associated with modernization, and considering the European Economic Community's (EEC) recognition that even among their core member nations some had a technological, economical, and developmental level advantage over others in the transboundary movement of hazardous and other waste, a four-level developmental level model of nations, or a consideration of even finer graded developmental levels, will prove beneficial in directing research on international transboundary waste movement. I posit that the characteristics of core, semi-core, semi-periphery, and periphery countries, or even finer developmental grade levels, are determinants of transboundary waste as it moves globally, and as such, they should be seriously considered as potential variables when researching transboundary waste.

In the Chapter IV, Section 5, I will describe the construction of a dependent variable development level scale by using finer gradients of 5,000 GDP to distinguish development levels rather than the traditional world-system's levels of core, semi-core, semi-periphery, and periphery. This development level movement scale will explore a modified world-system theoretical perspective explanation for development level movement of waste.

Additionally, and according to the world-systems theory, countries on the semi-

core and semi-periphery of the world-system and occupying positions adjacent to and midway between industrialized and developing countries, have mixed economies and mid-level wealth, but are still relatively disadvantaged and dependent on fully industrialized countries. Typically, these countries are rapidly developing, experiencing problems along with this rapid development, and also occupy positions at midlevel between and adjacent to core and periphery level countries. I would posit that these semi-core and semi-periphery countries are also midlevel in their characteristics as indicators of transboundary waste related variables.

As specified in Chapter I, Section 3 “Transboundary Waste Research Objectives”, the third objective of this research is to determine if the more hazardous waste tends to move from higher developed countries to lower developed ones. The next section reviews the literature relating to waste hazard and discusses possible indicators of waste hazard.

8. Waste Hazard Variables

The level of waste hazard, as it relates to waste production, waste transportation and waste disposal, has long been a concern of public policy makers and researchers. By the mid-1980's, a large body of established research related literature existed on "environmental injustice" or the tendency of hazardous waste production and waste disposal facilities to be located near the poor portions of the U.S. population, often with detrimental results (Szasz and Meuser 1997). In the last three decades, much has also been written concerning the potential for the more hazardous waste to be exported to less industrially developed, thus economically poorer, countries (Asante-Duah and Nagy 1998). Several multinational environmental conventions were convened, resulting in

treaties being proposed and ratified in response to this internationally viewed problem (Kummer 1992; Puckett 1994; Hongkyum 1998; Krueger 1999b).

Additionally, emphasizing the importance of hazard as a variable in transboundary waste research, other writers and researchers have specifically addressed this topic. Montgomery (1992) speculates that importing countries accept or reject shipments of waste by weighing risks versus benefits. Buell (1998) notes that risk assessments of waste have a subjective as well as an objective component: immediate death/injury versus death/disease at a decades later date or perhaps death/injury by an explosion versus death/injury by an infectious agent. Often times, these may be the choices when dealing with a variety of types of waste. Different individuals, groups, countries, and cultures view these choices with disparate levels of abhorrence/preference. Therefore, they assess the risk for various types of waste differently. Paleologos and Lerche (2000) view waste risk assessment as “spillage in route” or “spillage at disposal site” more than by any innate characteristic of the waste, similar to the risk assessment policy of the U.S. Environmental Protection Agency. A particular amount and type of waste, for example, a drum of the highest radioactive waste, may have the potential to kill many people in an instant if it is not properly shielded, but if properly shielded, packaged, transported, and properly disposed, radioactive waste is, in this view, considered a waste completely without risk. Other researchers, such as Chang and Lu (1997) and Ugglä (2004), maintain that valid long-term risk assessment of some types of waste and their disposal is extremely difficult, if not impossible.

The world-systems theoretical perspective would also posit that the semi-periphery and periphery countries would receive the more hazardous waste in a

transboundary waste exchange, as a part of the theory that characterizes these countries as at a disadvantage in exchanges of labor, materials, and goods. A country's economic level would be a major indicator of their world-systems position and according to this perspective, countries with lower economic levels would be the ones receiving the more hazardous waste or types of waste that are considered more hazardous.

A major hurdle that was overcome during the negotiation of the articles of the 1989 Basel Convention Treaty was concerning differences of opinions by countries regarding waste reported as exported for recycling. Some parties regarded recycling as an effort by polluters to circumvent environmental treaties (Alter 2000; Clapp 2001). Others argued that whether it was locally regenerated waste or imported waste under consideration, recycling was important for sustainable development in developing countries (Baud 2004; Post and Baud 2004). Beukering, and Janssen (2001) maintained that it was the manufacture and sale of such things as automobile tires that had a greater negative environmental impact than the trade or disposal of the used items. Lastly, some writers and researchers noted that both locally generated and imported waste made poor sources of energy for developing countries and that much of this waste recycling required a lot of energy (Marteel et al. 2003; Fobil et al. 2005). In any case, it is apparent that a study on transboundary waste should consider recycling/disposal as a variable. The next section reviews the independent variables related to transboundary waste research.

9. Independent Variables

The world-system perspective looks for historically rooted power/dominance relationships as reflected in characteristics of developed and developing countries as explanations for the phenomenon. This perspective would not deny that other theoretical

perspectives identified independent variables are not also important, but would place additional or stronger emphasis on these same historically rooted power/dominance identified country characteristic independent variables. Therefore, transboundary waste movement research directed by the world-system perspective would of necessity use or control for many, if not most, of the same independent variables as transboundary waste movement research directed by any of the other four potential theoretical perspectives identified in Section 6 of this chapter.

However, the world-system theoretical perspective considers these independent variables as being important for the research for different reasons than the other theoretical perspectives or of having greater or lesser importance to economic development level movement than the other theoretical perspectives. In regard to transboundary waste movement, the major difference in the world-system perspective and the other theoretical perspectives is that the former recognizes and predicts a problem with economic level movement of transboundary waste, while the latter scarcely recognizes any problems or views the problems that may exist with this type of movement as being of a temporary or minor nature.

As noted in Chapter I, "Introduction", little, if any qualitative comparative research that is international in scope has been done on the transboundary movement of waste. As a consequence, there are scarce quantitative research results to guide one in determining which independent variables are important to include or exclude in transboundary waste movement research. Lieberman (1992) notes that at times an a-theoretical approach to research may be justified, where the researcher explores alternatives unguided by, or irrespective of theoretical perspectives. Therefore, as noted

in Chapter I, Section 3, one of the three objectives of this research is to examine as many of the potential independent variables related to transboundary waste movement as prudently possible, as indicated by the results of the large body of qualitative research. This section reviews the literature on this research in order to identify these same potential independent variables.

In regard to developing dependency periphery countries, as compared to core or industrialized dominant countries, the tenets of the world-system theoretical perspective point out eleven areas of country characteristics that have a potential relevancy during research on transboundary waste. These variables are: 1) Having a low gross national wealth and a low per capita wealth, 2) Having a highly unequal internal distribution of wealth, 3) Having a concentration of exports in a relatively few raw materials, 4) Having a majority of their trade with one or two industrialized countries, 5) Having a high external debt, 6) Having a low level of urbanization, 7) Having low energy consumption, 8) Having a lower total global ecological impact, 9) Having lower valued raw materials as primary export commodities, 10) Having a lower portion of their economy involved in industry, and 11) Having health issues, perhaps with some of these environmentally related. These variables, and any other variables also indicated by this review of the literature that are relevant to transboundary waste research, will be discussed in this section beginning with economic development level.

A multitude of qualitative studies has observed the relation between economic level development and transboundary movement of solid and liquid waste. Also a number of quantitative studies have examined the relationship between economic level and the international placement of hazardous waste producing factors and the movement

of air pollution.

Countries with higher economic levels produce much more carbon dioxide air pollution than countries with lower economic levels, with the latter disproportionately reaping the consequences (Heil and Wodon 1999; Lofdahl 2002). One option some transnational corporations in higher economic level countries take to avoid stricter air pollution and waste disposal regulations at home is to relocate to lower economic level countries (Geisler 1977; Frey 1998b; Hurrell and Woods 1999).

One of the determinants of the amount of waste generation waste discovered by Nick and Labonne (2004) was economic level. Adedibu (1988) discovered that socio-economic factors are related to the type and amount of waste generated. Additionally, researchers have noticed that countries of high economic level generate more waste than countries of lower economic level (Rose 1989; Foster 1994; Frey 1995b, 1998a) and that the amount of waste generated, in turn, determines the amount of waste exported (Krueger 1999a). Scant data are available on waste generation. However, either energy consumption and oil/fuel imports might be indicators of the amount of waste generation.

A number of researchers have noted that transboundary countries of origin tend to be larger in economic size than transboundary countries of waste destination. Several of these noted that the direction of waste flow between countries tended to be from higher to lower economically developed countries (Clapp 1994; Foster 1994; Frey 1998a). Hofrichter (1993) depicts companies in highly developed countries as "targeting" lower developed countries for waste disposal. Frey (1995b) posits that power relationships between countries determine waste movement from higher to lower economically developed countries. Montgomery (1992) reveals that the size of an economy, as

measured in Gross National Product (GNP), is related to the amount of waste generated. The greater the GNP, the greater the amount of waste generated and, therefore, the greater amount exported. Other research results indicate that it is income inequality existing within the mostly lower economic developed countries that makes them vulnerable to exploitation and environmental degradation (Payet and Obura 2004; Jorgenson, Rice and Crowe 2005).

As a world-system position characteristic, export concentration has also proved useful in predicting such things as export and income instability (Love 1986; Abebayehu 1991) and low economic growth (Rubinson 1981). Both factors are also related to a country's susceptibility to exploitation. Other research has shown that in Third World countries, export concentration is a cause of environmental degradation. The latter is associated with health problems (Burns et al. 2002; Jorgenson and Burns 2004).

A country's employment/unemployment is another variable that is posited to be related to waste movement. Post and Baud (2004) maintain that solid waste management decisions for developing countries are related to labor supply. Reduction of unemployment is often viewed as a benefit for locating waste disposal facilities in underdeveloped areas (Baud et al. 2001; Hunter and Sutton 2004). Bullard and Johnson (2000) take a different approach in regard to employment, noting that increased environmental regulation leads to increased employment.

Militarization is also a variable that is potentially related to transboundary waste movement. Kick et al. (1998) posit that excessive expenditures on military imports may deplete funds that may be better spent for infrastructure improvements. Kentor (2000) notes the negative impact that military expenditures have had historically on economic

growth. Research reviewed in this paper previously shows the importance of modern technology and modern infrastructure to waste transportation and disposal safety (Nunan and Satterthwite 2001).

Several studies note a relationship between land use in developing countries and environmental problems, including problems of waste handling and waste disposal (Adedibu 1988; Leao, Bishop and Evans 2001). Marcotulli (2003) finds that accelerating urbanization rates, along with increased development, create environmentally related problems in Asian-Pacific cities. Ley, Macauley and Salant (2000) propose that land use is associated with the exporting and importing of waste.

Population is an indication of the size of a country, and as noted earlier (Montgomery 1992), the size of a country as measured by its GNP is indicative of the amount of waste generated, thus, the potential amount exported. However, urban population size and urban population change have each been found to have environmental impacts (Lofdahl 2002; Burns, Kick and Davis 2003; Marcotullio 2003; Jorgenson 2005). Additionally, demographics and population density (Johnstone and Labonne 2004) are determinants of waste generation, while population increase and urban sprawl (Leao, Bishop and Evans 2001) are both related to problems with solid waste disposal in developing countries.

Health issues, as addressed by research on pollution and environmental problems, are most often perceived as dependent variables, or as the consequences of pollution-caused environmental problems (Adeola 1998; Baud et al. 2001). Regardless of whether the waste was produced locally or was imported, several developing country studies explore linkages between the production, transportation, and disposal of waste and

degraded environment-induced health problems (Baud et al. 2001; Suk et al. 2003; Misra and Pandey 2004). However, using a single year's data in a "snapshot type study" on transboundary waste, it would be possible and permissible to use health issues as an indicator of a country's developmental level.

Another interesting concept that must be considered as a potential variable in researching transboundary waste is the concept of Ecological Footprint (Rees 1992; Venetoulis, Chazan and Gaudet 2004). Ehrlich and Ehrlich (1990) in their book *The Population Explosion*, propose the idea (afterward labeled "The Netherlands Fallacy") that many highly developed countries maintain an illusion of ecological sustainability and maintain their healthy resource-consuming lifestyles by using production both from local acreage and production from acreage located elsewhere globally. Wackernagel and Rees (1996) develop this idea further by calculating the acreage a country, a city, or a person uses locally and exploits elsewhere globally in maintaining their particular level of living. A country, city, or person's "Ecological Footprint" is defined as the amount of acreage used in the production of consumed resources and waste absorbing acreage, either of which could be local, global or both in actual location. An Ecological Footprint has the potential in transboundary waste research to be an indicator of a country's waste generation, something for which there is scant direct data (Jorgenson 2003).

Countries' external debt is another factor with a potential for explaining the movement of transboundary waste (Miller 1991). Lundy (1999) hypothesizes that countries with excessive external debt are susceptible to exploitation, with detrimental consequences to the environment. In a second example of research on this topic, Gullison and Losos (1993) investigate the role of countries' foreign debt in their

environmental problems. Therefore, it is reasonable to conclude that external debt's role in transboundary waste movement should be examined in a transboundary waste study.

Export partner dependency is another variable that needs to be examined when researching transboundary waste movement, as Jorgenson (2004) does in his cross-national study on deforestation in less-developed countries. Kick and Davis (2001) also examine world-system country position variables, including trading partners, finding that “ties of friendship” are significantly important for understanding a multiplicity of sociological phenomena. Furthermore, Chase-Dunn and Jorgenson (2003a, 2003b) found that interaction trade networks are more productive than cultural and regional approaches in understanding human social systems.

Having environmental issues is a country characteristic that likely should be investigated in research on the movement of transboundary waste. In expounding her theory of waste trade regulation, O'Neill posits that one reason that Japan restricts its waste imports is because of its citizens' historical experience with toxic waste disasters. One might logically assume that countries that are already experiencing environmental problems would be reluctant to allow waste imports and would be more eager to export their own waste. Properly designed and conducted research will determine if either is true.

Membership in environmental regulatory agreements or treaties is another country characteristic that may affect transboundary shipping (exporting) or receiving (importing) shipments of waste (Strohm 1991). Bernauer (1995) reports that international environmental institutions vary enormously in terms of performance, but that it is difficult to determine their effectiveness due to the problem of separating exogenous

research variables. Krueger (1999a, 1999b) examines the effectiveness of the Basel Convention and concludes that it has succeeded in eliminating some of the worst forms of illegal dumping of transboundary waste. However, he additionally concludes that in terms of diminishing or limiting the illegal waste trade, much more needs to be done. After examining multiple environmental regimes, Chayes and Chayes (1995) report the existence of a poor relationship between treaty membership and treaty reporting compliance. As with environmental issues discussed in the previous paragraph, properly designed and conducted research will determine if there is a relationship between treaty membership and environmental behavior.

Four other variables describing waste shipment characteristics are also related to the movement of transboundary waste. These are proximity of origin/destination countries, number of countries that shipments cross in transit to destination, and waste type and waste hazard level, and whether the waste is recycled or disposed of in some manner. These variables were deemed so important by the negotiators and signatory parties to the Basel Convention that reporting requirements related to these items were included as a part of the convention articles (Krueger 1999a; Secretariat of the Basel Convention. 2006d). Waste type/hazard level and waste recycled/disposed were discussed in the pervious section of the chapter. .

Proximity, or the relative distance between origination and destination, is another shipment characteristic that might potentially affect transboundary waste (Secretariat of the Basel Convention. 2006d). In both classical and modern trade research, proximity has proved to be an important explanatory variable for the direction and composition of ordinary trade between countries (Srivastara and Green 1986; Poon 1997; Hillberry

2002). For the same reasons that regular trade is greatest between adjacent countries (lower cost and the existence of other types of ties), transboundary waste is assumed to be the same, therefore, proximity is a potential variable to be considered in studies of the movement of transboundary waste.

Another variable addressed as necessary in reporting transboundary waste in Basel Convention articles, is shipment with multiple country transits (Secretariat of the Basel Convention. 2006d). The idea behind waste shipment country transit reporting was that multinational crossing provided an opportunity and potential for unscrupulous operators to re-label waste, with the intent of circumventing convention restrictions (Hilz and Radka 1990; Chayes and Chayes 1995). The more hazardous waste might be relabeled as less hazardous waste during transportation procedures in transit.

This concludes the review of the literature on independent variables related to transboundary waste research.

10. Summary of the Review of the Literature

In summary, research conducted on the transboundary movement of hazardous and other wastes, during the last three decades has been quite voluminous. However, due to the lack of a comprehensive international data that would allow quantitative comparative research, most, if not all, of this research has been incidental or qualitative in nature. The types of waste moving transboundary runs a full gamut of the various kinds of solids, liquids, and gases that form industrial, agricultural, and household waste. Estimates of the volume of globally generated waste generally run from 300 to 400 millions metric tons per year, with some estimates substantially higher and with about ten percent of this estimated to move transboundary. According to the results of the bulk of

the qualitative research, transboundary waste prior to the 1990's involved thousands of shipments that sent some of the industrial world's most toxic waste to developing countries that often did not have the modern facilities, technological expertise, and/or modern infrastructures necessary to handle this waste.

During the late 1980's and early 1990's, several international conventions were convened to address the problems associated with the transboundary movement of hazardous and other waste and the relocation of waste producing industry to developing countries. The most notable, both in the comprehensiveness of the conventions' articles and in the number of countries ratifying the resulting treaty, was the Basel Convention of 1989.

Although the agreement resulting from the 1989 Basel Convention of 1989 allowed for what some critics labeled "a large loophole", in that a portion of waste generated in industrial countries could be exported to developing countries for the purpose of recycling, the agreement was quite specific in the conditions regulating transboundary waste. The Basel Convention agreement was also noteworthy in that it defined the waste to be regulated, and required its signatories to report any and all of the so-defined waste to convention officials. One dimension of this definition was according to the level of waste hazard.

Many of the Basel Convention signatories choose to report all solid and liquid waste they export to the convention authorities. These records, kept by the Basel Convention officials, allow for a quantitative international comparative research study of the transboundary movement of hazardous and other waste, using the world-systems perspective.

Utilizing the data collected by the Basel Convention, I have three objectives in this research. The first objective is to examine and determine the characteristics of both transboundary waste sending and waste receiving countries as they relate to the amount of waste that is shipped or received. The second objective is to determine what country characteristics and shipment frequency characteristics effect the economic level movement of waste shipments. The third objective is to determine quantitatively if the more hazardous portion of the waste has a transboundary movement from sending countries that have characteristics of higher levels of development relative to receiving countries that have characteristics of lower levels of development.

In regard to core, periphery, and semi-periphery countries, the world-system theoretical perspective points out, and this review has discussed, 11 country characteristics that have the potential of being relevant as independent variables to transboundary waste research. These are: 1) economic level of development; 2) internal distribution of wealth; 3) export and perhaps import concentration; 4) restrictiveness of trading partners; 5) external debt; 6) land use; 7) energy consumption; 8) ecological footprint; 9) value of export and imports; 10) portion of economy in agriculture/industry; and 11) health issues.

Seven other country characteristics that this review has identified and that might be related as independent variables to transboundary waste movement are: 1) amount of waste generated; 2) military expenditures; 3) workforce unemployment; 4) land area; 5) population, and population density; 6) environmental issues; and 7) environmental treaty participation and ratification.

In addition to the 18 independent variables listed above, two additional shipment

frequency variables are discussed in this review, since they also potentially relate as independent variables to the movement of transboundary waste. These are proximity of origin/destination countries and number of countries that shipments crossed in transit.

In summary, this study examines the characteristics of origination countries and the characteristics of destination countries, since these characteristics relate to the amounts of waste shipped (exported) or received (imported) and also relate to economic level movement of waste shipments. In addition to these country characteristics variables, shipment frequency variables are also examined as potential independent variables related to transboundary waste economic level movement. Controlling for the relevant independent and exogenous variables, this study examines waste hazard level as a determinant in the transboundary movement of this waste. The following two hypotheses are used to test if this is true.

11. Research Hypotheses

- H1:** Waste hazard level affects the movement of transboundary waste.
- H2:** Transboundary waste with higher hazard levels moves to countries with lower economic development levels more than to countries with higher economic development levels.

CHAPTER III

METHODOLOGY

1. Data and Data Sources

In the previous chapter, I reviewed the literature on international transboundary waste movement and examined the various theoretical perspectives used as guides in research on waste movement. This review noted that one factor that has severely limited or prevented quantitative comparative research on the transboundary movement of hazardous waste and other waste has been the lack of quantitative data. Most, if not all, of the research to date have been descriptive case studies of an incidental nature. Recently, data of a quantitative nature has become available from information compiled according to the terms of the Basel Convention.

Data for the transboundary wastes in this study are from the Basel Convention website (Secretariat of the Basel Convention 2006a, 2006b). The particular data on wastes used from the website is from: Table 3 Export of Hazardous Wastes and Other Wastes in 2000 (Basel Convention Table 3), and Table 4 Import of Hazardous Wastes and Other Wastes in 2000 (Basel Convention Table 4). These two tables contain data for hazardous and other waste movement. Basel Convention Table 3 reports shipments of waste by exporting countries and Basel Convention Table 4 reports shipments of waste by importing countries. A total of 133 countries had ratified the terms of the Basel Convention treaty in time for their reports to be included in the year 2000 reports, with 99 of these reporting waste exports or imports by the convention deadline to be included in reports for that year (Secretariat of the Basel Convention 2006f). The countries that had ratified the treaty by the year 2000 and those that had ratified whose waste exports and

imports are included in the Nation Reports for 2000 are listed in Appendix E at the end of this report.

The data contained in the twelve columns of Basel Convention Table 3 and Basel Convention Table 4 provides a wide variety of waste shipment information. The country of origin and country of destination, name and number of countries crossed in transit and amount of waste are provided. Types of origins of the waste (waste streams) are indicated and expressed in the form of Y-codes and text descriptions. Industrial, chemical and innate characteristics of the waste are provided in the form of two Basel Convention coding systems (Annex VII and H codes), by UN Class codes, and by text descriptions. Additionally, codes are provided for intended methods of disposal and intended methods of recycling in these two tables. Appendix D at the end of this paper provides a detailed description of the Basel Convention data and examples of each of the two Basel Convention data tables.

The Basel Convention data for the year 2000 is the primary source for data for this research. The CIA Year 2000 Factbook (2001) is a major secondary source for data on country characteristics used to construct independent variables for this research. Additional information on the characteristics of countries came from various sources, such as The United Nations, World Bank, from other global information publications and from websites. These sources will be cited, as their variables for country characteristics are operationalized and explained in the later sections and chapters of this report. Using the data taken from these sources, this paper will take a fresh look at the transboundary movement of hazardous and other waste.

2. Working Data Analysis Files

As noted in the introduction to this paper, I have three objectives in this research on the international transboundary movement of hazardous and other waste. The first objective is to ascertain and explore the characteristics of transboundary waste sending and receiving countries as they relate to the amounts of waste shipped or received. The second objective is to determine what country characteristics affect the economic level movement of waste shipments. The third objective is to determine quantitatively the question of whether the more hazardous portion of waste has a transboundary movement to countries with characteristics of lower levels of development, more than to countries with characteristics of higher levels of development.

Three working data analysis data files were constructed in order to facilitate the obtainment of these three objectives. A Country Case Data File (CCDF), using countries as the unit of analysis, was constructed in order to ascertain and explore the characteristics of transboundary waste sending and receiving countries, as they relate to the amounts of waste shipped or received. A Destination Shipment Frequency Data File (SFDF) and an origination Shipment Frequency Data File (SFDF), with waste shipments as the unit of analysis, were constructed in order to determine the country characteristics that affect economic level movement of wastes and to test my two hypotheses on waste hazard level and economic level movement.

Appendix D at the end of this paper provides specific examples of the spreadsheets for my Country Case Data File, my destination Shipment Frequency Data File, and my Origination Shipment Frequency Data File. Specific information describing the methods I used in constructing these three working data analysis files is also provided in the appendix.

3. Waste Hazard Level Variables

The information for construction of variables for checking our two hypotheses on level of waste hazard and economic level movement comes from Basel Convention Table 3 and Basel Convention Table 4. As noted in the first section of this chapter, the Basel Convention tables contain information on the three types of coding and text descriptions addressing level of waste hazard. These are the Y-codes and text descriptions on waste origins, the industrial/chemical waste codes, and text descriptions describing innate characteristics of the waste, and the two codes for methods of waste disposal/recycling. I used this information to create three category variables, two directly measuring waste hazard level and one indirectly measuring waste level hazard as a disposal/recycling category variable. These three waste hazard level variables are used in multivariate regressions for testing my hypotheses.

Appendix B, “Basel Convention Definitions and Codes provides extensive information on various codes and texts describing waste characteristics. The next chapter in this paper is on variables and variable creation and describes the creation of these three hazard level category variables. However, for detailed and specific descriptions on how these three variables are created, the reader may consult Appendix D, Section 6.

4. Independent Variables

As noted in a previous section of the chapter, the second objective of this research is to determine what country characteristics affect the economic level movement of waste shipments and the third objective is to determine if the more hazardous portion of waste moves to countries with characteristics of lower levels of development more than to countries with characteristics of higher levels of development. In order to obtain

these two objectives a wide variety of independent variables should be checked and/or controlled in my three working data analysis files. Table 4 is used in construction of an independent category variable for proximity and an independent category variable for number of countries a shipment crossed in transit. A brief description of how these two variables are created is described in the next chapter. However, detailed and specific descriptions of the creation of these variables is provided in Appendix D, Section 6

The next chapter provides sources, information, and descriptions for the creation of a wide variety of country characteristic independent variables. These types of independent variables include economic variables, geographical and land use variables, demographic variables, energy variables, environmental variables, and two types of trade variables.

5. Dependent Variables

In order to facilitate the obtainment of the second and third of my research objectives in determining the country characteristics that are related to economic level movement and checking my two hypotheses regarding economic level movement, a dependent variable in the form of an economic level movement scale is created in the form of an economic level movement scale. This economic level movement scale is created using Basel Convention (Secretariat of the Basel Convention 2006a, 2006b) data identifying countries of origin and countries of destination and the CIA's (2001) information on countries' GDP and population. Descriptions on the methods used in creation of this scale are given in Chapter IV, Section 5.

6. Limitations of this Study

Before discussing variables, variable creation, and variable operationalization, it

is appropriate to discuss the generalizability of the Basel Convention data on transboundary waste. These data, nearly exclusively address legal transboundary waste. The amount of illegal transboundary waste is, by its very nature, unknown. Therefore, generalizations from this research can only be made for legal transboundary waste movement.

Like most other international comparative data, are likely to be incomplete, because compliance with the articles of the Basel Convention by treaty members is not one hundred percent. There is also a large discrepancy between the total amount of waste reported by sending (exporting) countries that is substantially less than the total amount reported by receiving countries. I will first address the reporting problem.

Membership in the Basel Convention includes all but one of the world's industrialized major waste generating countries, with the exception of the United States (U.S.). Compliance with treaty reporting by these major waste generating, and therefore, major waste exporting countries, is almost a hundred percent according to Basel Convention records. For example, for the year 2000, only one fully industrialized country party to the treaty reported late (Secretariat of the Basel Convention 2006c).

Additionally, in regard to the reporting problem, even with the one fully industrialized non-treaty ratifying country (the United States) not reporting, the waste exports and imports for this country can be determined from the reports of the other treaty complying and reporting countries. According to Basel Convention, using the assumption that countries that reported exports and imports of waste in previous years also had waste to report in the year 2000, compliance in reporting for countries that are party to the treaty was relatively high for the year 2000 (Secretariat of the Basel

Convention 2006c).

The best way to address the problem of the large discrepancy between the totals amounts reported by sending countries and receiving countries is in methodology. I do this by comparing the data reported by the exporting countries with the data reported by the importing countries and in identifying unique cases. I report my method for doing in very specific detail this in Appendix D, Section 2.

CHAPTER IV

VARIABLES AND VARIABLE CREATION

1. Country Case Data File - Variables from the Basel Convention Data

In the previous chapter III, I outlined the methodology used in this study. Data and data sources are provided, working data analysis files are described, the source and rationale for the waste hazard level variables are given, the sources for the independent variables are presented, and the sources of information used to create a dependent variable, consisting of an economic level movement scale, are provided and explained. In this chapter I will discuss the variables used in this study and their method of creation.

As noted in the introduction of this paper, this research has three objectives. The first objective is to explore the characteristics of destination countries and origination countries as they relate to the amount of waste received (imported) and sent (exported). The second objective of this research is to explore the characteristics of destination countries and origination countries as they relate to economic level movement. The third objective of this research is to test my two hypotheses that relate to economic level movement. Section 2 of chapter 3 explores the necessity for the construction of three working data analysis files for the obtaining these three objectives, and outlines the nature of these files. Specific details of the construction of these three data files are given in Appendix D.

The objectives of this research govern the construction of the types of working data analysis files creation of the number and kind of variables. It follows that descriptions of the variables and the creation of variables are related to the type of working data file for which they are intended. Therefore, the plan of organization of

Chapter IV is as follows.

The first section of the chapter discusses the Country Case data file and the creation of that file's unique waste characteristic variables, as fashioned from Basel Convention data. The second section of this chapter discusses the creation of waste characteristic variables for the Destination Shipment Frequency and the Origination Shipment Frequency data files, also fashioned from Basel Convention information. The third section describes the creation of a wide variety of country characteristic variables applicable to all three data files, those deemed appropriate for both shipment frequency unit of analysis and country unit of analyses as fashioned from information from various sources. The fourth section describes the creation of two trade network variables, again using information from various sources. However, these network trade variables are deemed appropriate for shipment frequency unit analysis, but are not appropriate for an analysis using country as the unit of analysis and are not conducive to the analysis planned for this particular Country Case data file.

The fifth and last section of the chapter will describe the creation of a scale for measuring the difference in economic level between the origination country and the destination country, an economic level movement scale, which will serve as the dependent variable for the Shipment Frequency data analysis.

Variables and variable creations for the first file for transboundary waste research analysis as described in this chapter was created for the Country Case data file. As stated previously, this file has countries as a unit of analysis, either countries of waste origination or countries of waste destination. The initial four variables for this file are created from information from the Basel Convention Table 3 and Basel Convention Table

4 (Secretariat of the Basel Convention 2006a, 2006b).

By examining the cases of export waste shipments in Basel Convention Table 3 and the cases of import waste shipments in the Basel Convention Table 4 for such factors as destination countries, origination countries, types of waste, amounts of waste, countries crossed, and the method of disposal/recycling, 4,090 unique global shipments totaling 7,533,464 metric tons were identified. Specific and detailed information and the method used for identifying these unique cases is given in Appendix D at the end of this paper.

Using these 4,090 unique global shipments and information in the two tables associated with them, two variables in the Country Case data file are created as follows. The first variable is created by totaling the amounts of the shipments received by each country as a destination. This variable for total amounts of waste received by destination countries is labeled DESMNTT. The totals of DESMNTT are given in metric tons to the third decimal place. The second variable is created by totaling the amounts of the shipments sent from each country as an origination. This variable for total amounts of waste sent from origination countries is labeled ORGMNTT. The totals in ORGMNTT are given in metric tons to the third decimal place.

Again, using these same 4,090 unique global shipments discussed above, a fifth and a sixth variable are also created for the Country Case data file. The fifth variable is created by totaling the number of shipments received by each country as a destination. This variable for total number of shipments received by each destination country, is labeled DESFRQT. The sixth and last variable to be created for the Country Case data file fashioned from Basel Convention information is created by totaling the number of

shipments sent from each country as a country of origination. This variable for total number of shipments sent from an origination country is labeled ORIFRQ. Table 1 shows some of the central tendency statistics and descriptive statistics for the Country Case data file variables for destination country waste amounts (DESMNTT), origination country waste amounts (ORGMNTT), destination country waste shipment frequencies (DESEFRQT) and origination country waste shipment frequencies (ORIFRQ).

(Put table 1 about here)

The mean for the variable for destination country total waste amounts (DESMNTT) is 145,258.919 metric tons, the median is almost 16,964.957 metric tons; the mode is 200 metric tons; the standard deviation is 299,527.678 metric tons; the minimum is 73 metric tons; and the maximum for the variable for destination country total waste amounts is 1,646,081.304 metric tons. This variable has a total of 52 cases, with no missing cases.

The mean for the variable for origination country total waste amounts (ORGMNTT) is 78,681.914 metric tons; the median is almost 2,551.730 metric tons; the mode is 0.000 metric tons; the standard deviation is 223,386.221 metric tons; the minimum is 0.000 metric tons; and the maximum for the variable for origination country total waste amounts is 1,318,644.241 metric tons. This variable has a total of 96 cases, with no missing cases.

The mean for the variable for destination country total waste shipments (DESEFRQT) is 78.65; the median is almost 6.00; the mode is 1, the standard deviation is 214.61; the minimum is 1; and the maximum for the variable for destination country total waste shipments is 1344. This variable has a total of 52 cases, with no missing cases.

The mean for the variable for origination country total waste shipments (ORIFRQ) is 42.60; the median is 6.00, the mode is 1; the standard deviation is 143.02; the minimum is 1; and the maximum for the variable for origination country waste shipments is 1304. This variable has a total of 96 cases, with no missing cases.

2. Shipment Frequency Data Files - Variables from Basel Convention Data

The unit of analysis in both the Destination Shipment Frequency and the Origination Shipment Frequency data files are shipment frequencies. The variables in the two shipment frequency data files, those that are created for the Basel Convention data have the same number of cases, identical names, equal numbers of variables, and identical variable values.

The initial five variables for Destination Shipment Frequency and the Origination Shipment Frequency data files are created from information taken from the Basel Convention Table 3 and Basel Convention Table 4 (Secretariat of the Basel Convention 2006a, 2006b). The 4,090 unique global shipments totaling 7,533,464 metric tons that are identified and discussed in the first section of this chapter that are used to create the initial variables of these two shipment frequency data files are described as follows.

The amounts of waste in each of the above unique 4,090 shipments are used as a variable for sizes of waste shipments. The shipment size is given in metric tons to the third decimal place. This variable for amount of waste in the waste shipments is labeled SHPAMT in both files. Table 2 gives some descriptive statistics and central tendency statistics for SHPMT.

(Put table 2 about here)

The mean for the variable for amount of waste in the waste shipments (SHPAMT)

is 1,848.168; the median is 58.000 metric tons; the mode is 0.000 metric tons; the standard deviation is 13,400.049 metric tons; the minimum is 0.000 metric tons; and the maximum for the variable for amount of waste in the waste shipments is 493,093.000 metric tons. This variable has a total of 4,087 cases, with 3 missing cases.

The Basel Convention provides extensive information on all of the various codes and texts describing waste characteristics that are used in the reporting of the shipments and amounts of the international transboundary waste movement. I use this same information in the construction of APPENDIX B “Basel Convention Definitions and Codes” in order to guide the reader in understanding the sometimes-complex nature of the same data and in understanding of my recoding of this data (Secretariat of the Basel Convention 2006a; 2006b; 2006c; 2006d).

Information indicating the level of waste hazard, according to Y-coded waste sources and by text descriptions of these waste sources, is available in Basel Convention Table 3 and Basel Convention Table 4. Using this information and the 4,090 unique global shipments previously discussed in this section, I created a category variable for increasing waste hazard. The first lowest source waste hazard level category for this variable is coded 1, the next to lowest source waste hazard level category I coded 2. The second to the highest category in increasing source waste hazard I coded 3; and the highest category in increasing source waste hazard I coded 4. Shipments of mixed source waste hazard categories are coded 88 and shipments with no assigned category codes are coded 99. This source, or Y category waste hazard variable is labeled HAZY. A more detailed discussion and a specific description of the method used for coding this variable is provided in Appendix D. Table 3 provides some descriptive statistics and central

tendency statistics for HAZY.

(Put table 3 about here)

The mean for the variable for the source waste hazard category variable (HAZY) is 20.10; the median is 3; the mode is 3; the standard deviation is 36.37; the minimum is 1; and the maximum for the source waste hazard category variable is 99. 143 or 3.5% of the shipments are of the lowest source waste hazard level category. 1,174 or 28.7% of the shipments are in the next to the lowest source waste hazard level category. 1,914 shipments or 46.8% are in the second highest source waste hazard level category and 86 or 2.1% of the shipments are in the highest source waste hazard level category. 262 shipments or 6.4% are of mixed source waste categories and 511 shipments or 12.5% have no assigned source waste codes. This source waste hazard level category has a total of 4,090 cases, with no missing cases.

Five dummy variables for HAZY are created by coding its six categories appropriately; where 1 coded wastes remain equal to 1 and the other five categories of waste are recoded as 0, where 3 coded wastes are recoded equal to 1 and the other five categories of waste are recoded as 0, where 4 coded wastes are recoded equal to 1 and the other five categories of waste are recoded as 0, where 88 coded wastes are recoded as equal to 1 and the other five categories of waste are recoded as 0, and where 99 coded waste are recoded equal to 1, and the other five categories of waste are recoded as 0. The next to the lowest source waste hazard level will be the comparison category. These five HAZY dummy variables are labeled: HAZYCAT1, HAZYCAT3, HAZYCAT4, HAZYCAT5, and HAZYCAT6, respectively.

A third shipment frequency variable, derived from information provided in Base

Convention Tables 3 and Basel Convention Table 4, concerns the distance between origination and destination countries. Using the map provided for each country by *The World Factbook 2001*, it was determined if the origination and destination countries for each of our 4,090 unique global waste shipments were adjacent, not adjacent but in-region, or out-of-region. Shipments to countries out-of-region from their origin were coded 1; shipment to countries not adjacent, but within the region from their origin were coded 2; and shipments to countries adjacent from their origin were coded 3. This proximity variable is labeled PROX. Detailed and specific information on the method used to determine proximity is provided in Appendix D. Table 4 provides some descriptive statistics and central tendency statistics for this variable for proximity. (Table 4 about here)

The mean for the category variable for proximity (PROX) is 2.66; the median is 3; the mode is 3; the standard deviation is 0.59; the minimum is 1; and the maximum for the source waste hazard category variable is 3. 239 or 5.9% of the shipments are Out-of-Region. 929 or 22.8% of the shipments are within region. 2,914 shipments or 71.4% are to adjacent countries. This proximity category variable has a total of 4,090 cases, with no missing cases.

Two dummy variables are created for the proximity variable by coding not adjacent but in-region cases as 1 while coding the other two categories as 0, and by coding out-of-region cases as 1 while coding the other two categories as 0. The comparison category will be the adjacent category. These two dummy variables for proximity are labeled PROXDUM2, and PROXDUM3, respectively.

A subject of debate by public policy makers and researchers is whether waste

shipments that are stated as intended for recycling are more likely to go to lower economically developed countries than waste shipments that are stated as intended for disposal, with the waste labeled for recycling having a higher level of hazard than waste labeled for disposal. The 4,090 unique global shipments totaling 7,533,464 metric tons that are identified and discussed in the first section of this chapter, along with information on the intended method of disposal/recycling from Basel Convention information Table 3 and Basel Convention Table 4 (Secretariat of the Basel Convention 2006a, 2006b), are used to create a four category variable measuring disposal/recycling. Waste shipments intended for disposal are coded 1; waste shipments intended for recycling are coded 2; mixed shipments of disposal/recycling waste are coded 88; and shipments of unknown disposal/recycling waste are coded 99. This disposal/recycling category waste is labeled DSRC. The specific Basel Convention coding for disposal/recycling waste is provided in Appendix B and a detailed description of the method used in creation of this variable is provided in Appendix D. Table 5 provides some descriptive statistics and central tendency statistics for this waste disposal/recycling category variable.

(Table 5 about here)

The mean for the category variable for disposal/recycling waste is 3.14; the median is 1; the mode is 1; the standard deviation is 12.24; the minimum is 1; and the maximum for the category variable for disposal/recycling waste is 99. 2,075 or 50.7% of the shipments are for disposal. 1,941 or 47.5% of the shipments are for recycling. 40 or 1.0% of the shipments are mixed and 34 or 0.8% of the shipments have unknown disposal/recycling labels. This disposal/recycling waste category variable has a total of 4,090 cases, with no missing cases.

Since recycling and disposal methods are reported as category data, three dummy variables are created for the disposal/recycling waste category variable (DSRC) by recoding recycling waste as 1 while recoding the other three categories as 0, by recoding mixed waste as 1 while recoding the other three categories as 0, and recoding unreported or unknown disposed/recycled waste as 1 while recoding the other three categories as 0. Waste shipments intended for disposal is the comparison variable. These three dummy variables for DSRC are labeled DSRC DUM2, DSRC DUM3, and DSRC DUM4, respectively.

Information from the Basel Convention Tables 3 and Basel Convention Table 4 (Secretariat of the Basel Convention 2006a, 2006b), and the 4,090 unique global shipments totaling 7,533,464 metric tons that are identified and discussed in the first section of this chapter are used to create a variable for measuring number of countries in which shipments crossed in transit. Classifying each shipment according to no countries crossed, one country crossed, and two or more countries crossed in transit creates a three-category variable. Shipments that cross one country in transit are coded 1; shipments that cross no countries in transit are coded 2, and shipments that cross two or more countries in transit are coded 3. The Basel Convention codes used in determining countries crossed are contained in Appendix B. A more detailed description of the method used to create the variable for number of countries crossed in transit is given in Appendix D. The newly created category variable for number of countries shipments cross in transit is labeled TRAN. Some descriptive and central tendency statistics for the category variable for number of countries crossed in transit (TRAN) are given in Table 6.

(Put table 6 about here)

The mean for the category variable for number of countries crossed in transit is 1.96; the median is 2; the mode is 2; the standard deviation is 0.31; the minimum is 1; and the maximum for this category variable for number of countries crossed in transit is 3. 287 or 6.9% of the shipments crossed one country in transit. 3,685 or 90.1% of the shipments crossed no country in transit. 121 or 3.0% of the shipments crossed two or more countries in transit. This category variable for number of countries crossed in transit has a total of 4,090 cases, with no missing cases.

Two dummy variables are created for the variable for number of countries crossed in transit (TRAN) by coding one country crossed as 1 while coding the other two categories as 0, and coding two or more countries crossed as 1 while coding the other two categories as 0. These dummy variables for TRAN are labeled TRANDUM2, and TRANDUM3, respectively. No country crossed in transit is the comparison category.

In addition to the Y-coded waste sources and waste source text descriptions previously discussed in Section 1 of this chapter and previously used in this section to make a source waste hazard level category variable, information indicating level of waste hazard is available in the form of industrial/chemical waste codes and text descriptions revealing innate characteristics of the waste from Basel Convention Table 3 and Basel Convention Table 4. Using this information and the 4,090 unique global shipments totaling 7,533,464 metric tons, also previously identified and discussed, a ten category industrial/chemical waste hazard level category variable is created.

Basically, the UN class waste codes for industrial/chemical substances and compounds are used in coding the industrial/chemical waste hazard level category variable and it is coded as follows. Shipments composed of explosive substances are

coded 1; shipments of flammable liquids are coded 3; shipments of flammable solids are coded 4; shipments of oxidizing substances or organic peroxides are coded 5; shipments of poisonous or infectious substances are coded 6; shipments of corrosive substances are coded 8 and shipments composed of toxic gases, toxic substances, or eco-toxic substances are coded 9. Shipments of mixed substances are coded 10. Mixed shipments composed of multiple packages of several of the previous 10 substances are coded 88 and shipments of unlabeled or unknown wastes are coded 99.

Basel Convention and UN class waste codes are given in Appendix B. A specific and detailed description of the method used in creating the industrial/chemical waste hazard level category variable is provided in Appendix D. This waste hazard level category variable is labeled HAZH. Descriptive and central tendency statistics for HAZH are given in Table 7.

(Put table 7 about here)

The mean for the industrial/chemical waste hazard level category variable (HAZH) is 41.98; the median is 9; the mode is 99; the standard deviation is 43.37; the minimum is 1; and the maximum for the industrial/chemical waste hazard level category variable is 99. 6 or 0.1% of the shipments are of the UN Class waste hazard level category 1, explosive substances. 368 or 9.0% of the shipments are of the UN Class waste hazard level category 3, flammable liquids. 270 or 6.6% of the shipments are of the UN Class waste hazard level category 4, flammable solids. 52 or 1.3% of the shipments are of the UN Class waste hazard level category 5, oxidizing substances or organic peroxides. 515 or 12.6% of the shipments are of the UN Class waste hazard level (category 6), poisonous or infectious substances. 387 or 9.5% of the shipments are of the

UN Class waste hazard level category 8: corrosive substances. 800 or 19.6% of the shipments are of the UN Class waste hazard level category 9, toxic gases, toxic substances or eco-toxic substances. 54 shipments or 1.3% of all shipments are a mixture of substances. Mixed shipments comprise 620 or 15.2% of all shipments

The first four of nine dummy variables are created for the industrial/chemical waste hazard level category variable (HAZH) in the following manner. The first dummy variable for HAZH was created by leaving UN class category 1 as 1 while coding the other nine categories as 0, the second dummy variable for HAZH was created by recoding UN class category 4 as 1 while coding the other nine categories as 0, the fourth dummy variable for HAZH was created by recoding UN class category 5 as 1, while coding the other nine categories as 0, and the fifth dummy variable for HAZH was created by recoding UN class category 6 as 1 while coding the other nine categories as 0.

The fifth, sixth, seventh, eighth, and ninth of the nine dummy variables created for the industrial/chemical waste hazard level category variable (HAZH) are created in the exact manner as the first five. The fifth dummy variable for HAZH was created by recoding UN class category 8 as 1 while coding the other nine categories as 0, and the sixth dummy variable for HAZH was created by recoding UN class category 9 as 1 while coding the other nine categories as 0. The seventh dummy variable for HAZH was created by recoding mixed substances category coded 10 as 1 while coding the other nine categories as 0; the eighth dummy variable for HAZH was created by recoding mixed shipments category coded 88 as 1 while coding the other nine categories as 0, and the ninth dummy variable for HAZH was created by recoding unknown labeled shipments coded 99 as 1 while coding the other nine categories as 0. These nine dummy variables

for HAZH are labeled: HAZDUM1, HAZDUM3, HAZDUM4, HAZDUM5, HAZDUM6, HAZDUM7, HAZDUM8, HAZDUM9, and HAZDUM10. The comparison category is flammable liquids.

This concludes this section on Shipment Frequency data files - Variables from Basel Convention Information.

3. Country Case Data File and Shipment Frequency Data Files - Country

Characteristic Variables

a. Economic Variables

Most of the variables created for this transboundary waste study are used in all three data files: the Country Case data file, the Destination Shipment Frequency data file and the Origination data file. The Economic variables, the Land Use variables, the Demographic variables, the Energy variables, the Environmental variables and the Traditional Trade variables described in this third section of this chapter are all used in all three data files. The fourth section of this chapter will describe the creation of two trade network variables for the two Shipment Frequency data files. The fifth and last section of this chapter describes the creation of an economic level movement scale, the latter is used as the dependent variable for the two Shipment Frequency data files.

In all, thirteen economic variables are created for use in all three data files, the Country Case data file and the two Shipment Frequency data files, which are the three data files used in the analysis of the data in this study. These are: Economic Development Level, Income Inequality, Export Concentration, Import Concentration, External Debt, Unemployment, Military Expenditures, Military Imports, The Portion of the Economy in Agriculture, The Portion of the Economy in Industry, The Portion of the

Economy in Service, Export Value, and Import Value.

The first economic country characteristic variable for Economic Development Level is created from information taken from the World Bank's (2002) "World Development Indicators 2002", Table 1.1 Size of Economy. Year 2000 Purchasing Power Parity per capita values in U.S. dollars for each of our 99 countries in the Country Case file were determined and cataloged into one of four possible income levels, as defined by the World Bank for that year. Countries with less than \$755 Purchasing Power Parity per capita are classified as Low Income, countries with \$756 to \$2,995 are classified as Low Middle Income, countries with \$2,996 to \$9,265 are classified as Upper Middle Income, and countries with \$9,266 are classified as High Income countries. These four classifications are coded as follows: Low Income countries are coded as 1, Low Middle countries are coded as 2, Upper Middle countries are coded as 3, and High Income countries are coded 4. This newly created and recoded variable for country per capita income is labeled DEVLEV. The descriptive and central tendency statistics for the variable for economic development level are provided in Table 8.

(Put table 8 about here)

As shown in Table 8, the statistics for the economic development level variable differ according to destination countries or origination countries and the Country Case Data File (CCDF) and differ by Destination Shipment Frequency Data File (SFSF) or origination Shipment Frequency Data File (SFDF). It should be noted that this is true for all of the variables created and described in Section 3 of this chapter.

Some of the statistics for the variable for the destination countries' per capita income (DEVLEV) in the Country Case Data File are as follows. The mean is 3.12; the

median is 4; the mode is 4; the standard deviation is 1.07; the minimum is 1 and the maximum is 4. 6 destination countries or 11.5% of the total have Level 1 developmental level. 8 destination countries or 15.4% of the total have Level 2 developmental level. 11 destination countries or 21.2% of the total have Level 3 developmental level and 26 destination countries or 50.0% of the total have Level 4 developmental level. A total of 52 destination countries are in the Country Case Data File, with one country having missing data for this variable.

The statistics for the variable for the origination countries' per capita income (DEVLEV) in the Country Case Data File are as follows. The mean is 2.82; the median is 3; the mode is 4; the standard deviation is 1.09; the minimum is 1 and the maximum is 4. 14 origination countries or 14.6% of the total have Level 1 developmental level. 24 origination countries or 25.0% of the total have Level 2 developmental level. 22 origination countries or 22.9% of the total have Level 3 developmental level and 35 origination countries or 36.5% of the total have Level 4 developmental level. A total of 96 origination countries are in the Country Case Data File, with one country having missing data for this variable.

The statistics for the variable for the destination countries' per capita income (DEVLEV) in the Destination Shipment Frequency Data File are as follows. The mean is 3.95; the median is 4; the mode is 4; the standard deviation is 0.31; the minimum is 1 and the maximum is 4. 22 destination countries or 0.5% of the total have level 1 developmental level. 34 destination countries or 0.8% of the total have level 2 developmental level. 59 destination countries or 1.4% of the total have level 3 developmental level and 3,969 destination countries or 97.0% of the total have level 4

developmental level. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 6 shipments having missing data for this variable.

The statistics for the variable for the origination countries' per capita income (DEVLEV) in the Origination Shipment Frequency Data File are as follows. The mean is 3.85; the median is 4; the mode is 4; the standard deviation is 0.52; the minimum is 1 and the maximum is 4. 38 origination countries or 0.9% of the total have level 1 developmental level. 167 origination countries or 4.1% of the total have level 2 developmental level. 184 origination countries or 4.5% of the total have level 3 developmental level and 3695 origination countries or 90.3% of the total have level 4 developmental level. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 6 shipments having missing data for this variable.

A second economic country characteristic variable for Income Inequality is created using information from the World Bank's (2001,2002, 2003, 2004) "World Development Indicators", (WDI) Table 2.8 Distribution of Income or Consumption. The Gini Indexes for the year 2000 for most of the 99 destination and origination countries in our Country Case data file is taken from the WDI 2001 - 2004 editions. In cases where the year 2000 Gini Index for a country was not found in these four WDI editions, the year's Gini Index for that country closest to the year 2000 was used, giving preferences in ties in chronological distance from the year 2000 to the earlier year. The internal income distribution variable is labeled GINI. The statistics for the economic variable internal income distribution (GINI) are shown in Table 9.

(Put table 9 about here)

As shown in Table 9, the statistics for the variable for the destination countries'

internal income distribution (GINI) in the Country Case Data File are as follows. The mean is 34.93; the median is 33.10; the mode is 25; the standard deviation is 8.51; the minimum is 24.40; and the maximum is 59.30. A total of 52 destination countries are in the Country Case Data File, with two countries having missing data for this variable.

The statistics for the variable for the origination countries' internal income distribution (GINI) in the Country Case Data File are as follows. The mean is 38.11; the median is 36; the mode is 25; the standard deviation is 10.09; the minimum is 24.40; and the maximum is 63.00. A total of 96 origination countries are in the Country Case Data File, with 17 countries having missing data for this variable.

The statistics for the variable for the destination countries' internal income distribution (GINI) in the Destination Shipment Frequency Data File are as follows. The mean is 31.83; the median is 33.10; the mode is 33,10; the standard deviation is 4.49; the minimum is 24.70; and the maximum is 59.30. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 8 shipments having missing data for this variable.

The statistics for the variable for the origination countries' internal income distribution (GINI) in the Origination Shipment Frequency Data File are as follows. The mean is 35.02; the median is 35.90; the mode is 40.10; the standard deviation is 5.89; the minimum is 24.40; and the maximum is 63.00. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 125 shipments having missing data for this variable.

Two economic country characteristic variables for Export Concentration and Import Concentration are created using information from the United Nations Conference

on Trade and Development (UNCTAD) 2002 *UNCTAD Handbook of Statistics*. The specific information comes from Table 8.2A, “Export Concentration and Diversification Indices by Country”, and Table 8.2B, “Import Concentration and Diversification Indices by Country”. Export Concentration and Import Concentrations for the year 2000 are taken from these two tables. The Export Concentration variable is labeled EXCONC and the Import Concentration variable is labeled IMCOMC.² The statistics for the economic variable Export Concentration (EXCONC) are shown in Table 10.

(Put table 10 about here)

As shown in Table 10, the statistics for the variable for the destination countries’ Export Concentration (EXCONC) in the Country Case Data File are as follows. The mean is 0.1898; the median is 0.1353; the mode is 0.826, the standard deviation is 0.1532; the minimum is 0.0551; and the maximum is 0.8642. A total of 52 destination countries are in the Country Case Data File, with 4 countries having missing data for this variable.

The statistics for the variable for the origination countries’ Export Concentration (EXCONC) in the Country Case Data File are as follows. The mean is 0.2650; the median is 0.1709; the mode is 0.0826; the standard deviation is 0.2151; the minimum is 0.0551; and the maximum is 0.9961. A total of 96 origination countries are in the Country Case Data File, with 9 countries having missing data for this variable.

The statistics for the variable for the destination countries’ Export Concentration (EXCONC) in the Destination Shipment Frequency Data File are as follows. The mean is 0.1169; the median is 0.1050; the mode is 0.1327; the standard deviation is 0.0447; the minimum is 0.0551; and the maximum is 0.8642. A total of 4,090 shipments are in the

Destination Shipment Frequency Data File, with 11 shipments having missing data for this variable.

The statistics for the variable for the origination countries' Export Concentration (EXCONC) in the Origination Shipment Frequency Data File are as follows. The mean is 0.1310; the median is 0.0971; the mode is 0.0900; the standard deviation is 0.0875; the minimum is 0.0551; and the maximum is 0.9961. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 86 shipments having missing data for this variable.

The statistics for the economic variable, Import Concentration (IMCONC) is shown in Table 11.

(Put table 11 about here)

As shown in Table 11, the statistics for the variable for the destination countries' Import Concentration (IMCONC) in the Country Case Data File are as follows. The mean is 0.1112; the median is 0.0092; the mode is 0.0962; the standard deviation is 0.0056; the minimum is 0.0542 ;and the maximum is 3.1530. A total of 52 destination countries are in the Country Case Data File, with 4 countries having missing data for this variable.

The statistics for the variable for the origination countries' Import Concentration (IMCONC) in the Country Case Data File are as follows. The mean is 0.1196; the median is 0.1017; the mode is 0.0962; the standard deviation is 0.0614; the minimum is 0.0542; and the maximum is 0.4114. A total of 96 origination countries are in the Country Case Data File, with 10 countries having missing data for this variable.

The statistics for the variable for the destination countries' Import Concentration

(IMCONC) in the Destination Shipment Frequency Data File are as follows. The mean is 0.0897; the median is 0.0884, the mode is 0.0884; the standard deviation is 0.0206; the minimum is 0.0542; and the maximum is 0.3153. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 11 shipments having missing data for this variable.

The statistics for the variable for the origination countries' Import Concentration (IMCONC) in the Origination Shipment Frequency Data File are as follows. The mean is 0.1020; the median is 0.1030; the mode is 0.1030; the standard deviation is 0.0403; the minimum is 0.0542; and the maximum is 0.4114. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 89 shipments having missing data for this variable.

An Economic variable for External Debt is created for the Country Case and the two Shipment Frequency data files using information from the Central Intelligence Agency (CIA 2001, 2002 and 2005) *The World Factbook 2001*, *The World Factbook 2002*, and *The World Factbook 2005* are used for the countries in all three data files. The statistics for External Debt are calculated as a percentage of GDP using information from the year 2000, or the closest year available. This Economic variable for External Debt is labeled EXTDEBT. The statistics for the economic variable, External Debt (EXTDEBT), are shown in Table 12.

(Put table 12 about here)

As shown in Table 12 the statistics for the variable for the destination countries' External Debt (EXTDEBT) in the Country Case Data File are as follows. The mean is 13.53; the median is 11.10; the mode is 0.00; the standard deviation is 11.74; the

minimum is 0.00; and the maximum is 49.30. A total of 52 destination countries are in the Country Case Data File, with one country having missing data for this variable.

The statistics for the variable for the origination countries' External Debt (EXTDEBT) in the Country Case Data File are as follows. The mean is 20.34; the median is 16.80; the mode is 0.00; the standard deviation is 17.79; the minimum is 0.00; and the maximum is 87.90. A total of 96 origination countries are in the Country Case Data File, with one country having missing data for this variable.

The statistics for the variable for the destination countries' External Debt (EXTDEBT) in the Destination Shipment Frequency Data File are as follows. The mean is 4.88; the median is 0.25; the mode is 0.20; the standard deviation is 7.66; the minimum is 0.00; and the maximum is 49.30. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with no shipments having missing data for this variable.

The statistics for the variable for the origination countries' External Debt (EXTDEBT) in the Origination Shipment Frequency Data File are as follows. The mean is 8.87; the median is 8.29; the mode is 8.30; the standard deviation is 9.84; the minimum is 0.00; and the maximum is 87.90. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with no shipments having missing data for this variable.

Unemployment, as it relates to transboundary waste, is another Economic variable that I will examine in this study. Information on unemployment for most of the 99 countries in all three data files used in the data analysis of this study is also obtained from *The World Factbook* (2001). Unemployment data from this source is given as percentages of total workforces for the year 2000, or from the closest year available. This economic variable for Unemployment is labeled UNEMP. The statistics for the

economic variable Unemployment (UNEMP) are shown in Table 13.

(Put table 13 about here)

As shown in Table 13, the statistics for the variable for the destination countries' Unemployment (UNEMP) in the Country Case Data File are as follows. The mean is 9.40; the median is 8.40; the mode is 14.00; the standard deviation is 6.14; the minimum is 1.90; and the maximum is 30.00. A total of 52 destination countries are in the Country Case Data File, with 5 countries having missing data for this variable.

The statistics for the variable for the origination countries' Unemployment (UNEMP) in the Country Case Data File are as follows. The mean is 12.84; the median is 9.80; the mode is 30.00; the standard deviation is 10.68; the minimum is 1.80; and the maximum is 50.00. A total of 96 origination countries are in the Country Case Data File, with 13 countries having missing data for this variable.

The statistics for the variable for the destination countries' Unemployment (UNEMP) in the Destination Shipment Frequency Data File are as follows. The mean is 7.39; the median is 6.80; the mode is 6.80; the standard deviation is 2.67; the minimum is 1.90; and the maximum is 30.00. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 32 shipments having missing data for this variable.

The statistics for the variable for the origination countries' Unemployment (UNEMP) in the Origination Shipment Frequency Data File are as follows. The mean is 6.45; the median is 4.1; the mode is 4.00; the standard deviation is 5.34; the minimum is 1.80; and the maximum is 50.00. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 61 shipments having missing data for this variable.

Information on Military Expenditures from *The World Factbook* (2001) is

used to create another Economic variable. Military Expenditures for each country for the year 2000, or the closest year available, is reported in this book as a percentage of Gross Domestic Parity. MIL_EXPS is the label for this Economic variable. The statistics for the economic variable Military Expenditures (MIL_EXPS) is shown in Table 14.

(Put table 14 about here)

As shown in Table 14, the statistics for the variable for the destination countries' Military Expenditures (MIL_EXPS), in the Country Case Data File are as follows. The mean is 1.94; the median is 1.50; the mode is 1.20; the standard deviation is 1.44; the minimum is 0.00; and the maximum is 9.40. A total of 52 destination countries are in the Country Case Data File, with 2 countries having missing data for this variable.

The statistics for the variable for the origination countries' Military Expenditures (MIL_EXPS), in the Country Case Data File are as follows. The mean is 2.68; the median is 1.71; the mode is 1.20; the standard deviation is 2.57; the minimum is 0.00; and the maximum is 13.00. A total of 96 origination countries are in the Country Case Data File, with 11 countries having missing data for this variable.

The statistics for the variable for the destination countries' Military Expenditures (MIL_EXPS), in the Destination Shipment Frequency Data File are as follows. The mean is 1.72; the median is 1.40; the mode is 1.30; the standard deviation is 0.69; the minimum is 0.00; and the maximum is 9.40. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 18 shipments having missing data for this variable.

The statistics for the variable for the origination countries' Military Expenditures (MIL_EXPS), in the Origination Shipment Frequency Data File are as follows. The

mean is 2.1; the median is 1.70; the mode is 3.20; the standard deviation is 1.14; the minimum is 0.00; and the maximum is 13.00. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 110 shipments having missing data for this variable.

Military Imports is another economic variable used in this Transboundary waste study. The information for this variable is obtained from *Encyclopædia Britannica* (1999) “Nation's Rank, Arms Imports for the Year 1999”. This variable is a measure of Military Imports as valued in millions of U.S. dollars. The variable is labeled MIL_IM. The statistics for the economic variable, Military Imports (MIL_IM), are shown in Table 15.

(Put table 15 about here)

As shown in Table 15, the statistics for the variable for the destination countries' Military Imports (MIL_IM), in the Country Case Data File are as follows. The mean is 554.31; the median is 220.00; the mode is 10.00; the standard deviation is 744.71; the minimum is 0.00; and the maximum is 3,000.00. A total of 52 destination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the origination countries' Military Imports (MIL_IM), in the Country Case Data File are as follows. The mean is 503.83; the median is 70.00; the mode is 0.00; the standard deviation is 1,034.50; the minimum is 0.00; and the maximum is 7,700.00. A total of 96 origination countries are in the Country Case Data File, with 2 countries having missing data for this variable.

The statistics for the variable for the destination countries' Military Imports (MIL_IM), in the Destination Shipment Frequency Data File are as follows. The mean

is 1,052.11; the median is 1,000.00; the mode is 1,000.00; the standard deviation is 597.48; the minimum is 0.00; and the maximum is 3,000.00. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 6 shipments having missing data for this variable.

The statistics for the variable for the origination countries' Military Imports (MIL_IM) in the Origination Shipment Frequency Data File are as follows. The mean is 910.37; the median is 1,000.00; the mode is 1,600.00; the standard deviation is 682.00; the minimum is 0.00; and the maximum is 7,700.00. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 31 shipments having missing data for this variable.

Three other economic characteristics of the countries in our sample, as reported by the CIA (2001) *The World Factbook 2001*, distinguish types of economies. These three types of economies are: Agriculture, Industry, and Service economies. As variables in our three data files, each of the three is a measure of economic activity as a percentage of the Gross Domestic Parity engaged in that particular economic activity. The variable measuring Agricultural Economic Activity is labeled PCAGGDP, the variable measuring Industry Economic Activity is labeled PCINDGP, and the variable measuring Service Economic Activity is labeled PCSERGDP. Information from the year 2000 is used for these variables, or if not available, information from the closest year that is available.

The statistics for the economic variable for Agricultural Economic Activity (PCAGGDP) are shown in Table 16.

(Put tables 16 about here)

As shown in Table 16, the statistics for the variable for the destination countries'

Agricultural Economic Activity (PCAGGDP) in the Country Case Data File are as follows. The mean is 8.13; the median is 4.00; the mode is 4.00; the standard deviation is 8.79; the minimum is 0.00; and the maximum is 39.00. A total of 52 destination countries are in the Country Case Data File, with 2 countries having missing data for this variable.

The statistics for the variable for the origination countries' Agricultural Economic Activity (PCAGGDP) in the Country Case Data File are as follows. The mean is 10.86, the median is 7.00; the mode is 3.00; the standard deviation is 10.51; the minimum is 0.00; and the maximum is 49.00. A total of 96 origination countries are in the Country Case Data File, with 4 countries having missing data for this variable.

The statistics for the variable for the destination countries' Agricultural Economic Activity (PCAGGDP) in the Destination Shipment Frequency Data File are as follows. The mean is 2.65; the median is 3.00; the mode is 3.00; the standard deviation is 1.94; the minimum is 0.00; and the maximum is 39.00. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 9 shipments having missing data for this variable.

The statistics for the variable for the origination countries' Agricultural Economic Activity (PCAGGDP) in the Origination Shipment Frequency Data File are as follows. The mean is 3.42; the median is 2.20; the mode is 2.00; the standard deviation is 3.93; the minimum is 0.00; and the maximum is 49.00. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 26 shipments having missing data for this variable.

The statistics for the economic variable for Industrial Economic Activity

(PCINDGP) are shown in Table 17.

(Put tables 17 about here)

As shown in Table 17, the statistics for the variable for the destination countries' Industrial Economic Activity (PCINDGP) in the Country Case Data File are as follows. The mean is 30.51; the median is 30.00; the mode is 35.00; the standard deviation is 5.84; the minimum is 18.00; and the maximum is 46.00. A total of 52 destination countries are in the Country Case Data File, with 2 countries having missing data for this variable.

The statistics for the variable for the origination countries' Industrial Economic Activity (PCINDGP), in the Country Case Data File are as follows. The mean is 31.38; the median is 30.55; the mode is 35.00; the standard deviation is 8.94; the minimum is 7.00; and the maximum is 55.00. A total of 96 origination countries are in the Country Case Data File, with 4 countries having missing data for this variable.

The statistics for the variable for the destination countries' Industrial Economic Activity (PCINDGP) in the Destination Shipment Frequency Data File are as follows. The mean is 28.31; the median is 30.40; the mode is 31.00; the standard deviation is 4.10; the minimum is 18.00; and the maximum is 46.00. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 9 shipments having missing data for this variable.

The statistics for the variable for the origination countries' Industrial Economic Activity (PCINDGP) in the Origination Shipment Frequency Data File are as follows. The mean is 26.61; the median is 26.30; the mode is 18.00; the standard deviation is 7.49; the minimum is 7.00 and the maximum is 55.00. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 26 shipments having missing data for

this variable.

The statistics for the economic variable for Service Economic Activity (PCSERGDP) are shown in Table 18.

(Put tables 18 about here)

As shown in Table 18, the statistics for the variable for the destination countries' Service Economic Activity (PCSERGDP) in the Country Case Data File are as follows. The mean is 61.36; the median is 63.70; the mode is 60.00; the standard deviation is 9.95; the minimum is 39.00; and the maximum is 80.00. A total of 52 destination countries are in the Country Case Data File, with 2 countries having missing data for this variable.

The statistics for the variable for the origination countries' Service Economic Activity (PCSERGDP) in the Country Case Data File are as follows. The mean is 57.77; the median is 59.00; the mode is 60.00; the standard deviation is 12.70; the minimum is 20.00; and the maximum is 90.00. A total of 96 origination countries are in the Country Case Data File, with 4 countries having missing data for this variable.

The statistics for the variable for the destination countries' Service Economic Activity (PCSERGDP) in the Destination Shipment Frequency Data File are as follows. The mean is 69.04; the median is 68.40; the mode is 66.00; the standard deviation is 4.93; the minimum is 39.00; and the maximum is 80.00. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 9 shipments having missing data for this variable.

The statistics for the variable for the origination countries' Service Economic Activity (PCSERGDP) in the Origination Shipment Frequency Data File are as follows. The mean is 69.97; the median is 70.00; the mode is 80.00; the standard deviation is 9.29;

the minimum is 20.00; and the maximum is 90.00. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 26 shipments having missing data for this variable.

Again, as reported by the CIA (2001) *The World Factbook 2001*, an additional two economic characteristics of the countries in our sample are used as variables in our three data files. These two economic characteristics of countries are trade type characteristics in that the information is the value of exports and imports for the 99 countries in our sample for the year 2000, as reported in billions of U.S. dollars. Without recoding, these values can be use in this study of transboundary waste. The variable measuring export value is labeled EXP_B, while the variable measuring import value is labeled IMP_B. The statistics for the economic variable for export value (EXP_B) are shown in Table 19.

(Put tables 19 about here)

As shown in Table 19, the statistics for the variable for the destination countries' export value (EXP_B) in the Country Case Data File are as follows. The mean is 103.530; the median is 41.200; the mode is 7.600; the standard deviation is 154.315; the minimum is 0.372; and the maximum is 776.000. A total of 52 destination countries are in the Country Case Data File, with 2 countries having missing data for this variable.

The statistics for the variable for the origination countries' export value (EXP_B) in the Country Case Data File are as follows. The mean is 65.51; the median is 14.550; the mode is 2.000; the standard deviation is 124.115; the minimum is 0.058; and the maximum is 776.000. A total of 96 origination countries are in the Country Case Data File, with 2 countries having missing data for this variable.

The statistics for the variable for the destination countries' export value (EXP_B) in the Destination Shipment Frequency Data File are as follows. The mean is 323.949; the median is 272.300; the mode is 272.300; the standard deviation is 197.800; the minimum is 0.372; and the maximum is 776.000. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 9 shipments having missing data for this variable.

The statistics for the variable for the origination countries' export value (EXP_B) in the Origination Shipment Frequency Data File are as follows. The mean is 357.978; the median is 241.100; the mode is 776.000; the standard deviation is 315.523; the minimum is 0.058; and the maximum is 776.000. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 24 shipments having missing data for this variable.

The statistics for the economic variable for export value (IMP_B) are shown in Table 20.

(Put tables 20 about here)

As shown in Table 20, the statistics for the variable for the destination countries' export value (IMP_B) in the Country Case Data File are as follows. The mean is 99.688; the median is 35.150; the mode is 3.200; the standard deviation is 192.514; the minimum is 0.579; and the maximum is 1,223.000. A total of 52 destination countries are in the Country Case Data File, with 2 countries having missing data for this variable.

The statistics for the variable for the origination countries' export value (IMP_B) in the Country Case Data File are as follows. The mean is 63.930; the median is 12.500; the mode is 2.200; the standard deviation is 148.807; the minimum is 0.305; and the

maximum is 1,223.000. A total of 96 origination countries are in the Country Case Data File, with 2 countries having missing data for this variable.

The statistics for the variable for the destination countries' export value (IMP_B) in the Destination Shipment Frequency Data File are as follows. The mean is 313.119; the median is 238.200; the mode is 238.000; the standard deviation is 302.465; the minimum is 0.579; and the maximum is 1,223.000. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 9 shipments having missing data for this variable.

The statistics for the variable for the origination countries' export value (IMP_B) in the Origination Shipment Frequency Data File are as follows. The mean is 483.859; the median is 201.200; the mode is 1,223.000; the standard deviation is 520.854; the minimum is 0.305; and the maximum is 1,223.000. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 24 shipments having missing data for this variable

Other network trade variables that are designed for use only in the Destination and Origination Shipment Frequency data files are described in the fourth section of this chapter, "Shipment Frequency Data Files - Trade Network Variables".

b. Geography and Land Use Variables

One geography and five land use variables are created from information in the CIA's (2001) *The World Factbook 2001*. A seventh variable for the "Urban Land Portion" is fashioned from information from Socioeconomic Data and Applications Center (SEDAC). An eighth variable, measuring extremely low land use is created from both CIA and SEDAC information. All geographical and land use variables are

fashioned from year 2000 data, or the closest year available, giving preference in cases of ties in chronological distance to the earlier year. The first variable created will be the geographical variable of land area.

Land area is defined as the area within the recognized boundary of the country, minus areas covered by water such as rivers and lakes. Controlling for land area may be important because this variable is related to certain types of waste produced, such as bio-waste, and is related to amounts of waste that a country can potentially absorb. The land area variable is measured in square kilometers and is labeled AREA. Statistics for the geographical variable Area (AREA) are provided in Table 21.

(Put table 21 about here)

As shown in Table 21, the statistics for the variable for the destination countries' geographical variable Area (AREA) in the Country Case Data File are as follows. The mean is 1,371,700.3; the median is 298,170.0; the mode is 1.9; the standard deviation is 3,204,472.8; the minimum is 1.9; and the maximum is 16,995,800.0. A total of 52 destination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the origination countries' geographical variable Area (AREA) in the Country Case Data File are as follows. The mean is 1,036,661.2; the median is 207,600.0; the mode is 1.9; the standard deviation is 2,571,921.3; the minimum is 1.9; and the maximum is 16,995,800.0. A total of 96 origination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the destination countries' geographical variable Area (AREA) in the Destination Shipment Frequency Data File are as follows. The

mean is 3,993,925.4; the median is 499,542.0; the mode is 9,220,970.0; the standard deviation is 4,439,824.2; the minimum is 1.9; and the maximum is 116,995,800.0. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 6 shipments having missing data for this variable.

The statistics for the variable for the origination countries' geographical variable area (AREA) in the Origination Shipment Frequency Data File are as follows. The mean is 3,854,492; the median is 349,223.0; the mode is 9,158,960.0; the standard deviation is 4,488,738.6; the minimum is 1.9; and the maximum is 16,995,800.0. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 7 shipments having missing data for this variable.

Five of the land use variables are fashioned from CIA (2001) information. These are Arable Land, Permanent Crop, Permanent Pasture, Forest and Woodland, and Other Land. Arable land is defined as: "land cultivated for crops that are replanted after each harvest like wheat, maize, and rice"³ Permanent Crop is defined as: "land cultivated for crops that are not replanted after each harvest like citrus, coffee, and rubber". Permanent Pasture is defined as: "land permanently used for herbaceous forage crops". Forest and Woodland is defined as: "land under dense or open stands of trees". Other Land includes: "any land type not specifically mentioned above, such as urban areas, roads, and deserts, etc." The land use information on all five of these is reported as a percentage of the total land area. This information is imported unchanged into our three data files as it applies to origination and/or destination countries, whatever the situation might be in each case of the three files. These five variables are labeled ARAB_L, PERMCRP, PERMPST, FOREST, and OTH_L, respectively. Statistics for the land use variable Arable Land

(ARAB_L) area provided in Table 22.

(Put table 22 about here)

As shown in Table 22, the statistics for the variable for the destination countries' land use variable Arable Land (ARAB_L) in the Country Case Data File are as follows. The mean is 19.53; the median is 17.00; the mode is 10.00; the standard deviation is 14.56; the minimum is 0.00; and the maximum is 60.00. A total of 52 destination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the origination countries' land use variable Arable Land (ARAB_L) in the Country Case Data File are as follows. The mean is 17.1; the median is 12.00; the mode is 0.00; the standard deviation is 14.74; the minimum is 0.00; and the maximum is 60.00. A total of 96 origination countries are in the Country Case Data File, with 1 country having missing data for this variable. The statistics for the variable for the destination countries' land use variable Arable Land (ARAB_L) in the Destination Shipment Frequency Data File are as follows. The mean is 19.29; the median is 19.00; the mode is 5.00; the standard deviation is 13.04; the minimum is 0.00; and the maximum is 60.00. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 6 shipments having missing data for this variable.

The statistics for the variable for the origination countries' land use variable Arable Land (ARAB_L) in the Origination Shipment Frequency Data File are as follows. The mean is 20.21; the median is 19.00; the mode is 19.00; the standard deviation is 10.85; the minimum is 0.00; and the maximum is 60.00. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 7 shipments having missing data

for this variable

Statistics for the land use variable Permanent Crops (PERMCRP) are provided in Table 23.

(Put table 23 about here)

As shown in Table 23, the statistics for the variable for the destination countries' land use variable Permanent Crops (PERMCRP) in the Country Case Data File are as follows. The mean is 2.74; the median is 1.00; the mode is 0.00; the standard deviation is 3.34; the minimum is 0.00; and the maximum is 12.00. A total of 52 destination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the origination countries' land use variable Permanent Crops (PERMCRP) in the Country Case Data File are as follows. The mean is 2.8; the median is 1.00; the mode is 0.00; the standard deviation is 3.70; the minimum is 0.00; and the maximum is 15.00. A total of 96 origination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the destination countries' land use variable Permanent Crops (PERMCRP) in the Destination Shipment Frequency Data File are as follows. The mean is 1.00; the median is 0.00; the mode is 0.00; the standard deviation is 1.96; the minimum is 0.00; and the maximum is 12.00. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 6 shipments having missing data for this variable.

The statistics for the variable for the origination countries' land use variable Permanent Crops (PERMCRP) in the Origination Shipment Frequency Data File are as

follows. The mean is 1.56; the median is 0.00; the mode is 0.00; the standard deviation is 2.85; the minimum is 0.00; and the maximum is 15.00. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 7 shipments having missing data for this variable.

Statistics for the land use variable Permanent Pasture (PERMPST) are provided in Table 24.

(Put table 24 about here)

As shown in Table 24, the statistics for the variable for the destination countries' land use variable Permanent Pasture (PERMPST) in the Country Case Data File are as follows. The mean is 20.64; the median is 15.00; the mode is 0.00; the standard deviation is 18.42; the minimum is 0.00; and the maximum is 68.00. A total of 52 destination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the origination countries' land use variable Permanent Pasture (PERMPST) in the Country Case Data File are as follows. The mean is 20.94; the median is 18.00; the mode is 0.00; the standard deviation is 17.65; the minimum is 0.0; and the maximum is 68.00. A total of 96 origination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the destination countries' land use variable Permanent Pasture (PERMPST) in the Destination Shipment Frequency Data File are as follows. The mean is 14.75; the median is 15.00; the mode is 3.00; the standard deviation is 12.58; the minimum is 0.00 and the maximum is 68.00. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 6 shipments having

missing data for this variable.

The statistics for the variable for the origination countries' land use variable Permanent Pasture (PERMPST) in the Origination Shipment Frequency Data File are as follows. The mean is 22.86; the median is 25.00; the mode is 25.00; the standard deviation is 16.21; the minimum is 0.00; and the maximum is 68.00. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 7 shipments having missing data for this variable.

Statistics for the land use variable Forest and Woodland (FOREST) are provided in Table 25.

(Put table 25 about here)

As shown in Table 25, the statistics for the destination countries' land use variable Forest and Woodland (FOREST) in the Country Case Data File are as follows. The mean is 30.98; the median is 30.00; the mode is 34.00; the standard deviation is 19.89; the minimum is 0.00; and the maximum is 76.00. A total of 52 destination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the origination countries' land use variable Forest and Woodland (FOREST) in the Country Case Data File are as follows. The mean is 27.61; the median is 27.00; the mode is 0.00; the standard deviation is 20.14; the minimum is 0.00; and the maximum is 93.00. A total of 96 origination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the destination countries' land use variable Forest and Woodland (FOREST) in the Destination Shipment Frequency Data File are as follows. The mean is 36.63; the median is 31.00; the mode is 54.00; the standard

deviation is 17.48; the minimum is 0.00; and the maximum is 76.00. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 6 shipments having missing data for this variable.

The statistics for the variable for the origination countries' land use variable Forest and Woodland (FOREST) in the Origination Shipment Frequency Data File are as follows. The mean is 28.46; the median is 30.00; the mode is 30.00; the standard deviation is 14.28; the minimum is 0.00; and the maximum is 93.00. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 7 shipments having missing data for this variable.

Statistics for land use variable Other Land (OTH_L) are provided in Table 26.
(Put table 26 about here)

As shown in Table 26, the statistics for the destination countries' land use variable Other Land (OTH_L) in the Country Case Data File are as follows. The mean is 26.12; the median is 20.00; the mode is 14.00; the standard deviation is 20.16; the minimum is 3.00; and the maximum is 100.00. A total of 52 destination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the origination countries' land use variable Other Land (OTH_L) in the Country Case Data File are as follows. The mean is 31.42; the median is 20.00; the mode is 14.00; the standard deviation is 26.23; the minimum is 3.00; and the maximum is 100.00. A total of 96 origination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the destination countries' land use variable Other Land (OTH_L) in the Destination Shipment Frequency Data File are as follows. The

mean is 28.33; the median is 26.00; the mode is 38.00; the standard deviation is 10.17; the minimum is 3.00; and the maximum is 100.00. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 6 shipments having missing data for this variable.

The statistics for the variable for the origination countries' land use variable Other Land (OTH_L) in the Origination Shipment Frequency Data File are as follows. The mean is 26.90; the median is 26.00; the mode is 26.00; the standard deviation is 13.94; the minimum is 3.00; and the maximum is 100.00. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 7 shipments having missing data for this variable.

A sixth land use variable on urban land use is produced in an identical fashion to the previous five, using data from the SEDAC (2000): "Gridded Populations of the World". The information on this data is given as a percentage of the total land area and is imported unchanged into our three data files, in the manner described in the previous paragraph. This land use variable Urban Use is labeled URB_L. Statistics for land use variable Urban Use (URB_L) are provided in Table 27.

(Put table 27 about here)

As shown in Table 27, the statistics for the destination countries' land use variable Urban Use (URB_L) in the Country Case Data File are as follows. The mean is 12.77; the median is 8.18; the mode is 0.00; the standard deviation is 15.00; the minimum is 0.00; and the maximum is 91.00. A total of 52 destination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the origination countries' land use variable

Urban Use (URB_L) in the Country Case Data File are as follows. The mean is 13.33; the median is 6.09; the mode is 0.00; the standard deviation is 19.37; the minimum is 0.00; and the maximum is 98.00. A total of 96 origination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the destination countries' land use variable Urban Use (URB_L) in the Destination Shipment Frequency Data File are as follows. The mean is 13.25; the median is 13.73; the mode is 1.00; the standard deviation is 11.98; the minimum is 0.00; and the maximum is 91.00. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 6 shipments having missing data for this variable.

The statistics for the variable for the origination countries' land use variable Urban Use (URB_L) in the Origination Shipment Frequency Data File are as follows. The mean is 14.18; the median is 8.2; the mode is 8.00; the standard deviation is 12.75; the minimum is 0.00; and the maximum is 98.00. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 7 shipments having missing data for this variable.

An eighth variable is created using data from the CIA's (2001) *The World Factbook 2001* and the SEDAC (2000). The portion of urban land in the latter is subtracted from Other Land in the former, creating a variable for extremely low land use land, land that might be considered especially available for the disposal of waste. This variable for the portion of land in extremely low use is labeled LOWUSL. Statistics for land use variable Extremely Low Use (LOWUSL) are provided in Table 28.

(Put table 28 about here)

As shown in Table 28, the statistics for the destination countries' land use variable

Extremely Low Use (LOWUSL) in the Country Case Data File are as follows. The mean is 15.02; the median is 9.17; the mode is 0.00; the standard deviation is 17.50; the minimum is 0.00; and the maximum is 67.00. A total of 52 destination countries are in the Country Case Data File, with 2 countries having missing data for this variable.

The statistics for the variable for the origination countries' land use variable Extremely Low Use (LOWUSL) in the Country Case Data File are as follows. The mean is 20.52; the median is 11.56; the mode is 0.00; the standard deviation is 24.91; the minimum is 0.00; and the maximum is 96.00. A total of 96 origination countries are in the Country Case Data File, with 2 countries having missing data for this variable.

The statistics for the variable for the destination countries' land use variable Extremely Low Use (LOWUSL) in the Destination Shipment Frequency Data File are as follows. The mean is 16.25; the median is 9.03; the mode is 37.00; the standard deviation is 16.02; the minimum is 0.00; and the maximum is 67.00. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 9 shipments having missing data for this variable.

The statistics for the variable for the origination countries' land use variable Extremely Low Use (LOWUSL) in the Origination Shipment Frequency Data File are as follows. The mean is 13.86; the median is 9.90; the mode is 18.00; the standard deviation is 14.12; the minimum is 0.00; and the maximum is 96.00. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 9 shipments having missing data for this variable.

c. Demographic Variables

Five of the six demographic variables are produced solely from information in the

CIA's (2001) *The World Factbook 2001*. These five are Population, Population Density, Infant Mortality, Life Expectancy at Birth, and Total Fertility Rate. Population data, as reported in *The World Factbook 2001* is the total population of a country and is used without recoding as a variable for Population and is used in calculating Population Density. Population Density is calculated from CIA data by dividing the population of a country by their land area and is given in people per square kilometer. Infant Mortality Rate is the number of deaths of infants under one year old per 1,000 live births in the same year. Life Expectancy at Birth is the average number of years to be lived by a group of people born in the same year if the death rate remains the same. Total Fertility Rate is the average number of children that would be born per woman if all women lived to the end of their childbearing years and bore children according to a given fertility rate at each age. These five demographic variables are exported into the three data files, according to the appropriate origination and destination country to which they apply, and are labeled POP, POPDS, INMR, LIFE, and TFR, respectively. Statistics for the demographic variable Population (POP) are provided in Table 29.

(Put table 29 about here)

As shown in Table 29, the statistics for the destination countries' demographic variable Population (POP) in the Country Case Data File are as follows. The mean is 41,107,224; the median is 15,981,472; the mode is 31,842; the standard deviation is 58,596,292; the minimum is 31,842; and the maximum is 278,058,881. A total of 52 destination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the origination countries' demographic variable

Population (POP) in the Country Case Data File are as follows. The mean is 43,360,354; the median is 10,106,017; the mode is 31,842; the standard deviation is 137,000,000; the minimum is 31,842; and the maximum is 1,270,000,000. A total of 96 origination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the destination countries' demographic variable Population (POP) in the Destination Shipment Frequency Data File are as follows. The mean is 60,133,254; the median is 31,592,805; the mode is 31,592,805, the standard deviation is 69,499,246; the minimum is 31,842; and the maximum is 278,058,881. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 6 shipments having missing data for this variable.

The statistics for the variable for the origination countries' demographic variable Population (POP) in the Origination Shipment Frequency Data File are as follows. The mean is 109,000,000; the median is 31,592,805; the mode is 278,058,881; the standard deviation is 132,000,000; the minimum is 31,842; and the maximum is 1,270,000. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 7 shipments having missing data for this variable.

Statistics for the demographic variable Population Density (POPDS) are provided in Table 30.

(Put table 30 about here)

As shown in Table 30, the statistics for the destination countries' demographic variable Population Density (POPDS) in the Country Case Data File are as follows. The mean is 570.81; the median is 80.15; the mode is 2.54; the standard deviation is 2,494.24;

the minimum is 2.54; and the maximum is 16,758.95. A total of 52 destination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the origination countries' demographic variable Population Density (POPDS) in the Country Case Data File are as follows. The mean is 438.09; the median is 76.83; the mode is 2.54; the standard deviation is 1,956.40; the minimum is 2.54; and the maximum is 16,758.95. A total of 96 origination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the destination countries' demographic variable Population Density (POPDS) in the Destination Shipment Frequency Data File are as follows. The mean is 140.21; the median is 80.15; the mode is 3.43; the standard deviation is 406.57; the minimum is 2.54; and the maximum is 16,758.95. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 6 shipments having missing data for this variable.

The statistics for the variable for the origination countries' demographic variable Population Density (POPDS) in the Origination Shipment Frequency Data File are as follows. The mean is 209.59; the median is 55.75; the mode is 30.36; the standard deviation is 1,148.40; the minimum is 2.54; and the maximum is 16,758.95. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 7 shipments having missing data for this variable.

Statistics for the demographic variable Infant Mortality Rate (INMR) are provided in Table 31.

(Put table 31 about here)

As shown in Table 31, the statistics for the destination countries' demographic

variable Infant Mortality Rate (INMR) in the Country Case Data File are as follows.

The mean is 17.16; the median is 6.76; the mode is 3.47; the standard deviation is 19.09; the minimum is 3.47; and the maximum is 76.5. A total of 52 destination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the origination countries' demographic variable Infant Mortality Rate (INMR) in the Country Case Data File are as follows. The mean is 24.16; the median is 14.65; the mode is 5.83; the standard deviation is 24.55; the minimum is 3.47; and the maximum is 121.12. A total of 96 origination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the destination countries' demographic variable Infant Mortality Rate (INMR) in the Destination Shipment Frequency Data File are as follows. The mean is 5.48; the median is 5.02; the mode is 5.02; the standard deviation is 4.17; the minimum is 3.47; and the maximum is 76.50. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 7 shipments having missing data for this variable.

The statistics for the variable for the origination countries' demographic variable Infant Mortality Rate (INMR) in the Origination Shipment Frequency Data File are as follows. The mean is 7.51; the median is 5.55; the mode is 6.76; the standard deviation is 8.27; the minimum is 3.47; and the maximum is 121.12. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 7 shipments having missing data for this variable.

Statistics for the demographic variable Life Expectancy at Birth (LIFE) are provided in Table 32.

(Put table 32 about here)

As shown in Table 32, the statistics for the destination countries' demographic variable Life Expectancy at Birth (LIFE) in the Country Case Data File are as follows. The mean is 73.29; the median is 75.08; the mode is 75.08; the standard deviation is 48.09; the minimum is 48.09; and the maximum is 80.80. A total of 52 destination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the origination countries' demographic variable Life Expectancy at Birth (LIFE) in the Country Case Data File are as follows. The mean is 70.99; the median is 73.42; the mode is 75.94; the standard deviation is 9.26; the minimum is 37.08; and the maximum is 83.47. A total of 96 origination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the destination countries' demographic variable Life Expectancy at Birth (LIFE) in the Destination Shipment Frequency Data File are as follows. The mean is 78.14; the median is 78.43; the mode is 79.16; the standard deviation is 1.91; the minimum is 48.09; and the maximum is 80.80. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 7 shipments having missing data for this variable.

The statistics for the variable for the origination countries's demographic variable Life Expectancy at Birth (LIFE) in the Origination Shipment Frequency Data File are as follows. The mean is 76.90; the median is 77.26; the mode is 77.26; the standard deviation is 3.31; the minimum is 37.08; and the maximum is 83.47. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 7 shipments having

missing data for this variable.

Statistics for the demographic variable Total Birth Rate (TFR) are provided in Table 33.

(Put table 33 about here)

As shown in Table 33, the statistics for the destination countries' demographic variable Total Birth Rate (TFR) in the Country Case Data File are as follows. The mean is 1.81; the median is 1.70; the mode is 1.15; the standard deviation is 0.62; the minimum is 1.13; and the maximum is 3.42. A total of 52 destination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the origination countries' demographic variable Total Birth Rate (TFR) in the Country Case Data File are as follows. The mean is 2.40; the median is 1.82; the mode is 1.25; the standard deviation is 1.36; the minimum is 1.13; and the maximum is 6.97. A total of 96 origination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the destination countries' demographic variable Total Birth Rate (TFR) in the Destination Shipment Frequency Data File are as follows. The mean is 1.61; the median is 1.60; the mode is 1.60; the standard deviation is 0.23; the minimum is 1.13; and the maximum is 3.42. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 7 shipments having missing data for this variable.

The statistics for the variable for the origination countries' demographic variable Total Birth Rate (TFR) in the Origination Shipment Frequency Data File are as follows. The mean is 1.79; the median is 1.75; the mode is 2.06; the standard deviation is 0.41; the

minimum is 1.13 and the maximum is 6.97. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 7 shipments having missing data for this variable.

The sixth demographic variable, Non-Urban Population Density uses information from the CIA's (2001), *The World Factbook 2001* as a source, but also uses information from the SEDAC (2000), and the United Nations' *Demographic Yearbook* (2000, 2001, 2002, 2003). The CIA is used as a source for the land area and population of countries. The United Nations is used as a source of the percentage of population living in urban areas. The SEDAC is used as a source of the percent of urban land area. The population of non-urban land of countries and the non-urban land area of countries was calculated from this information. The population density of countries' non-urban land areas was calculated by dividing the non-urban population by the non-urban land area and is given in people per square kilometer. This variable is labeled NURBPD and is exported into the three data files, according to the appropriate origination and destination country to which they apply. Statistics for the demographic variable Non-Urban Population Density (NURBPD) are provided in Table 34.

(Put table 34 about here)

As shown in Table 34, the statistics for the destination countries' demographic variable Non-Urban Population Density (NURBPD) in the Country Case Data File are as follows. The mean is 33.36; the median is 24.31; the mode is 0.00; the standard deviation is 36.42; the minimum is 0.00; and the maximum is 188.96. A total of 52 destination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the origination countries' demographic variable Non-Urban Population Density (NURBPD) in the Country Case Data File are as follows. The mean is 211.74; the median is 27.05; the mode is 0.00; the standard deviation is 1,623.05; the minimum is 0.00; and the maximum is 15,847.48. A total of 96 origination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the destination countries' demographic variable Non-Urban Population Density (NURBPD) in the Destination Shipment Frequency Data File are as follows. The mean is 20.32; the median is 15.06; the mode is 0.73; the standard deviation is 22.29; the minimum is 0.00; and the maximum is 188.96. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 6 shipments having missing data for this variable.

The statistics for the variable for the origination countries' demographic variable Non-Urban Population Density (NURBPD) in the Origination Shipment Frequency Data File are as follows. The mean is 44.59; the median is 15.06; the mode is 7.48; the standard deviation is 479.77; the minimum is 0.00; and the maximum is 15,847.48. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 7 shipments having missing data for this variable.

d. Energy Variables

The amount of energy that a country consumes is thought to be an indicator of the economic development level of a country and is also an indicator of the amount of waste a country generates. Information for four energy variables was obtained from The World Bank's *World Development Indicators* (WDI)" (2000, 20001, 2002,

2003) and the World Bank, *2002 World Bank Atlas*. The WDI gives each country's energy consumption in kilowatt-hours of electricity consumed per capita and energy consumption in kilograms of oil equivalents per capita. The World Bank gives the population of each country. Two variables for total kilowatt-hours of electricity consumed and total energy equivalent in kilograms of oil consumed are calculated by multiplying each country's per capita consumption of each of the two by their population. The variable for electricity consumed per capita is labeled ELCPC. The variable for energy equivalent in oil consumed per capita is labeled ENGYPC. The variable for total electricity consumed is ELECCON and the variable for total energy equivalent in oil consumed is ENGYCON. Statistics for the energy variable Electricity Consumed per Capita (ELCPC) are provided in Table 35.

(Put tables 35 about here)

As shown in Table 35, the statistics for the destination countries' energy variable Electricity Consumed per Capita (ELCPC) in the Country Case Data File are as follows. The mean is 5,436.40; the median is 4,417.03; the mode is 285.31; the standard deviation is 4,655.85; the minimum is 285.31; and the maximum is 24,389.45. A total of 52 destination countries are in the Country Case Data File, with 2 countries having missing data for this variable.

The statistics for the variable for the origination countries' energy variable Electricity Consumed per Capita (ELCPC) in the Country Case Data File are as follows. The mean is 4,426.29; the median is 2,937.05; the mode is 56.77; the standard deviation is 4,772.62; the minimum is 56.77; and the maximum is 24,690.39. A total of 96 origination countries are in the Country Case Data File, with 11 countries having missing

data for this variable.

The statistics for the variable for the destination countries' energy variable Electricity Consumed per Capita (ELCPC) in the Destination Shipment Frequency Data File are as follows. The mean is 10,194.20; the median is 7,563.60; the mode is 15,648.64; the standard deviation is 4,703.88; the minimum is 285.31; and the maximum is 24,389.45. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 9 shipments having missing data for this variable.

The statistics for the variable for the origination countries' energy variable Electricity Consumed per Capita (ELCPC) in the Origination Shipment Frequency Data File are as follows. The mean is 9,270.13; the median is 7,563.60; the mode is 12,398.96; the standard deviation is 4,648.54; the minimum is 56.77; and the maximum is 24,690.39. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 82 shipments having missing data for this variable.

Statistics for the energy variable Energy Equivalent in Oil Consumed per Capita (ENGYPC) are provided in Table 36.

(Put tables 36 about here)

As shown in Table 36, the statistics for the destination countries' energy variable Energy Equivalent in Oil Consumed per Capita (ENGYPC) in the Country Case Data File are as follows. The mean is 3,383.16, the median is 3,226.09; the mode is 347.40; the standard deviation is 1,963.60; the minimum is 347.40; and the maximum is 8,408.68. A total of 52 destination countries are in the Country Case Data File, with 2 countries having missing data for this variable.

The statistics for the variable for the origination countries' energy variable Energy

Equivalent in Oil Consumed per Capita (ENGYPC) in the Country Case Data File are as follows. The mean is 3,037.48; the median is 2,473.95; the mode is 216.65; the standard deviation is 2,515.12; the minimum is 216.65 and the maximum is 11,544.48. A total of 96 origination countries are in the Country Case Data File, with 11 countries having missing data for this variable.

The statistics for the variable for the destination countries' energy variable Energy Equivalent in Oil Consumed per Capita (ENGYPC) in the Destination Shipment Frequency Data File are as follows. The mean is 5,929.62; the median is 5,785.31; the mode is 8,154.32; the standard deviation is 1,991.13; the minimum is 347.40 and the maximum is 8,408.68. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 9 shipments having missing data for this variable.

The statistics for the variable for the origination countries' energy variable Energy Equivalent in Oil Consumed per Capita (ENGYPC) in the Origination Shipment Frequency Data File are as follows. The mean is 5,777.57; the median is 5,743.04; the mode is 8,158.85; the standard deviation is 2,408.21; the minimum is 216.65 and the maximum is 11,544.48. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 82 shipments having missing data for this variable.

Statistics for the energy variable Total Electricity Consumed (ELECCON) are provided in Table 37.

(Put tables 37 about here)

As shown in Table 37, the statistics for the destination countries' energy variable Total Electricity Consumed (ELECCON) in the Country Case Data File are as follows. The mean is 267,600,000,000; the median is 62,960,000,000; the mode is 1,276,000,000;

the standard deviation is 645,300,000,000; the minimum is 1,276,000,000 and the maximum is 3,499,000,000,000. A total of 52 destination countries are in the Country Case Data File, with 2 countries having missing data for this variable.

The statistics for the variable for the origination countries' energy variable Total Electricity Consumed (ELECCON) in the Country Case Data File are as follows. The mean is 182,900,000,000; the median is 36,300,000,000; the mode is 347,160,660; the standard deviation is 523,000,000,000; the minimum is 347,160,660; and the maximum is 3,488,000,000,000. A total of 96 origination countries are in the Country Case Data File, with 11 countries having missing data for this variable.

The statistics for the variable for the destination countries' energy variable Energy Total Electricity Consumed (ELECCON) in the Destination Shipment Frequency Data File are as follows. The mean is 627,300,000,000; the median is 481,500,000,000; the mode is 481,500,000,000; the standard deviation is 881,400,000,000; the minimum is 1,276,000,000; and the maximum is 3,499,000,000,000. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 9 shipments having missing data for this variable.

The statistics for the variable for the origination countries' energy variable Total Electricity Consumed (ELECCON) in the Origination Shipment Frequency Data File are as follows. The mean is 1,321,000,000,000; the median is 385,100,000,000; the mode is 3,499,000,000,000; the standard deviation is 15,700,000,000; the minimum is 347,160,660 and the maximum is 3,499,000,000,000. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 82 shipments having missing data for this variable.

Statistics for the energy variable Total Energy Equivalent in Oil Consumed (ENGYCON) are provided in Table 38.

(Put tables 38 about here)

As shown in Table 38, the statistics for the destination countries' energy variable Total Energy Equivalent in Oil Consumed (ENGYCON) in the Country Case Data File are as follows. The mean is 156,300,000,000; the median is 49,280,000,000; the mode is 991,479,600; the standard deviation is 345,700,000,000; the minimum is 99,479,600 and the maximum is 2,303,000,000,000. A total of 52 destination countries are in the Country Case Data File, with two countries having missing data for this variable.

The statistics for the variable for the origination countries' energy variable Total Energy Equivalent in Oil Consumed (ENGYCON) in the Country Case Data File is as follows. The mean is 141,100,000,000; the median is 25,330,000,00; the mode is 99,149,600; the standard deviation is 295,200,000,000; the minimum is 99,149,600; and the maximum is 2,303,000,000,000. A total of 96 origination countries are in the Country Case Data File, with 11 countries having missing data for this variable.

The statistics for the variable for the destination countries' energy variable Total Energy Equivalent in Oil Consumed (ENGYCON) in the Destination Shipment Frequency Data File are as follows. The mean is 386,100,000,000; the median is 250,900,000,000; the mode is 250,900,000,000; the standard deviation is 570,500,000,000; the minimum is 991,479,600 and the maximum is 2,303,000,000,000. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 9 shipments having missing data for this variable.

The statistics for the variable for the origination countries' energy variable Total

Energy Equivalent in Oil Consumed (ENGYCON) in the Origination Shipment Frequency Data File are as follows. The mean is 843,600,000,000; the median is 250,900,000,000; the mode is 2,303,000,000,000; the standard deviation is 1,022,000,000,000; the minimum is 1,106,214,100 and the maximum is 2,303,000,000,000. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 82 shipments having missing data for this variable.

e. Environmental Variables

Information on the Ecological Footprint of countries for the year 2000 is obtained from *Ecological Footprint of Countries 2004*. The footprint is given in global hectares per capita, which will be exported into my three statistical data files unchanged, as applicable to each Destination and Origination country. A second environmental variable is created by multiplying each country's ecological footprint by its population for the year 2000 as provided by the CIA (2001). The ecological footprint per capita variable is labeled ECOFTPPC. The second variable that measures total ecological impact for a country given in total global hectares is labeled ECOFTP. Statistics for the environmental variable Ecological Footprint per Capita (ECOFTPPC) are provided in Table 39.

(Put table 39 about here)

As shown in Table 39, the statistics for the destination countries' Ecological Footprint per Capita (ECOFTPPC) in the Country Case Data File are as follows. The mean is 4.18; the median is 3.94; the mode is 3.26; the standard deviation is 2.12; the minimum is 0.76; and the maximum is 9.57. A total of 52 destination countries are in the Country Case Data File, with four countries having missing data for this variable.

The statistics for the variable for the origination countries' Ecological Footprint per Capita (ECOFTPPC) in the Country Case Data File are as follows. The mean is 3.42; the median is 3.17; the mode is 3.26; the standard deviation is 2.19; the minimum is 0.64; and the maximum is 9.57. A total of 96 origination countries are in the Country Case Data File, with 15 countries having missing data for this variable.

The statistics for the variable for the destination countries' Ecological Footprint per Capita (ECOFTPPC) in the Destination Shipment Frequency Data File are as follows. The mean is 6.48; the median is 5.74; the mode is 8.56; the standard deviation is 2.09; the minimum is 0.76; and the maximum is 9.57. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 12 shipments having missing data for this variable.

The statistics for the variable for the origination countries' Ecological Footprint per Capita (ECOFTPPC) in the Origination Shipment Frequency Data File are as follows. The mean is 6.58; the median is 5.34; the mode is 9.57; the standard deviation is 2.55; the minimum is 0.64; and the maximum is 9.57. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 133 shipments having missing data for this variable.

Statistics for the environmental variable Total Ecological Footprint (ECOFTP) are provided in Table 40.

Put table 40 about here)

As shown in Table 40, the statistics for the destination countries' Total Ecological Footprint (ECOFTP) in the Country Case Data File are as follows. The mean is 172,000,000; the median is 59,316,165; the mode is 2,263,587; the standard deviation is

392,000,000; the minimum is 2,263,587; and the maximum is 2,660,000,000. A total of 52 destination countries are in the Country Case Data File, with 4 countries having missing data for this variable.

The statistics for the variable for the origination countries' Total Ecological Footprint (ECOFTP) in the Country Case Data File are as follows. The mean is 137,000,000; the median is 38,310,021; the mode is 625,320; the standard deviation is 358,000,000; the minimum is 625,320 and the maximum is 2,660,000,000. A total of 96 origination countries are in the Country Case Data File, with 15 countries having missing data for this variable.

The statistics for the variable for the destination countries' Total Ecological Footprint (ECOFTP) in the Destination Shipment Frequency Data File are as follows. The mean is 425,000,000; the median is 270,000,000; the mode is 270,434,411; the standard deviation is 664,000,000; the minimum is 2,263,587 and the maximum is 2,660,000,000. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 12 shipments having missing data for this variable.

The statistics for the variable for the origination countries' Total Ecological Footprint (ECOFTP) in the Origination Shipment Frequency Data File are as follows. The mean is 996,000,000; the median is 207,000,000,000; the mode is 2,660,000,000; the standard deviation is 1,200,000,000; the minimum is 625,320; and the maximum is 2,660,000,000. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 133 shipments having missing data for this variable.

The CIA's (2001) *The World Factbook 2001* provides information for three additional environmental variables. For each country, information is provided on the

number of environmental treaties to which a country has preliminarily agreed, but has not as yet ratified and also on the number of these treaties each country has ratified.

Additionally, environmental issues or concerns are listed for each country, for example, "extensive soil erosion" or "moderate to severe water pollution".

The total number of environmental treaties for which a country has a preliminarily agreement plus the total number of treaties they have ratified is summed up to create a variable labeled E_TT_PNR. The total number of environmental treaties a country has ratified is counted, creating a variable labeled E_TRT_P. The total environmental issues or concerns for each country are counted to create a variable labeled EV_ISS. These three newly created environmental variables are appropriately exported into each of my three data files, according to the destination and origination country that they describe.

Statistics for the environmental variable Total Environmental Treaties (E_TT_PNR) are provided in Table 41.

(Put table 41 about here)

As shown in Table 40, the statistics for the destination countries' Total Environmental Treaties (E_TT_PNR) in the Country Case Data File are as follows. The mean is 18.4; the median is 20.0; the mode is 20.0; the standard deviation is 6.0; the minimum is 5; and the maximum is 27. A total of 52 destination countries are in the Country Case Data File, with one country having missing data for this variable.

The statistics for the variable for the origination countries' Total Environmental Treaties (E_TT_PNR) in the Country Case Data File are as follows. The mean is 14.92; the median is 14.00; the mode is 11.00; the standard deviation is 6.5; the minimum is 0; and the maximum is 27. A total of 96 origination countries are in the Country Case Data

File, with one country having missing data for this variable.

The statistics for the variable for the destination countries' Total Environmental Treaties (E_TT_PNR) in the Destination Shipment Frequency Data File are as follows. The mean is 25.17; the median is 26.00; the mode is 26.00; the standard deviation is 2.11; the minimum is 5 and the maximum is 27. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 7 shipments having missing data for this variable.

The statistics for the variable for the origination countries' Total Environmental Treaties (E_TT_PNR) in the Origination Shipment Frequency Data File are as follows. The mean is 22.79; the median is 24.00; the mode is 24.00; the standard deviation is 4.49; the minimum is 0 and the maximum is 27. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 7 shipments having missing data for this variable.

Statistics for the environmental variable Total Ratified Environmental Treaties (E_TRT_P) are provided in Table 42.

(Put table 42 about here)

As shown in Table 42, the statistics for the destination countries' Total Ratified Environmental Treaties (E_TRT_P) in the Country Case Data File are as follows. The mean is 16.37; the median is 17.00; the mode is 12; the standard deviation is 5.42; the minimum is 6; and the maximum is 25. A total of 52 destination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the origination countries' Total Ratified Environmental Treaties (E_TRT_P) in the Country Case Data File are as follows. The

mean is 13.3; the median is 12.00; the mode is 9.00; the standard deviation is 5.77; the minimum is 0; and the maximum is 25. A total of 96 origination countries are in the Country Case Data File, with 1 country having missing data for this variable.

The statistics for the variable for the destination countries' Total Ratified Environmental Treaties (E_TRT_P) in the Destination Shipment Frequency Data File are as follows. The mean is 21.90; the median is 22.00; the mode is 21; the standard deviation is 2.30; the minimum is 6; and the maximum is 25. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 7 shipments having missing data for this variable.

The statistics for the variable for the origination countries' Total Ratified Environmental Treaties (E_TRT_P) in the Origination Shipment Frequency Data File are as follows. The mean is 19.42; the median is 19.0; the mode is 19; the standard deviation is 4.09; the minimum is 0 and the maximum is 25. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 7 shipments having missing data for this variable.

Statistics for the environmental variable Total Environmental Issues (EV_ISS) are provided in Table 43.

(Put table 43 about here)

As shown in Table 43, the statistics for the destination countries' Total Environmental Issues (EV_ISS) in the Country Case Data File are as follows. The mean is 3.86; the median is 4.00; the mode is 3; the standard deviation is 1.29; the minimum is 1; and the maximum is 7. A total of 52 destination countries are in the Country Case Data File, with 2 countries having missing data for this variable.

The statistics for the variable for the origination countries' Total Environmental Issues (EV_ISS) in the Country Case Data File are as follows. The mean is 3.81; the median is 4.00; the mode is 3.00; the standard deviation is 1.33; the minimum is 1; and the maximum is 8. A total of 96 origination countries are in the Country Case Data File, with 2 countries having missing data for this variable.

The statistics for the variable for the destination countries' Total Environmental Issues (EV_ISS) in the Destination Shipment Frequency Data File are as follows. The mean is 3.59; the median is 3.00; the mode is 3; the standard deviation is 1.20; the minimum is 1; and the maximum is 7. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 9 shipments having missing data for this variable.

The statistics for the variable for the origination countries' Total Environmental Issues (EV_ISS) in the Origination Shipment Frequency Data File are as follows. The mean is 3.52; the median is 4.00; the mode is 4; the standard deviation is 1.16; the minimum is 1 and the maximum is 8. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 24 shipments having missing data for this variable.

f. Traditional Trade Variables

All of the information used in creating the four traditional types of trade variables in this segment of Chapter IV, “Variables and Variable Creation”, is obtained from the CIA’s (2001) *The World Factbook 2001*. The first two of these traditional trade variables address the energy trade of countries.

In Chapter II, “Review of the Literature”, it was discussed how some writers and researchers posit a relationship may exist between a country's energy exports and imports and its waste exports and imports. Information in *The World Factbook 2001* allows for

the creation of two variables to control for energy exports and energy imports. In the primary exports and imports of countries reporting section of this book, both oil and fuel may be among the list of raw materials and products. In the book's Electricity section, information reporting electricity production, and the importation and exportation of electricity for each country allows for a calculation to determine if a country is a net electricity exporter or a net electricity importer.

Using the information discussed in the previous paragraph, a variable for "net energy exporter" can be created and a variable for "net energy importer" can also be created. Coding 1 for "yes" when a country is a primary exporter of either oil or electricity and coding 2 for "no" they are not, creates a variable for "net energy exporter". This variable is labeled EXEG. Coding 1 for "yes" when a country is a primary importer of either oil or electricity and coding 2 for "no" they are not creates a variable for "net energy importer". This variable is labeled IMEG.

Statistics for the energy variable Net Energy Exporter (EXEG) are provided in Table 44.

(Put table 44 about here)

As shown in Table 44, the statistics for the destination countries' Net Energy Exporter (EXEG) in the Country Case Data File are as follows. The mean is 1.75; the median is 2.00; the mode is 2; the standard deviation is 0.42; the minimum is 1; and the maximum is 2. 11 cases, or 21.2% of the cases were Net Energy Exporters and 38 cases, or 73.1% of the cases were not Net Energy Exporters. A total of 52 destination countries are in the Country Case Data File, with 2 countries having missing data for this variable.

The statistics for the origination countries' Net Energy Exporter (EXEG) in the

Country Case Data File are as follows. The mean is 1.78; the median is 2.00; the mode is 2; the standard deviation is 0.41; the minimum is 1; and the maximum is 2. 20 cases, or 20.8% of the cases were Net Energy Exporters and 72 cases, or 75.0% of the cases were not Net Energy Exporters. A total of 96 origination countries are in the Country Case Data File, with 4 countries having missing data for this variable.

The statistics for the variable for the destination countries' Net Energy Exporter (EXEG) in the Destination Shipment Frequency Data File are as follows. The mean is 1.65; the median is 2.00; the mode is 2; the standard deviation is 0.4; the minimum is 1; and the maximum is 2. 1,412 cases, or 34.5% of the cases were Net Energy Exporters and 2,665 cases, or 65.2% of the cases were not Net Energy Exporters. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 18 shipments having missing data for this variable.

The statistics for the variable for the origination countries' Net Energy Exporter (EXEG) in the Origination Shipment Frequency Data File are as follows. The mean is 1.88, the median is 2.00, the mode is 2, the standard deviation is 0.32, the minimum is 1 and the maximum is 2. 474 cases or 11.6% of the cases were Net Energy Exporters and 3,551 cases or 86.8% of the cases were not Net Energy Exporters. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 65 shipments having missing data for this variable.

Statistics for the energy variable Net Energy Importer (IMEG) are provided in Table 45.

(Put table 45 about here)

As shown in Table 45, the statistics for the destination countries' Net Energy

Importer (IMEG) in the Country Case Data File are as follows. The mean is 1.32; the median is 1.00; the mode is 1; the standard deviation is 0.47; the minimum is 1; and the maximum is 2. 34 cases, or 65.4% of the cases were Net Energy Importers and 16 cases, or 30.8% of the cases were not Net Energy Importers. A total of 52 destination countries are in the Country Case Data File, with 2 countries having missing data for this variable.

The statistics for the origination countries' Net Energy Importer (IMEG) in the Country Case Data File are as follows. The mean is 1.34; the median is 1.00; the mode is 1; the standard deviation is 0.48; the minimum is 1 and the maximum is 2. 61 cases, or 63.5% of the cases were Net Energy Importers and 31 cases, or 32.3% of the cases were not Net Energy Importers. A total of 96 origination countries are in the Country Case Data File, with 4 countries having missing data for this variable.

The statistics for the variable for the destination countries' Net Energy Importer (IMEG) in the Destination Shipment Frequency Data File are as follows. The mean is 1.29; the median is 1.00; the mode is 1; the standard deviation is 0.45; the minimum is 1 and the maximum is 2. 2,917 cases, or 71.3% of the cases were Net Energy Importers and 1,164 cases, or 28.5% of the cases were not Net Energy Importers. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 9 shipments having missing data for this variable.

The statistics for the variable for the origination countries' Net Energy Importer (IMEG) in the Origination Shipment Frequency Data File are as follows. The mean is 1.23; the median is 1.00; the mode is 1; the standard deviation is 0.42; the minimum is 1; and the maximum is 2. 3,097 cases, or 75.7% of the cases were Net Energy Importers and 937 cases, or 23.0% of the cases were not Net Energy Importers. A total of 4,090

shipments are in the Origination Shipment Frequency Data File, with 54 shipments having missing data for this variable.

A dummy variable is created for EXEG. Recoding "yes" as 0, and recoding "no" as 1, creates the dummy variable. The dummy variable for EXEG is labeled EXEGDUM2. The "yes" Net Energy Exporter is the comparison category.

In exactly the same manner as I did for EXEG, a dummy variable is created for IMEG. The first dummy variable for IMEG is labeled IMEGDUM2. The "yes" Net Energy Importer is the comparison category.

The world-system theoretical perspective, as discussed in the theoretical section of the Review of the Literature chapter, posits that a country's position in the world-system is reflected in its exports and imports. Core or industrialized countries are primarily thought to import raw materials and export manufactured products. The reverse is thought to be true for periphery or developing countries. Since world-system position is perceived as being reflected in regular imports and exports, perhaps it is also reflected in transboundary waste movement of countries.

The World Factbook (2001) also provides information to control for this factor. Two variables on primary exports and imports can be created from the information found in the book. This information provides two lists of up to a dozen items, one for a country's primary exports and the other for the country's primary imports.

A variable for primary exports is created by examining the list of primary exports for each country, coding 1 if the export list is primarily raw materials, coding 2 if the list is primarily manufactured products and coding 3 if the export list is a mixture of each. This variable for primary exports is labeled EXCM. Statistics for the trade

variable Primary Exports (EXCM) are provided in Table 46.

(Put table 46 about here)

As shown in Table 46, the statistics for the destination countries' Primary Exports (EXCM) in the Country Case Data File are as follows. The mean is 1.88; the median is 2.00; the mode is 2; the standard deviation is 0.59; the minimum is 1; and the maximum is 3. 12 cases or 23.1% of the cases exported primarily raw materials. 32 cases or 61.5% of the cases exported primarily manufactured goods. 6 cases or 11.5% of the cases exported a mixture of raw materials and manufactured goods. A total of 52 destination countries are in the Country Case Data File, with 2 countries having missing data for this variable.

The statistics for the origination countries' Primary Exports (EXCM) in the Country Case Data File are as follows. The mean is 1.67; the median is 2.00; the mode is 1; the standard deviation is 0.68; the minimum is 1; and the maximum is 3. 41 cases or 42.7% of the cases exported primarily raw materials. 40 cases or 41.7% of the cases exported primarily manufactured goods. 11 cases or 11.5% of the cases exported a mixture of raw materials and manufactured goods. A total of 96 origination countries are in the Country Case Data File, with 4 countries having missing data for this variable.

The statistics for the variable for the destination countries' Primary Exports (EXCM) in the Destination Shipment Frequency Data File are as follows. The mean is 1.91; the median is 2.00; the mode is 2; the standard deviation is 0.31; the minimum is 1; and the maximum is 3. 395 cases or 9.7% of the cases exported primarily raw materials. 3650 cases or 89.2% of the cases exported primarily manufactured goods. 36 cases or 0.9% of the cases exported a mixture of raw materials and manufactured goods. A total

of 4,090 shipments are in the Destination Shipment Frequency Data File, with 9 shipments having missing data for this variable.

The statistics for the variable for the origination countries' Primary Exports (EXCM) in the Origination Shipment Frequency Data File are as follows. The mean is 1.96; the median is 2.00; the mode is 2; the standard deviation is 0.31; the minimum is 1; and the maximum is 3. 276 cases or 6.7% of the cases exported primarily raw materials. 3638 cases or 88.9% of the cases exported primarily manufactured goods. 122 cases or 3.0% of the cases exported a mixture of raw materials and manufactured goods. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 54 shipments having missing data for this variable.

Two dummy variables are created for EXCM by recoding 2 as 1, and recoding 1 and 3 as 0; and recoding 3 as 1, and recoding 1 and 2 as 0. These two dummy variables for EXCM are labeled EXCMDUM2, and EXCMDUM3, respectively. The category for "Primarily Raw Materials is the comparison category.

A variable for primary imports is created by examining the list of primary imports for each country, coding 1 if the import list is primarily "raw materials", coding 2 if the list is primarily manufactured products, and 3 if the import list is a mixture of each. This variable for primary import variables is labeled IMCM.⁴ Statistics for the trade variable Primary Imports (IMCM) are provided in Table 47.

(Put table 47 about here)

As shown in Table 46, the statistics for the destination countries' Primary Imports (IMCM) in the Country Case Data File are as follows. The mean is 2.24; the median is 2.00; the mode is 2; the standard deviation is 0.43; the minimum is 2; and the maximum

is 3. There were no cases of "Primarily Imported Raw Materials" for destination countries in the Country Case Data File. 38 cases or 73.1% of the cases imported primarily manufactured goods. 12 cases or 23.1% of the cases imported a mixture of raw materials and manufactured goods. A total of 52 destination countries are in the Country Case Data File, with two countries having missing data for this variable.

The statistics for the origination countries' Primary Imports (IMCM) in the Country Case Data File are as follows. The mean is 2.20; the median is 2.00; the mode is ; the standard deviation is 0.43; the minimum is 1; and the maximum is 3. One cases or 1.0% of the cases imported primarily raw materials. 71 cases or 74.0% of the cases imported primarily manufactured goods. 19 cases or 19.8% of the cases imported a mixture of raw materials and manufactured goods. A total of 96 origination countries are in the Country Case Data File, with 5 countries having missing data for this variable.

The statistics for the variable for the destination countries' Primary Imports (IMCM) in the Destination Shipment Frequency Data File are as follows. The mean is 2.11; the median is 2.00; the mode is 2; the standard deviation is 0.31; the minimum is 2; and the maximum is 3. There were no cases of "Primarily Imported Raw Materials" for destination countries in the Destination Shipment Frequency Data File. 3642 cases or 89.0% of the cases imported primarily manufactured goods. 439 cases or 10.7% of the cases imported a mixture of raw materials and manufactured goods. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 9 shipments having missing data for this variable.

The statistics for the variable for the origination countries' Primary Imports (IMCM) in the Origination Shipment Frequency Data File are as follows. The mean is

2.42; the median is 2.00; the mode is 2; the standard deviation is 0.5; the minimum is 1; and the maximum is 3. 3 cases or 0.1% of the cases imported primarily raw materials. 2310 cases or 56.5% of the cases imported primarily manufactured goods. 1693 cases or 41.4% of the cases imported a mixture of raw materials and manufactured goods. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 84 shipments having missing data for this variable.

A dummy variable is created for IMCM by recoding 3 as 1, and recoding 2 as 0. This dummy variable for IMCM is labeled EXCMDUM3.

This concludes the section on Country Case data file and Shipment Frequency data files - Country Characteristic Variables. The next section covers the creation of two trade network variables for the Destination and Origination Shipment Frequencies data files, variables for which the analysis planned for the Country Case data file would not be applicable.

4. Shipment Frequency Data Files - Trade Network Variables

The two variables in this section of Chapter IV, “Variables and Variable Creation” concern regular trade networks. As discussed in Chapter II, “Review of the Literature”, some researchers and writers speculate that transboundary waste may move in a manner similar to trade in regular or traditional trade, hence the term “waste trade”. These two variables allow controls for this factor. All of the information used in creating these two trade network variables is obtained from the CIA’s (2001) *The World Factbook 2001*.

For each country, *The World Factbook 2001* lists 3 - 6 countries with which the country conducts the majority of its export trade and also lists 3 - 6 countries with which

the country conducts the majority of its import trade. Countries in the list of "Majority Export Trade" are considered the country's export trading partners. Countries in the list of "Majority Import Trade" are considered the country's import trading partners.

Using the information discussed in the previous paragraph, two variables are created, one measuring "export trading partnership" and the other measuring "import trading partnership". In this study, the first export "trading partnership" variable, labeled EXTP, is coded 1 for "yes", when an ordinary "export trading partnership" relationship exists with the other country in the waste exchange and is coded 2 for "no", when it does not exist. The second import "trading partnership" variable, labeled IMTP, is coded 1 for "yes" when an ordinary "import trading partnership" relationship exists with the other country in the waste exchange and is coded 2 for "no" when it does not exist.

Statistics for the trade network variable Export Trading Partner (EXTP) are provided in Table 48.

(Put table 48 about here)

As shown in Table 48, the statistics for the destination countries' Export Trading Partner (EXTP) in the Destination Shipment Frequency Data File are as follows. The mean is 1.32; the median is 1.00; the mode is 1; the standard deviation is 0.47; the minimum is 1; and the maximum is 2. 2,760 cases or 67.5% of the cases were export trading partners and 1,312 cases or 32.1% of the cases were not export trading partners. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 18 shipments having missing data for this variable.

The statistics for the origination countries' Export Trading Partner (EXTP) in the Origination Shipment Frequency Data File are as follows. The mean is 1.16; the median

is 1.00; the mode is 1; the standard deviation is 0.37; the minimum is 1; and the maximum is 2. 3,414 cases or 83.5% of the cases were export trading partners and 660 cases or 16.1% of the cases were not export trading partners. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 16 shipments having missing data for this variable.

Statistics for the trade network variable Import Trading Partner (IMTP) are provided in Table 49.

(Put table 49 about here)

As shown in Table 49, the statistics for the destination countries' Import Trading Partner (IMTP) in the Destination Shipment Frequency Data File are as follows. The mean is 1.36; the median is 1.00; the mode is 1; the standard deviation is 0.4; the minimum is 1; and the maximum is 2. 2,604 cases or 63.7% of the cases were import trading partners and 1,468 cases or 35.9% of the cases were not import trading partners. A total of 4,090 shipments are in the Destination Shipment Frequency Data File, with 18 shipments having missing data for this variable.

The statistics for the origination countries' Import Trading Partner (IMTP) in the Origination Shipment Frequency Data File are as follows. The mean is 1.16; the median is 1.00; the mode is 1; the standard deviation is 0.37; the minimum is 1; and the maximum is 2. 3,412 cases or 83.4% of the cases were import trading partners and 662 cases or 16.2% of the cases were not import trading partners. A total of 4,090 shipments are in the Origination Shipment Frequency Data File, with 16 shipments having missing data for this variable.

A dummy variable is created for EXTP by Recoding "yes" as 0 and recoding "no"

as 1. The dummy variable for EXTP is labeled EXTPDUM2. The comparison category is "Yes" for export trading partners.

In exactly the same manner as I did for EXTP, a dummy variable is created for IMTP. This dummy variable for IMTP is labeled IMTPDUM2. The comparison category is "Yes" for import trading partners.

This concludes Section 4, “Shipment Frequency Data Files - Trade Network Variables”, describing the methods used in creating these two economic trade network variables and their associated dummy variables.

5. Shipment Frequency Data Files - Economic Level Movement Scale

This transboundary waste study examines the relationship between waste hazard and economic level movement. Does the level of waste hazard determine the economic level movement and, if it does, what is the direction of that movement? In order to test the two hypotheses related to this, as stated in the “Research Hypotheses” section of Chapter II, “Review of the Literature”, I need to create a scale measuring economic level change or economic level movement. This scale is created from information from the CIA’s (2001) *The World Factbook 2001*, information on countries' GDP and population. The method of this creation is described below.

The first step in the creation of the Economic Development Movement Scale is to calculate the GDP per capita given in U.S. Dollars, for the 99 countries in the sample. The range of the GDP per capita for these 99 countries is from \$710 for the United Republic of Tanzania to \$36,400 for Luxembourg. The second step of creating this scale involves the use of the combined export and import country reported 4,090 unique waste shipment cases, those previously described in the first section of Chapter III,

“Methodology”.

In each of the 4,090 waste shipments, the GDP per capita of the country of origination is subtracted from the GDP per capita of the country of destination. Then, the outcomes of these initial operations are each divided by 5,000 U.S. Dollars. Finally, the results of these divisions are rounded down to the nearest whole number, creating the final scale of whole numbers ranging from -5 to +5, with 1599 cases where the scale is zero, or has no noteworthy difference between the level of economic development of waste origination and destination countries. Thirteen cases exist where the difference cannot be identified. This newly created economic level movement scale is the dependent variable in the Shipment Frequency data files transboundary waste movement analysis, and is labeled ECONSCCL. Central tendency, distribution, and other statistics for GDP per capita and ECONSCCL are given in Table 50.

(Put table 50 about here).

As shown in Table 50, the statistics for the Economic Level Movement Scale (ECONSCCL) in the Destination Shipment Frequency and the Origination Shipment Frequency Data Files are as follows. The mean is -0.34; the median is 0.00; the mode is 0; the standard deviation is 1.62; the minimum is -5; and the maximum is +5. 10 cases or 0.2% of the cases moved down five development levels. 7 cases or 0.2% of the cases moved down four development levels. 20 cases or 0.5% of the cases moved down three development levels. 1,461 cases or 35.7% of the cases moved down two development levels. 118 cases or 2.9% of the cases moved down one development level. 1,589 cases or 38.9% of the cases moved to the same development level. 262 cases or 6.4% of the cases moved up one development level. 393 cases or 9.6% of the cases moved up two

development levels. 115 cases or 2.8% of the cases moved up three development levels. 91 cases or 2.2% of the cases moved up four development levels and 11 cases or 0.3% of the cases moved up five development levels. A total of 4,090 shipments are in the Destination Shipment Frequency Data File and in the Origination Shipment Frequency Data File, with 13 shipments having missing data for this variable.

The idea for this rounding down was to create a scale that was conservative in measuring economic level movement so that any movement measured could be interpreted as "real" and not statistically manufactured. The question was asked: "Could any waste movement between countries having a GDP difference of less than \$5,000 be considered a genuine economic level movement?" The answer to this question was: "Likely not".

This concludes Chapter IV, "Variables and Variable Creation". The next Chapter V will present the results of the data analysis for this study on transboundary waste movement. The next chapter describes and explains the statistical analysis of the data in our three Transboundary Waste Movement data files.

CHAPTER V

DATA ANALYSES

1. Data Analysis Procedure

In the previous chapter, I described the creation of the independent variables and a dependent variable for the Country Case data file and also the independent variables and the dependent variables for the Destination Shipment Frequency and the Origination Shipment Frequency data files. In this chapter, I will describe the data analyses and provide the statistical results, in the form of bivariate correlations and multivariate regressions, for variables in these same three files.

The procedure to be used in the data analysis of this research is determined by the objectives of the research. As noted in the introduction to this paper, I have three objectives in this research on the international transboundary movement of hazardous and other waste. The first objective is to ascertain and explore the characteristics of transboundary waste sending and receiving countries as they relate to the amounts of waste shipped or received. The second objective is to determine what country characteristics affect the economic level movement of waste shipments. The third objective is to determine quantitatively the question of whether the more hazardous portion of waste has a transboundary movement to countries with characteristics of lower levels of development, more than to countries with characteristics of higher levels of development. Therefore, the course of action to be used in the data analysis described in this chapter is as follows.

The two types of statistics used in the data analysis are bivariate correlations and multivariate regressions. Selecting first for destination countries and then for origination

countries, bivariate correlations are run on the variables in the Country Case data file in order to identify possible cases of multiple collinearity and to identify and eliminate from further analyses variables that have no relationship with the dependent variable in the file.

For the same reason that has been done for the Country Case data file, bivariate correlations are run on the variables in the Destination and Origination Shipment Frequency data files. Bivariate correlations are run on the variables in these two Shipment Frequency Data Files in order to identify possible cases of multiple collinearity and to identify and eliminate from further analyses variables that have no relationship with the dependent variable in the file. Of the remaining variables that have significant correlations with both the dependent variable and have correlations of 0.80 or higher with one or more other variables of their type, only one variable of each type is selected as representative of all variables of their type in the six following regressions runs. For example, considering destination country characteristics in the Country Case Data file, the economic variables development level (DEVLEV) and agriculture activity (PCAGGDP) have a correlation of 0.8837, therefore it is only necessary to only use development level as an independent economic variable in the following regression of waste amounts on destination country characteristics.

Two multivariate regressions were done using the Country Case data file. In the first regression the dependent variable for destination country variables is the amount of destination county waste (DESMNTT). For the second regression, the dependent variable for origination country variables is the amount of origination country waste (ORDMNTT). Two multivariate regressions are ran for each of the Destination Shipment Frequency data file and the Origination Shipment Frequency data file, using as

a dependent variable the development level movement scale (ECONSCL), but using different variables representing levels of waste hazard.

2. Bivariate Correlations

Bivariate correlations for the variables in the Country Case data file describing destination country characteristics are shown in Table 51.

(TABLE 51, Parts a, b, c, d, e & f about here)

Of the Country Case data file variables describing destination country characteristics in Table 51, 10 of them have significant correlations with the dependent variable, amount of destination country waste (DESMNTT). These variables are: development level (DEVLEV), external debt (EXDEBT), percent of GDP comprised of service (PCSERGDP), value of exports in billions of U.S. dollars (EX_B), value of imports in billions of U.S. dollars (IM_B), life expectancy (LIFE), energy consumption in kilograms of oil equivalents per capita (ENGYPG), total number of environmental treaties both agreed to and ratified (E_TT_PNR), total number of environmental treaties ratified (E_TRT_P), and destination country total frequencies of waste shipments (DESEFRQT).

As economic development level, percentage of economy involved in agriculture, value of exports, value of imports, life expectancy, energy consumption measured in kilograms of oil, number of environmental treaties both agreed to and ratified, number of environmental treaties ratified, and number of shipments increase, so does the amount of waste received by destination countries increase. As the amount of external debt increases, the amount of waste received by destination countries decreases.

The above list of ten variables are examined for possible cases of multiple

collinearity, indicated by their having correlations of 0.800 or higher with each other. EX_B and IM_B and also E_TT_PNR and E_TRT_P are shown to be measuring similar or perhaps the same concept by having correlations with the other of 0.911 and 0.975, respectively, therefore, only EX_B and E_TRT_P of each of these pairs of variables are used in the subsequent multivariate regressions, thereby avoiding possible multiple collinearity between the variables in each of the pairs.

The independent variable for destination country shipment frequency (DESEFRQT) is also eliminated from subsequent multivariate regression runs due to the logic of a necessary and close association with the dependent variable destination country total waste amounts (DESMNTT); therefore, it is reasonably omitted from the multivariate regression run.

The seven independent variables that remain are development level (DEVLEV), external debt (EXDEBT), percent of GDP comprised of service (PCSERGDP), value of exports in billions of U.S. dollars (EX_B), life expectancy (LIFE), energy consumption in kilograms of oil equivalents per capita (ENGYPC), and total number of environmental treaties ratified (E_TRT_P).

The significant correlations between the ten variables as characteristics of destination countries and the amounts of waste received is a finding that will be useful as a starting point in other quantitative research on the transboundary movement of waste. However, the regression of amounts of waste origination countries sent on the seven variables enumerated in the previous paragraph, which is done in a following section of this chapter, are more relevant in telling us which ones are still statistically significant for increasing or decreasing waste amounts received when the others are controlled.

Table 52 displays the bivariate correlations for the variables in the Country Case data file that describe origination country characteristics.

(TABLE 52, Parts a, b, c, d, e & f about here)

Considering the variables describing the characteristics of the origination countries in the Country Case data file displayed in Table 52, 21 of them have significant correlations with the dependent variable, amount of origination country waste. The first 11 of these 21 independent variables identified by their significant correlations are: development level (DEVLEV), internal income distribution index (GINI), export concentration index (EXCONC), external debt (EXDEBT), unemployment (UNEMP), percent of GDP comprised of agriculture (PCAGGDP), percent of GDP comprised of service (PCSERGDP), value of exports in billions of U.S. dollars (EX_B), value of imports in billions of U.S. dollars (IM_B), infant mortality rate (INMR), life expectancy (LIFE), and total fertility rate (TFR).

The final ten of these 21 Country Case data file origination country characteristic independent variables identified by their significant correlations are total electricity consumption per capita (ELCPC), total energy consumption in kilograms of oil equivalents per capita (ENGYPC), total electricity consumption (ELECCON), total energy consumption in kilograms of oil equivalents (ENGYCON), environmental consumption impact per capita (ECOFTPPC), environmental consumption impact (ECOFT), number of environmental treaties agreed to plus the number ratified (E_TT_PNR), the number of environmental treaties ratified (E_TRT_P), and origination country total frequencies of waste shipments (ORIFRQT).

The following fourteen-origination country characteristic variables increase as the

amount of waste sent by origination countries increases. These are, development level (DEVLEV), percent of GDP comprised of service (PCSERGDP), value of exports in billions of U.S. dollars (EX_B), value of imports in billions of U.S. dollars (IM_B), life expectancy (LIFE), are total electricity consumption per capita (ELCPC), total energy consumption in kilograms of oil equivalents per capita (ENGYPC), total electricity consumption (ELECCON), total energy consumption in kilograms of oil equivalents (ENGYCON), environmental consumption impact per capita (ECOFTPPC), environmental consumption impact (ECOFT), number of environmental treaties agreed to plus the number ratified (E_TT_PNR), the number of environmental treaties ratified (E_TRT_P), and origination country total frequencies of waste shipments (ORIFRQT).

The following seven origination country characteristic variables increase as the amount of waste sent by origination countries decreases. These are, internal income distribution index (GINI), export concentration index (EXCONC), external debt (EXDEBT), unemployment (UNEMP), percent of GDP comprised of agriculture (PCAGGDP), infant mortality rate (INMR), and total fertility rate (TFR).

In the manner outlined in the above paragraphs dealing with the significant correlations between pairs of independent variables identified in the Country Case data file for destination countries, eight origination country variables are found to have high correlations with one or more other of the 21-origination country variables and are omitted from subsequent multivariate regressions. The high correlations of these eight variables may be due to their possible measurement of similar or identical concepts and the high correlation may also indicate a possible case of multiple collinearity, if the two were both run with the other independent variables in subsequent multivariate regression

runs.

The independent variable for origination country shipment frequency (ORIFRQT) is also eliminated from subsequent multivariate regression runs due to the logic of a necessary and close association with the dependent variable origination country total waste amounts (ORGMNTT); therefore, it is reasonably omitted from the multivariate regression run.

The twelve independent variables that remain are development level (DEVLEV), internal income distribution index (GINI), export concentration index (EXCONC), external debt (EXDEBT), unemployment (UNEMP), percent of GDP comprised of service (PCSERGDP), value of exports in billions of U.S. dollars (EX_B), life expectancy (LIFE), total electricity consumption per capita (ELCPC), environmental consumption impact per capita (ECOFTPPC), environmental consumption impact (ECOFT), and the number of environmental treaties ratified (E_TRT_P).

The significant correlations between the twenty-one variables as characteristics of origination countries and the amounts of waste sent are a finding that will be useful as a starting point in other quantitative research on transboundary movement of waste. However, the regression of amounts of waste origination countries sent on the twelve variables enumerated in the previous paragraph, which is done in a following section of this chapter, are more relevant in telling us which ones are still statistically significant for increasing or decreasing waste amounts sent when the others are controlled.

Bivariate correlations for the variables in the Destination Shipment Frequency data file describing destination country characteristics are shown in Table 53.
(TABLE 53, Parts a, b, c, d, e & f about here)

Upon examination of the variables describing destination country characteristic variables, taken from the Destination Shipment Frequency data file and shown in Table 53, 35 of them are revealed to have significant correlations with the dependent variable, development level movement scale (ECONSCL). The first ten of these 35 are: development level (DEVLEV), export concentration index (EXCONC), import concentration index (IMCONC), external debt in billions of U.S. dollars (EXDEBT), unemployment (UNEMP), military expenditures as a percent of GDP (MIL_EXPS), military imports in millions of U.S. dollars (MIL_IM), percent of GDP comprised of agriculture (PCAGGDP), percent of GDP comprised of industry (PCINDGDP), and percent of GDP comprised of service (PCSERGDP).

The second ten of these 35 Destination Shipment Frequency data file independent variables displaying significant correlation with the dependent variable ECONSCL are: value of exports in billions of U.S. dollars (EXP_B), value of imports in billions of U.S. dollars (IMP_B), total land area (AREA), arable land (ARAB_L), permanent crop land (PERMCRP), permanent pasture (PERMPST), forest land (FOREST), all other land (OTH_L), urban land (URB_L), and extremely low use land (LOWUSL or OTH_L minus URB_L).

The third ten of these 35 independent variables displaying significant correlations with the dependent variable ECONSCL in Table 53 are: population (POP), population density (POPDS), infant mortality (INMR), life expectancy (LIFE), total fertility rate (TFR), population density for non-urban areas (NURBPD), electricity consumption per capita (ELCPC), energy in equivalent kilograms of oil per capita (ENGYPC), electricity consumption (ELECCON), and energy in equivalent kilograms of oil (ENGYCON).

The final five of these 35 independent variables displaying significance with the dependent variable ECONSCL are: environmental consumption impact per capita (ECOFTPPC), environmental consumption impact (ECOFT), number of environmental treaties agreed to plus the number ratified (E_TT_PNR), the number of environmental treaties ratified (E_TRT_P), and the number of environmental issues (ENV_ISS).

As the following 21 destination country characteristic variables increase the shipment movement is upward on the economic level movement scale or in other words, the shipments tend to move from countries of lower economic level development to countries of higher economic level development. These are, development level (DEVLEV), import concentration index (IMCONC), external debt in billions of U.S. dollars (EXDEBT), military expenditures as a percent of GDP (MIL_EXPS), military imports in millions of U.S. dollars (MIL_IM), percent of GDP comprised of service (PCSERGDP), value of exports in billions of U.S. dollars (EXP_B), value of imports in billions of U.S. dollars (IMP_B), arable land (ARAB_L), permanent crop land (PERMCRP), permanent pasture (PERMPST), extremely low use land (LOWUSL), population (POP), population density (POPDS), total fertility rate (TFR), population density for non-urban areas (NURBPD), electricity consumption (ELECCON), energy in equivalent kilograms of oil (ENGYCON), environmental consumption impact (ECOFT), the number of environmental treaties ratified (E_TRT_P), and the number of environmental issues (ENV_ISS).

As the following 14 destination country characteristic variables increase the shipment movement is downward on the economic level movement scale or in other words, the shipments tend to move from countries of higher economic level development

to countries of lower economic level development. These are, export concentration index (EXCONC), unemployment (UNEMP), percent of GDP comprised of agriculture (PCAGGDP), percent of GDP comprised of industry (PCINDGDP), total land area (AREA), forest land (FOREST), all other land (OTH_L), urban land (URB_L), infant mortality (INMR), life expectancy (LIFE), electricity consumption per capita (ELCPC), energy in equivalent kilograms of oil per capita (ENGYPC), environmental consumption impact per capita (ECOFTPPC), and the number of environmental treaties agreed to plus the number ratified (E_TT_PNR).

In a manner similar to the one outlined in the dealings with the significant correlations between pairs of independent variables identified in the Country Case data file for destination countries and origination countries, 19 of the 35 Destination Shipment Frequency data file's independent variables were identified and omitted from subsequent multivariate regressions. The omission of these 19 independent variables is due to their apparent measurement of similar or identical concepts and the need to eliminate possible multiple collinearity. Care was taken to identify at least one independent variable from each type (economic, demographic, land use, etc.) that could remain in subsequent multivariate regressions without causing possible problems with multiple collinearity.

The sixteen independent variables that remain are development level (DEVLEV), index of internal income distribution (GINI), export concentration index (EXCONC), external debt in billions of U.S. dollars (EXDEBT), unemployment (UNEMP), military expenditures as a percent of GDP (MIL_EXPS), military imports in millions of U.S. dollars (MIL_IM), percent of GDP comprised of service (PCSERGDP), value of exports in billions of U.S. dollars (EXP_B), urban land (URB_L), population (POP), life

expectancy (LIFE), population density for non-urban areas (NURBPD), energy in equivalent kilograms of oil per capita (ENGYPC), the number of environmental treaties ratified (E_TRT_P), and number of environmental issues (ENV_ISS).

The significant correlations between the 35 independent variables as characteristics of destination countries and the development level movement scale (ECONSCL) are findings that will be useful as a starting point in other quantitative research on transboundary movement of waste. However the regression of movement on the development level movement scale (ECONSCL) on the sixteen variables enumerated in the previous paragraph, which is done in a following section of this chapter, are more relevant in telling us which ones are still statistically significant for change on the economic level movement scale when the others are controlled.

Bivariate correlations for the variables in the Origination Shipment Frequency data file describing origination country characteristics are shown in Table 54. (TABLE 54, Parts a, b, c, d, e & f about here)

Inspection of the variables describing origination country characteristic variables, originally obtained from the Origination Shipment Frequency data file and shown in Table 54, demonstrates that thirty-six of them have significant correlations with the dependent variable, development level movement scale (ECONSCL). The first 11 of these 36 are: development level (DEVLEV), index of internal income distribution (GINI), export concentration index (EXCONC), import concentration index (IMCONC), external debt in billions of U.S. dollars (EXDEBT), unemployment (UNEMP), military expenditures as a percent of GDP (MIL_EXPS), military imports in millions of U.S. dollars (MIL_IM), percent of GDP comprised of agriculture (PCAGGDP), percent GDP

comprised of industry (PCINDGDP), and percent of GDP comprised of service (PCSERGDP).

The second ten of these 36 Origination Shipment Frequency data file independent variables displaying significant correlation with the dependent variable ECONSCL are: value of exports in billions of U.S. dollars (EXP_B), value of imports in billions of U.S. dollars (IMP_B), total land area (AREA), arable land (ARAB_L), permanent crop land (PERMCRP), permanent pasture (PERMPST), forest land (FOREST), all other land (OTH_L), urban land (URB_L), and extremely low use land (LOWUSL or OTH_L minus URB_L). The third ten of these 36 independent variables displaying significant correlation with the dependent variable ECONSCL in Table 54 are: population (POP), population density (POPDS), infant mortality (INMR), life expectancy (LIFE), total birth rate (TFR), population density for non-urban areas (NURBPD), electricity consumption per capita (ELCPC), energy in equivalent kilograms of oil per capita (ENGYPC), Electricity consumption (ELECCON), and energy in equivalent kilograms of oil (ENGYCON).

The final five of these 36 independent variables displaying significance with dependent variable ECONSCL are environmental consumption impact per capita (ECOFTPPC), environmental consumption impact (ECOFT), number of environmental treaties agreed to plus the number ratified (E_TT_PNR), the number of environmental treaties ratified (E_TRT_P), and number of environmental issues (ENV_ISS).

As the following thirteen origination country characteristic variables increase the shipment movement is upward on the economic level movement scale or in other words, the shipments tend to move from countries of lower economic level development to

countries of higher economic level development. These are, export concentration index (EXCONC), import concentration index (IMCONC), external debt in billions of U.S. dollars (EXDEBT), unemployment (UNEMP), percent of GDP comprised of agriculture (PCAGGDP), percent GDP comprised of industry (PCINDGDP), permanent crop land (PERMCRP), forest land (FOREST), all other land (OTH_L), extremely low use land (LOWUSL), population density (POPDS), infant mortality (INMR), and population density for non-urban areas (NURBPD).

As the following twenty-three origination country characteristic variables increase the shipment movement is downward on the economic level movement scale or in other words, the shipments tend to move from countries of higher economic level development to countries of lower economic level development. These are, development level (DEVLEV), index of internal income distribution (GINI), military expenditures as a percent of GDP (MIL_EXPS), military imports in millions of U.S. dollars (MIL_IM), percent of GDP comprised of service (PCSERGDP), value of exports in billions of U.S. dollars (EXP_B), value of imports in billions of U.S. dollars (IMP_B), total land area (AREA), arable land (ARAB_L), permanent pasture (PERMPST), urban land (URB_L), population (POP), life expectancy (LIFE), total fertility rate (TFR), electricity consumption per capita (ELCPC), energy in equivalent kilograms of oil per capita (ENGYPC), electricity consumption (ELECCON), energy in equivalent kilograms of oil (ENGYCON), environmental consumption impact per capita (ECOFTPPC), environmental consumption impact (ECOFT), number of environmental treaties agreed to plus the number ratified (E_TT_PNR), the number of environmental treaties ratified (E_TRT_P), and number of environmental issues (ENV_ISS).

In a process similar to the one outlined in the above dealings with the significant correlations between pairs of independent variables, identified in the Country Case data file for destination countries and origination countries, and in an approach identical to the one used in identifying these pairs of independent variables with significant correlations for the Destination Shipment Frequency data files, 21 of the 36 Origination Shipment Frequency data files independent variables were identified and omitted from subsequent multivariate regressions. The non-inclusion of these 21 independent variables is due to their possible measurement of similar or identical concepts and the need to eliminate possible multiple collinearity. Again as with the independent variables from the previous two data files (County Case and Destination Shipment Frequency) care was taken to identify at least one independent variable from each type (economic, demographic, land use, etc.) that could remain in subsequent multivariate regressions without causing possible problems with multiple collinearity.

The 15 independent variables that remain are development level (DEVLEV), index of internal income distribution (GINI), export concentration index (EXCONC), external debt in billions of U.S. dollars (EXDEBT), unemployment (UNEMP), military expenditures as a percent of GDP (MIL_EXPS), percent of GDP comprised of service (PCSERGDP), value of exports in billions of U.S. dollars (EXP_B), urban land (URB_L), population (POP), life expectancy (LIFE), population density for non-urban areas (NURBPD), energy in equivalent kilograms of oil per capita (ENGYPC), the number of environmental treaties ratified (E_TRT_P), and number of environmental issues (ENV_ISS).

The significant correlations between the 36 independent variables as

characteristics of origination countries and the development level movement scale (ECONSCL) are findings that will be useful as a starting point in other quantitative research on transboundary movement of waste. However the regression of movement on the development level movement scale (ECONSCL) on the fifteen variables enumerated in the previous paragraph, which is done in a following section of this chapter, are more relevant in telling us which ones are still statistically significant for change on the economic level movement scale when the others are controlled.

This concludes this section on the description of the bivariate correlations between the dependent and independent variables in the three data files. The next data analysis section will address multivariate regressions.

3. Multivariate Regressions

Multivariate regression analyses are used in this section to determine which of the independent destination country characteristic variables and the independent origination country characteristic variables as identified in the Country Case data file are truly descriptions of the characteristics of waste destination (importing) countries and waste origination (exporting) countries. Multivariate regression will also be used with the Destination and Origination Shipment Frequency data files to test my two hypotheses. Altogether, six multivariate regressions are run. First to be addressed will be the characteristics of waste destination and waste origination countries using the independent variables identified in Table 51 and Table 52, respectively.

In the first multivariate regression, the dependent variable for destination country waste amounts (DESMNTT) is regressed on the seven destination country independent variables from the Country Case data file, as identified in Table 51 in the previous

section. In addition to these ten variables, four independent traditional trade variables in the form of category variables are also controlled for in this multivariate regression in the form of dummy variables. These four category variables are: a traditional trade variable for net energy exports (EXEG), a traditional trade variable for net energy imports (IMEG), a traditional trade variable for primary exports (EXCM), and a traditional trade variable for primary imports (IMCM). Values measured by these variables are identified and a description of the creation of these four category variables and their dummy variables are provided in Section 3, Segment f., “Traditional Trade Variables” of Chapter IV. The result of this regression is shown in Table 55.

(TABLE 55, Parts a & b about here)

As shown in Table 55, only two independent variables are found to be significant when the other 10 independent variables are controlled. These are the value of the destination countries' exports in billions of U.S. dollars (EXP_B) and the number of environmental treaties ratified (E_TRT_P). They have standardized coefficients of 0.391 and 0.390 respectively, and are significant at the .05 level. This means that when all other independent variables describing destination country characteristics are controlled, as these two independent variables for destination country characteristics increase, the amount of waste received by these countries also increases. This model of multivariate regression has an adjusted $R^2 = 0.332$, meaning that slightly over 33% of the variation in waste received by destination countries is explained by this model.

The result of this multivariate regression is a partially a fulfillment of the first objective of this research: Determining the characteristics of countries that affect the amount of waste sent or received. As the value of a destination countries' exports

increases and the number of environmental treaties ratified by a destination country increases, the amount of waste received (imported) also increases.

The second multivariate regression regresses the dependent variable for origination country waste amounts (ORGMNTT) on the twelve independent variables for origination country characteristics from the Country Case data file, as identified in the previous section in Table 52. In addition to these twelve variables, four independent traditional trade variables in the form of category variables are also controlled in this multivariate regression in the form of dummy variables. These four category variables are: a traditional trade variable for net energy exports (EXEG), a traditional trade variable for net energy imports (IMEG), a traditional trade variable for primary exports (EXCM), and a traditional trade variable for primary imports (IMCM). Values measured by these variables are identified and a description of the creation of these four variables and their dummy variables are provided in Section 3, Segment f., “Traditional Trade Variables” of Chapter IV. The result of this regression is shown in Table 56.

(TABLE 56, Parts a & b about here)

As shown in Table 56, only two independent variables are found to be significant when the other 11 independent variables are controlled. These are value of the origination countries' exports in billions of U.S. dollars (EXP_B) and the dummy variable measuring if a country is a net energy importer (IMEGDUM2). The comparison variable for the latter is the “Yes, net energy importer category”. In this regression, countries that are not net energy importers (IMEGDUM2) are compared to countries that are net energy importers. EXP_B has a standardized coefficient (Beta) of 0.688, while IMEGDUM2 has a standardized coefficient (Beta) of -.299. Both of these independent variables are

significant at the 0.05 levels. This means that when the independent variables describing origination characteristics and other variables are controlled, as the value of a country's exports increase, so does the amount of waste they send to other countries. This also means that as the other variables are controlled, countries that are not net energy importers send less waste to other countries than countries that are net energy importers. This model of multivariate regression has an adjusted $R^2 = 0.405$, meaning that slightly over 40% of the amount of waste sent by origination countries is explained by this model.

The result of this multivariate regression is a partially a fulfillment of the first objective of this research: Determining the characteristic of countries that affect the amount of waste sent or received. As the value of an origination country's exports increases, the amount of waste sent (exported) also increases. Origination countries that are not net energy importers sent (exported) less waste than countries that are net energy importers.

The third multivariate regression regresses the dependent variable for development level movement (ECONSCL) on the dummy variables for Y-type waste hazard (HAZY). All of the variables used in this third multivariate regression are from the Destination Shipment Frequency data files. The HAZY variable category for waste streams (Y1 – Y18), is the lowest of the Basel Convention source categories Y type waste and so is left out of the regressions as the comparison category. Control variables for the 16 independent variables identified in Table 53 in the previous section of this chapter are included as part of this regression. In addition to these 16 independent variables, nine independent category variables are controlled for in this regression in the form of their dummy variables.

The first three of these nine independent category variables are the variables of proximity (PROX), disposal/recycling (DSRC), and number of countries shipments crossed in transit (TRAN). Definitions of the values of these three variable measures and a description of their creation and the creation of their dummies are provided in Section 3 of Chapter IV.

The next four of these nine independent category variables are traditional trade variables. These are a traditional trade variable for net energy exports (EXEG), a traditional trade variable for net energy imports (IMEG), a traditional trade variable for primary exports (EXCM), and a traditional trade variable for primary imports (IMCM). Values measured by these variables are identified and a description of the creation of these four variables and their dummy variables are provided in Section 3, Segment f., “Traditional Trade Variables” of Chapter IV.

The last two of these nine independent category type variables that are also included in this third multivariate regression run are network trade variables. Variables and dummy variables for export trading partners (EXTP) and import trading partners (IMTP) are identified and the descriptions of their creation are provided in Section 4 of Chapter IV. The result of this regression is shown in Table 57.

(TABLE 57, Parts a, b & c about here)

Table 57 shows that with the 25 above described controls, Y-coded waste (Y46 – Y47), which is composed of incinerated household waste ashes (HAZYCAT4), has a standardized coefficient (Beta) of -0.035 and is significant at the 0.001 level. This means that when all independent destination country characteristics and other appropriate variables are controlled, more shipments of this type of waste go to destination countries

of lower economic level development than do shipments composed of “waste streams (Y1 – Y18), the lowest hazard category of the Basel Convention defined Y type waste. Waste streams are waste of a particular type from sources that provide a continuous flow of this type of waste, for example: organic waste from cattle operations such as feedlots.

This result supports both hypothesis **H1**: “Waste hazard level affects the movement of transboundary waste” and hypothesis **H2**: “Transboundary waste with higher hazard levels moves to countries with lower economic development levels more than to countries with higher economic development levels”.

It is also of interest to look how our variable for disposed/recycled waste fared in this third multivariate regression run. Dummy variables for mixed disposed/recycled waste (DSRCDUM3) and unknown codes for disposed/recycled waste (DSRCDUM4) have standardized coefficients (Beta) of 0.055 and 0.053, respectively. Both have significance at the 0.001 levels. The dummy variable for recycled waste (DSRCDUM2) is not significant. The absent comparison category is disposed waste. This means that when all the independent destination country characteristics and other appropriate variables are controlled, both mixed shipments of waste (DSRCDUM3) and unknown coded shipments of disposed/recycled waste (DSRCDUM4) more often arrive at destinations that are higher economically developed countries relative to their origination countries, than do shipments of waste defined as being for disposal at destination.

There is no evidence that these two categories of disposed/recycled waste are more hazardous than waste labeled for disposal or recycling. However if one were to assume that they were more hazardous then this result could be interpreted as an indication of nonsupport of this research’s two hypotheses.

In addition to the Y type of hazard level waste and the disposed/recycled waste, this regression model shows that eighteen other independent variables that are either characteristics of waste destination countries or waste shipments also affect economic development level movement. Eight of these eighteen independent variables affect waste shipments to move from countries of lower economic development to countries of higher economic development or in an upward direction on the Development Level Movement scale. Nine of these eighteen independent variables affect waste shipments to move from countries of higher economic development to countries of lower economic development or a downward direction on the Development Level Movement scale. One of these eighteen independent variables is a category variable with categories moving in opposite directions compared to the comparison category. Let us first look at the ten that affect upward direction on the Development Level Movement scale.

The regression model in Table 57 shows that Proximity, a waste shipment characteristic independent category variable, has an upward affect on a shipment's movement on the Development Level Movement scale. Waste shipments moving to both in-region (PROXDUM2) and out-of-region (PROXDUM3) destinations more often travel to countries of higher level of development, when compared to waste shipments to adjacent destinations. These two dummy variables for Proximity have standardized coefficients (Beta) of 0.166 and 0.198, respectively. Each also has significance at the 0.001 level.

Other destination country characteristic independent category variable that exert an upward affect on a shipment's movement on the Development Level Movement scale are a variables that measure import trading partners (IMTP). Shipments to countries

having destination country characteristics of “no, not import trading partners” (IMTPDUM2) exhibit a movement of going to countries of higher economic development relative to their origination countries more often than do shipments to countries with destination country characteristics of being import trading partners. “No, not import trading partners” (IMPTDUM2) has a Standardized Coefficient (Beta) of 0.243, with significance at the 0.001 level.

A variable measuring net energy exports (EXEG) is another destination country characteristic independent category variable displayed in Table 57 that exerts an upward affect on a shipment’s movement on the Development Level Movement scale. Shipments to countries having destination country characteristics of “no, not a net energy exporter” (EXEGDUM2) exhibit a movement of going from countries of lower economic development to countries of higher economic levels of development more often than shipments to countries with the comparison category destination country characteristic of “yes, net energy exporter”. “No, not a net energy exporter” (EXEGDUM2) destination countries have a standardized coefficients (Beta) of 0.685 and a significance at the .001 level.

The regression model in Table 57 shows that five additional destination country characteristic numeric variables affect waste shipments to move upward on the development level movement scale, or from lower economic developed countries to higher economic level developed countries. These five destination country characteristic numeric variables are economic development level (DEVLEV), export concentration index (EXCONC), population density for non-urban areas (NURBPD), energy in equivalent kilograms of oil per capita (ENGYPC), and environmental consumption

impact (ECOFTP). These five destination country characteristic numeric variables have standardized coefficients (Betas) of 0.098, 0.132, 0.112, 0.132, and 0.333, respectively. These five also have significance at the 0.001, 0.001, 0.001, 0.05 and 0.01 levels, respectively.

As mentioned previously, nine of these eighteen independent variables shown in Table 57 affect waste shipments to move from countries of higher economic development to countries of lower economic development or in a downward direction on the Development Level Movement scale. Let us now take a look at these nine variables that affect a downward direction on the Development Level Movement scale.

Two destination country characteristic independent category variables exert a downward affect on a shipment's movement on the Development Level Movement scale, causing the shipments to go from countries of higher economic development to countries of lower economic development. These two are the type of exports (EXCM) and the type of imports (IMCM) category variables.

An examination of the dummy variables for type of exports (EXCM) shows that shipments to destination countries with the characteristic of having primary exports of "manufactured goods" (EXCMDUM2) and primary exports of "mixed manufactured goods and raw materials" (EXCMDUM3) more often exhibit the movement of arriving from countries of higher economic level development relative to their origination countries than do shipments arriving at destination countries having the characteristics of the comparison category of primary exports of "raw materials". The Standardized Coefficients (Betas) of these two dummy variables for type of exports are -0.089 and -0.027, respectively. The significant levels are 0.001 and 0.05, respectively.

The dummy variable for the type of imports (IMCM) shows that shipments to destination countries having characteristics of primary imports of “mixed manufactured goods and raw materials” (IMCMDUM3) more often exhibit a movement of arriving from countries of Lower economic development relative to their origination countries than do shipments arriving at destination countries with the characteristic of the comparison category of having primary imports of “manufactured goods”. The Standardized Coefficient (Beta) of having primary imports of “mixed manufactured goods and raw materials” (IMCMDUM3) is -0.106 and the variable has significance at the 0.001 level.

Another destination country characteristic independent category variable that exert a downwards affect on a shipment’s movement on the Development Level Movement scale is a variable that measures export trading partners (EXTP). Shipments to countries having destination country characteristics of “No, not export trading partners” (EXTPDUM2) exhibit a movement of going to countries of lower economic development relative to their origination countries more often than do shipments to countries with destination country characteristics of being export trading partners. “No, not export trading partners” (EXTPDUM2) has a Standardized Coefficient (Beta) of -0.090 , and with significance at the 0.001 level.

The regression model in Table 57 shows that six destination country characteristic numeric variables affect waste shipments to move downward on the development level movement scale, or from higher economic developed countries to lower economic level developed countries. These six destination country characteristic numeric variables are external debt in billions of U.S. dollars (EXTDEBT), unemployment (UNEMP), military

expenditures as a percent of GDP (MIL_EXPS), military imports in millions of U.S. dollars (MIL_IM), urban land (URB_L), and the number of environmental treaties ratified (E_TRT_P).

These six destination country characteristic numeric variables have standardized coefficients (Betas) of -0.074 , -0.107 , -0.137 , -0.067 , -0.080 and -0.074 , respectively. These six also have significance at the 0.01, 0.001, 0.001, 0.01, 0.05 and 0.01 levels, respectively.

The regression model in Table 57 shows Transit, the waste shipment characteristic independent category variable defined as the number of countries shipments cross, has a mixed directional affect on the shipment's movement on the Development Level Movement scale. Waste shipments that cross one country in transit (TRANDUM2) move from countries of lower levels of economic development to higher levels of economic development, when compared to waste shipments that go directly from one country to another. Waste shipments that cross two or more countries in transit (TRANDUN3) move to countries of lower development level more so than to countries of higher economic development level, when compared to waste shipments that go directly from one country to another. One country crossed in transit (TRANDUM2) has a standardized coefficient (Beta) of -0.028 and two or more countries crossed in transit (TRANDUM3) has a standardized coefficient (Beta) of 0.184 , with each having significance at the 0.01 level and 0.001 level, respectively.

This multivariate regression model has an adjusted $R^2 = 0.735$, meaning that over 73% of the variation in development level movement that shipments received by countries have experienced is explained by this model.

These results also partially fulfill my second research objective of determining which independent variables affect waste shipments' economic development level movement. Future researchers studying transboundary waste movement may also find these findings relating to the other independent variables, besides the waste hazard variables, valuable in determining which ones to include in their studies.

Table 58 presents the fourth multivariate regression, which regresses the dependent variable for development level movement (ECONSCL) on the dummy variables for H or UN type waste hazard (HAZH). All of the variables used in this fourth multivariate regression are from the Destination Shipment Frequency data files. The category for “flammable liquids” is left out of the regressions as the comparison category. The same set of control variables described in the previous third regression is also used in this regression.

(TABLE 58, Parts a, b & c about here)

Table 58 demonstrates that with the 25 control variables described in the paragraphs for the third regression, “Explosive substances” (HAZHDUM1) has a standardized coefficient of -0.016 ; “Poisonous or infectious substances” (HAZHDUM5) has a standardized coefficient of -0.038 ; “Toxic gases, toxic substances or ecotoxic substances” (HAZHDUM7) has a standardized coefficient of -0.033 ; and shipments of “Unknown H or Unknown UN codes” (HAZHDM10) has a standardized coefficient of -0.037 . All three have significance at the 0.05 levels. This means that when all destination country characteristics and other appropriate variables are controlled, these four types of H or UN coded waste more often travel to destinations of lower economic development, relative to their origination, than do shipments of “Flammable liquids”

(HAZHDUM2), the comparison category.

This result supports both hypothesis **H1**: “Waste hazard level affects the movement of transboundary waste” and hypothesis **H2**: “Transboundary waste with higher hazard levels moves to countries with lower economic development levels more than to countries with higher economic development levels”.

It is again also of interest to look at how our variable for disposed/recycled waste fared in this fourth multivariate regression run, as I did after the third multivariate regression run. The dummy variable for “Mixed disposed/recycled waste” (DSRCDUM3) has a standardized coefficient of 0.054 and the dummy variable for “Unknown waste” (DSRCDUM4) has a standardized coefficient (Beta) of 0.054. Both have significance at the 0.001 levels. The dummy variable for “Recycled waste” (DSRCDUM2) is not significant. The absent comparison variable is “Disposed waste” (DSRCDUM1). This means that when all destination country characteristics and other appropriate variables are controlled, both “Mixed shipments of waste” (DSRCDUM3) and “Unknown” (DSRCDUM4) coded waste disposed/recycled shipments, more often arrive at destinations of higher economically developed countries relative to their origination countries, than do shipments of waste defined as being for disposal at destination.

There is no evidence that these two categories of disposed/recycled are more hazardous than waste labeled for disposal or recycling. However, if one were to assume that they were more hazardous, then this result could be interpreted as an indication of nonsupport of this research’s two hypotheses.

In addition to the Chemical/Industrial or UN type of hazard level waste and the

disposed/recycled waste, this regression model displayed in Table 58 shows that eighteen other independent variables that are either characteristics of waste destination countries or waste shipments also affect economic development level movement. Eight of these eighteen independent variables affect waste shipments to move from countries of lower economic development to countries of higher economic development or in an upward direction on the Development Level Movement scale. Nine of these eighteen independent variables affect waste shipments to move from countries of higher economic development to countries of lower economic development or a downward direction on the Development Level Movement scale. One of these eighteen independent variables is a category variable with categories moving in opposite directions compared to the comparison category. Let us first look at the ten that affect upward direction on the Development Level Movement scale.

Other than the slight changes in the Unstandardized Coefficients, minor changes in Standardized Coefficients, and no changes in significance levels, the results for these eighteen other independent variables remain unchanged from when compared to their regression with the Y type hazard waste shown in Table 57. This indicates that both Y type and the UN Chemical/Industrial classification methods are measuring similar concepts of waste hazard. Due to lack of relative change in the results for these nineteen variables, a detailed discussion of these same nineteen variables' regression in Table 58 is unnecessary.

The regression model shown in table 58 has an adjusted $R^2 = 0.735$, meaning that over 74% of the variation in development level movement that shipments received by countries have experienced is explained by this model.

Table 59 presents the fifth multivariate regression, which regresses the dependent variable for development level movement (ECONSCL) on the dummy variables for Y-type waste hazard (HAZY). All of the variables used in this fifth multivariate regression are from the Origination Shipment Frequency data files. The HAZY dummy variable for waste streams (Y1 – Y18) or HAZYDUM2 is the lowest of the Basel Convention source categories of Y type waste and so is left out of the regressions as the comparison dummy variable. Control variables for the 15 independent variables are included as part of this regression. As with the third and fourth regressions, nine additional independent category variables are additionally controlled for in this regression in the form of their dummy variables.

The first three of these nine independent category variables are the variables of proximity (PROX), disposal/recycling (DSRC), and number of countries shipments crossed in transit (TRAN). Definitions of the values these three variable measures and a description of their creation and the creation of their dummy are provided in Section 3 of Chapter IV.

The next four of these nine independent category variables are the variables for export (EXEG) and import (IMEG) energy, and for type of exports (EXCM) and type of imports (IMCM). A definition of the measured values and a description of the creation of these four variables and their dummy variables are provided in Section 3, Segment g., “Traditional Trade Variables” of Chapter IV.

The last two of these nine independent category variables included in this third multivariate regression run are the variables for network trade. Variables and dummy variables for export trading partners (EXTP) and import-trading partners (IMTP) are

defined and descriptions of their creation are provided in Section 4 of Chapter IV. The results of these two regression models are shown in Table 59.

(TABLE 59, Parts a, b & c about here)

Table 59 demonstrates that with the 24 above described controls, Y- coded (Y18 – Y45) waste having as constituents (HAZYCAT3) has a standardized coefficient (Beta) of –0.020. Y-coded waste (Y46 – Y47) that is composed of incinerated household waste ashes (HAZYCAT4) has a standardized coefficient (Beta) of –0.030. Additionally, Y category waste with Y codes “unknown or unreported”, (HAZYCAT6) has a standardized coefficient (Beta) of –0.016. All three of these dummy variables for Y type waste have significance at the 0.05 levels. The Y type comparison category of waste streams (Y1 – Y18) is considered in general to be the lowest hazard of the Basel Convention regulated Y type waste. This means when all independent origination country and other appropriate variables are controlled, these three higher hazardous Y type wastes travel to lower economically developed destination countries, relative to their countries of origination, more often than to higher economically developed countries.

This result supports both hypothesis **H1**: “Waste hazard level affects the movement of transboundary waste” and hypothesis **H2**: “Transboundary waste with higher hazard levels moves to countries with lower economic development levels more than to countries with higher economic development levels”.

As I did with the third and fourth multivariate regressions, it is also of interest again to look how the variable for disposed/recycled waste fared in this fifth multivariate regression run. Dummy variables for “Recycled waste” (DSRCDUM2), “Mixed disposed/recycled waste” (DSRCDUM3), and “Unknown waste” (DSRCDUM4) have

standardized coefficients (Beta) of -0.049 , -0.053 , and -0.034 , respectively. All three of the dummy variables for disposed/recycled wastes have significance at the 0.001 levels. The absent comparison category is “Disposed waste” (DSRCDUM1). This means that when all independent country characteristics and other appropriate variables are controlled, three types of disposal/recycled waste, “Recycled waste” (DSRCDUM2), “Mixed shipments of waste” (DSRCDUM3), and “Unknown coded disposed/recycled shipments of waste” (DSRCDUM4), more often travel from origination countries of higher economically development to destinations of relatively lower economic development, than do shipments of waste designated as being for “Disposal” (DSRCDUM1) by origination countries.

There is no evidence that these three categories of disposed/recycled are more hazardous than waste labeled for disposal. However if one were to assume that they were more hazardous, then this result could be interpreted as an indication of support my two hypotheses.

In addition to the Y type of hazard level waste and the disposed/recycled waste, this regression model shows that nineteen other independent variables that are either characteristics of waste origination countries or waste shipments also affect economic development level movement. Eight of these nineteen independent variables affect waste shipments to move from countries of lower economic development to countries of higher economic development or in an upward direction on the Development Level Movement scale. Eleven of these nineteen independent variables affect waste shipments to move from countries of higher economic development to countries of lower economic development or a downward direction on the Development Level Movement scale.

The regression model in Table 59 shows that Proximity, a waste shipment characteristic independent category variable, has an upward affect on a shipment's movement on the Development Level Movement scale. Waste shipments moving in-region (PROXDUM2) and out-of-region (PROXDUM3) from origination countries more often travel to countries of higher level of development, when compared to waste shipments to adjacent destinations. These two dummy variables for Proximity have standardized coefficients (Beta) of 0.065 and 0.092, respectively. Each also has significance at the 0.001 level.

Another destination country characteristic independent category variables that exert an upward affect on a shipment's movement on the Development Level Movement scale, causing the shipments to go from countries of lower economic development to countries of higher economic development, is one for the type of exports (EXCM). An examination of the dummy variables for type of exports (EXCM) shows that shipments leaving origination countries with the characteristic of having primary exports of "manufactured goods" (EXCMDUM2) and primary exports of "mixed manufactured goods and raw materials" (EXCMDUM3), more often exhibit the movement of departing from countries of lower economic level development relative to their destination countries than do shipments departing from origination countries having the characteristics of the comparison category of primary exports of "raw materials". The Standardized Coefficients (Betas) of these two dummy variables for type of exports are 0.045 and 0.075, respectively. The significant levels are .001.

The regression model in Table 59 shows that six origination country characteristic numeric variables affect waste shipments to move upward on the development level

movement scale, or from lower economic development countries to higher economic level development countries. These six origination country characteristic numeric variables are external debt in billions of U.S. dollars (EXTDEBT), unemployment (UNEMP), life expectancy (LIFE), population density for non-urban areas (NURBPD), the number of environmental treaties ratified (E_TRT_P), and the number of environmental issues (ENV_ISS). These six origination country characteristic numeric variables have standardized coefficients (Betas) of 0.073, 0.180, 0.035, 0.059, 0.067 and 0.038 respectively. These six also have significance at the 0.001, 0.001, 0.01, 0.001, 0.001 and 0.01 levels, respectively.

The regression model in Table 59 shows Transit, the waste shipment characteristic independent category variable defined as the number of countries shipments cross, has a downward directional affect on the shipment's movement on the Development Level Movement scale. Both waste shipments that cross one country in transit (TRANDUM2) and waste shipments that cross two or more countries in transit (TRANDUN3) move from countries of higher development level to countries of lower development level, more so than waste shipments that go directly from one country to another. One country crossed in transit (TRANDUM2) has a standardized coefficients (Beta) of -0.022, with the significance at the 0.001 level. Two or more countries crossed in transit (TRANDUM3) is not significant.

Two other origination country characteristic independent category variables that exert a downward affect on a shipment's movement on the Development Level Movement scale are variables that measure export trading partners (EXTP) and import trading partners (IMTP). Shipments leaving countries having origination country

characteristics of “No, not export trading partners” (EXTPDUM2) and “No, not import trading partners” (IMTPDUM2) exhibit a movement of going to countries of lower economic development relative to the origination countries more often than do shipments departing from countries with origination country characteristics of being export trading partners and being import trading partners, respectively. “No, not export trading partners” (EXTPDUM2) has a Standardized Coefficients (Betas) of -0.030 , and significance at the 0.05 level. “No, not import trading partners” (IMTPDUM2) has a Standardized Coefficient (Beta) of -0.040 , and significance at the 0.01 level.

A variable measuring net energy exports (EXEG) is another origination country characteristic independent category variable displayed in Table 59 that exerts a downward affect on a shipment’s movement on the Development Level Movement scale. Shipments leaving countries having origination country characteristics of “no, not a net energy exporter” (EXEGDUM2) exhibit a movement of going from countries of high economic development to countries of lower economic levels of development more often than do shipments to countries with the comparison category origination country characteristic of “Yes, net energy exporter”. “No, not a net energy exporter” (EXEGDUM2) origination countries have a standardized coefficients (Beta) of -0.389 and a significance at the 0.001 level.

Another energy variable, one measuring net energy imports (IMEG) is an origination country characteristic independent category variable displayed in Table 59 that exerts a downward affect on a shipment’s movement on the Development Level Movement scale. Shipments leaving countries having origination country characteristics of “No, not a net energy importer” (IMEGDUM2) exhibit a movement of going from

countries of high economic development to countries of lower economic levels of development more often than do shipments to countries with the comparison category origination country characteristic of “Yes, net energy importer”. “No, not a net energy importer” (IMEGDUM2) origination countries have a standardized coefficients (Beta) of -0.130 and a significance at the $.001$ level.

The last origination country characteristic independent category variable displayed in Table 59 that exerts a downward affect on a shipment’s movement on the Development Level Movement scale is the type of imports (IMCM). The dummy variable for the type of imports (IMCM) shows that shipments to destination countries having characteristics of primary imports of “mixed manufactured goods and raw materials” (IMCMDUM3) more often exhibit a movement of departing to countries of Lower economic development relative to their origination countries than do shipments departing from origination countries with the characteristic of the comparison category of having primary imports of “manufactured goods”. The Standardized Coefficient (Beta) of having primary imports of “mixed manufactured goods and raw materials” (IMCMDUM3) is -0.285 and this variable has significance at the 0.001 level.

The regression model in Table 59 shows that five additional origination country characteristic numeric variables affect waste shipments to move downward on the development level movement scale, or move from higher economic level development countries to lower economic level development countries. These five origination country characteristic numeric variables are economic development level (DEVLEV), internal income distribution (GINI), export concentration index (EXCONC), service economic activity (PCSERGDP), and export value (EXP_B). These five destination country

characteristic numeric variables have standardized coefficients (Betas) of -0.169 , -0.066 , -0.137 , -0.357 , and -0.056 , respectively. These five also have significance at the 0.001 , 0.001 , 0.001 and 0.01 levels, respectively.

The model for this regression shown in Table 59 has an adjusted $R^2 = 0.876$, meaning that nearly 88% of the variation in development level movement that shipments sent by origination countries experience is explained by this model.

These results also partially fulfill my second research objective of determining which independent variables affect waste shipments' economic development level movement. Future researchers studying transboundary waste movement may also find these findings relating to the other independent variables, besides the waste hazard variables, valuable in determining which ones to include in their studies.

The sixth, and last, multivariate regression regresses the dependent variable for development level movement (ECONSCL) on the dummy variables for H, UN or Chemical/Industrial coded waste hazard (HAZH). All of the variables used in this sixth multivariate regression are from the Origination Shipment Frequency data files. The HAZH category for "Flammable liquids" (HAZHDUM2) is left out of the regressions as the comparison dummy variable. The same set of 24 control variables described in the fifth regression is also used in this regression. Table 60 shows the results of this multivariate regression.

(TABLE 60, Parts a, b & c about here)

The model for this sixth and last multivariate regression, shown in Table 60, demonstrates that with the same 24 control variables described in the previous paragraphs for the fifth multivariate regression, "Poisonous or infectious substances"

(HAZHDUM5), has a standardized coefficient of -0.029, “Toxic gases, toxic substances, or ecotoxic substances” (HAZHDUM7), has a standardized coefficient of -0.028, shipments of “Mixed H coded waste (HAZHDUM9), has a standardized coefficient of -0.022, and shipments of “Unknown H or Unknown UN codes (HAZHM10) has a standardized coefficient of -0.024. The four of the preceding dummy variables for H, UN or Chemical/Industrial coded waste indicating relative hazard levels have significance at the 0.01, 0.01, 0.05 and 0.05 levels, respectively. This means that when all independent origination county characteristics and other appropriate variables are controlled, these four types of H or UN coded waste are more often leave origination countries of higher economic development level for destinations of lower economic development than do shipments of “Flammable liquids” (HAZHDUM2), the comparison dummy variable.

As with the third, fourth, and fifth multivariate regressions, it is also of interest to examine how the variable for disposed/recycled waste fared in this sixth multivariate regression run. Dummy variables for recycled waste (DSRCDUM2), mixed disposed/recycled waste (DSRCDUM3), and unknown waste (DSRCDUM4) have standardized coefficients (Beta) of -0.051, -0.053 and -0.035 respectively. All three of the dummy variables for disposed/recycled waste have significance at the 0.001 level. The absent comparison variable is “Disposed waste” (DSRCDUM1). This means that when all independent origination country characteristics and other appropriate variables are controlled, all three types of disposal/recycled waste, recycled waste (DSRCDUM2), mixed shipments of waste (DSRCDUM3), and unknown coded disposed/recycled shipments (DSRCDUM4), more often leave from origination countries of higher

economic development to destination countries of relatively lower economic development than do shipments of waste designated as being for “Disposal” (DSRCDUM1) by origination countries.

There is no evidence that these three categories of disposed/recycled are more hazardous than waste labeled for disposal. However, if one were to assume that they were more hazardous, then this result could be interpreted as an indication of support of this research’s two hypotheses.

In addition to the Chemical/Industrial or UN type of hazard level waste and the disposed/recycled waste, this regression model displayed in Table 60 shows that nineteen other independent variables that are either characteristics of waste destination countries or waste shipments also affect economic development level movement. Eight of these nineteen independent variables affect waste shipments to move from countries of lower economic development to countries of higher economic development or in an upward direction on the Development Level Movement scale. Eleven of these eighteen independent variables affect waste shipments to move from countries of higher economic development to countries of lower economic development or in a downward direction on the Development Level Movement scale.

Other than the slight changes in the Unstandardized Coefficients, minor changes in Standardized Coefficients and only one instance of change in significance levels for a variable the results for these nineteen other independent variables remain unchanged from when compared to their regression with the Y type hazard waste shown in Table 59. The one variable that changed significance levels was the dummy variable for export trading partners (EXTPDUM2) from 0.035 to 0.058. This indicates that both Y type and

the UN Chemical/Industrial classification methods are measuring similar concepts of waste hazard. Due to lack of relative change in the results for these nineteen variables, a detailed discussion of these same nineteen variables' regression in Table 60 is unnecessary.

This model of this sixth multivariate regression shown in Table 60 has an adjusted $R^2 = 0.876$, meaning that nearly 88% of the variation in development level movement that shipments sent by origination countries experience is explained by this model.

These results also partially fulfill my second research objective of determining which independent variables affect waste shipments' economic development level movement. Future researchers studying transboundary waste movement may also find these findings relating to the other independent variables, besides the waste hazard variables, valuable in determining which ones to include in their studies.

This concludes Chapter V, "Data Analysis". Chapter VI, "Discussion and Conclusions" will finish the report of this research study.

Chapter VI

SUMMARY AND CONCLUSIONS

1. Summary and Conclusions

Chapter one introduced the extent and central problem with previous research on international transboundary waste movement, namely that although the research on this topic is extensive, this research tends to be qualitative in nature, made up almost entirely of case studies or accounts and lists of incidents. The three objectives of this research were also specified and outlined. The first objective is to examine and determine the characteristics of both transboundary waste sending and waste receiving countries as they relate to the amount of waste that is shipped or received. The second objective is to determine what country characteristics effect the economic level movement of waste shipments. The third objective is to determine quantitatively if the more hazardous portion of the waste has a transboundary movement from sending countries that have characteristics of higher levels of development relative to receiving countries that have characteristics of lower levels of development.

Chapter two reviewed the literature on this topic, and expounded on the theme of the scarcity of quantitative research on the international transboundary movement of waste. Using data on international transboundary waste that the Basel Convention collected in their annual records of member nation imports and exports, shipment amounts and frequencies (Secretariat of the Basel Convention 2006a, 2006b, 2006c, 2006d), the research in this paper addressed the deficiency of quantitative research on this topic. The literature review also disclosed the various theoretical perspectives used as guides in research on waste movement, proposing that Wallerstein's (1974; 1980; 1989)

world-systems theoretical perspective in its present day form, is the theoretical perspective that best guides research on international transboundary waste movement. Two world-systems generated hypotheses are proposed as an explanation for the movement of international transboundary waste.

Chapter three outlined the methodology used in this study. Data from the Basel Convention, Year 2000, consisting of the Member Nation Import and Export Reports were used to construct Country Case data file and two Shipment Frequency data files. The data was described, Basel Convention codes and the methods of construction of these files were discussed. Limitations of the study were also discussed.

Chapter four described in detail the creation of the independent variables and a dependent variable for the destination and origination countries in the Country Case data file and also the independent variables and the dependent variables for the Destination Shipment Frequency and the Origination Shipment Frequency data files. Forty-seven independent variables were created in a Country Case data file for examining the characteristics of origination countries and destination countries as these characteristics potentially relate to the amounts of hazardous and other waste sent or received by these countries, respectively. In order to test my two hypotheses, forty-five independent variables relating to the characteristics of origination countries and destination countries or as they related to waste characteristics that potentially affect waste movement were created in Destination Shipment Frequency and Origination Shipment Frequency data files.

Chapter five provided and described data analyses and statistical results in the form of bivariate correlations and multivariate regressions for the variables in these same

three files. Bivariate correlations were performed on the variables in the Country Case data file to determine independent variables that have no affect on waste amounts sent or received, thus eliminating them from further analysis. Bivariate correlations were used in the Origination Shipment Frequency and Destination Shipment Frequency data files to determine independent variables that have no affect on economic level movement, thus eliminating them from further analysis. Bivariate correlations were used in all three data files to eliminate cases of possible multiple collarity, so proper adjustments could be made for these cases. In a test of my two hypotheses relating to the international transboundary movement of waste, the chapter also provided and described the results of multivariate regressions for the variables remaining in these three data files.

Two multivariate regressions were done using the Country Case data file. In the first data run the dependent variable for destination country variables was the amount of destination country waste. The 10 independent variables used in the first multivariate regression were the six variables previously identified by the bivariate correlations of the variables in the Destination Country data file plus four other destination country characteristic independent category variables identified by the literature review. For the second data run, the dependent variable for origination country variables was the amount of origination country waste. The 16 independent variables used in the second multivariate regression were the 12 variables previously identified by the bivariate correlations of the variables in the Origination Country data file plus four other origination country characteristic independent category variables identified by the literature review.

Two multivariate regressions are run for the Destination Shipment Frequency data

file and the Origination Shipment Frequency data file, using the development level movement scale as a dependent variable, but using two different types of independent variables representing levels of waste hazard. The two multivariate regressions on the variables in the Destination Shipment Frequency data file use as controls the 16 independent variables previously identified by the bivariate correlations of the variables in this file, three waste characteristic category variables and six other destination country characteristic independent category variables identified by the literature review, for a total of 25 variables. The two multivariate regressions on the variables in the Origination Shipment Frequency data file use as controls the 15 independent variables previously identified by the bivariate correlations of the variables in this file, three waste characteristic category variables, and six other origination country characteristic independent category variables identified by the literature review, for a total of 24 variables. In all, six multivariate regressions are run, using the three data files.

When the nine other independent variables were controlled, two characteristics of destination countries were found to increase the amount of waste received. These were the values of exports in billions of U.S. Dollars and the number of environmental treaties a country had ratified. As the amount of each of these two characteristics increased, the amount of waste received (imported) also increased, thus explaining slightly over 33% of the amount of waste received by destination countries.

Likewise, when the fifteen other independent variables were controlled, two characteristics of origination countries are found to increase the amount of waste sent (exported). These were the value of the origination country's exports in billions of U.S. Dollars and the amount of their net energy imports. As the amount of the first of these

characteristics increased, the amount of waste sent (exported) also increased. Countries that were not net energy importers sent less waste than countries that were net energy importers. This model explained over 40% of the amount of waste sent by origination countries.

The third, fourth, fifth, and sixth multivariate regressions tested our two hypotheses on waste hazard level and development level movement, using the Destination and Origination Shipment Frequency data files.

In the third regression, 25 destination country independent variables were controlled, while comparisons were made for development level movement in waste shipment frequencies for Y category waste. It was found that the highest hazard category of Y-coded waste, incinerated household waste or Y46- Y47 category waste, more often moved to countries of lower development level than did the lowest Y-category waste or Y1 – Y18, waste streams waste. Waste shipments labeled disposal and recycling did not differ in their economic level movement. Mixed and unknown destination country waste labeled for Recycling/Disposal went to higher-level developed countries more than destination shipments labeled for “Disposal”. This model explained 74% of the development level movement of transboundary waste.

This result supports both hypothesis **H1**: “Waste hazard level affects the movement of transboundary waste” and hypothesis **H2**: “Transboundary waste with higher hazard levels moves to countries with lower economic development levels more than to countries with higher economic development levels”.

In the fourth regression, 25 destination country independent variables were controlled, while comparisons were made for development level movement of the waste

shipment frequencies of UN coded or Basel Convention H-coded waste. The comparison dummy variable in this regression was the relatively low hazardous “Flammable liquids” waste. It was found that the three higher hazardous waste categories of UN/H-coded wastes of “Explosive substances”, “Poisonous or infectious substances”, and “Toxic gases, toxic substances and ecotoxic substances” as well as “Unknown” UN/H-coded shipments all moved to countries of lower economic development than waste labeled as “Flammable liquids”. Waste shipments labeled “Disposal” and “Recycling” did not differ in their economic level movement. As in the third regression for destination countries, both “Mixed” and “Unknown” labeled shipments of recycled/disposal-coded waste moved to countries of higher-level development than waste labeled for “Disposal”. This model explained about more than 73% of the development level movement of transboundary waste.

This result supports both hypothesis **H1**: “Waste hazard level affects the movement of transboundary waste” and hypothesis **H2**: “Transboundary waste with higher hazard levels moves to countries with lower economic development levels more than to countries with higher economic development levels”.

The third and fourth multivariate regressions of development level movement on the two waste hazard level variables and the 25 destination country independent variables identified eighteen variables that affected development level movement, eight of these variables exerted waste shipments to move to countries with higher development levels, nine of these variables exerted waste shipments to move to countries of lower developmental levels, and one variable exerted mixed movement for two of the categories of this variable. Future transboundary waste researchers may use these results

to determine which independent variables are important to use in their research.

In the fifth regression, twenty-four origination country independent variables were controlled, while comparisons were made for development level movement of waste shipment frequencies of Y-category waste. It was found that the second highest hazard Y-category waste or Y18 – Y45, waste having as constituents; the highest hazard category of Y-category waste or Y46 – Y47, incinerated household waste; and Y-codes unknown or unreported more to countries of lower development level than did the lowest Y-category waste or Y1 – Y18, waste streams waste. Waste shipments labeled for “Recycling”, shipments with recycling/disposal codes “Unknown” and shipments with recycling/disposal codes “Mixed” more often moved to countries of lower level economic level development than waste labeled for “Disposal”. This model explained nearly 88% of the development level movement of transboundary waste.

This result supports both hypothesis **H1**: “Waste hazard level affects the movement of transboundary waste” and hypothesis **H2**: “Transboundary waste with higher hazard levels moves to countries with lower economic development levels more than to countries with higher economic development levels”.

In the sixth regression, 24 origination country independent variables were controlled, while comparisons were made for development level movement of the waste shipment frequencies of UN or Basel convention H-coded waste. The comparison dummy variable in this regression was the relatively low hazardous “Flammable liquids” waste. It was found that the two higher hazardous waste categories of UN/H-coded wastes of “Poisonous or infectious substances” and “Toxic gases, toxic substances and ecotoxic substances” as well as both the “Mixed” UN/H-coded waste and the “Unknown”

UN/H-coded shipments more often moved to countries of lower economic development as compared to shipments labeled as “Flammable liquids” waste. As in the fifth regression for origination countries, waste shipments labeled “Recycling”, shipments labeled as “Unknown” and waste shipments labeled as “Mixed” moved to destinations of lower-level development than their originations, as compared to waste shipments labeled as for “Disposal”. This model explained nearly 88% of the development level movement of transboundary waste.

This result supports both hypothesis **H1**: “Waste hazard level affects the movement of transboundary waste” and hypothesis **H2**: “Transboundary waste with higher hazard levels moves to countries with lower economic development levels more than to countries with higher economic development levels”.

The fifth and sixth multivariate regressions of development level movement on the two waste hazard level variables and the 24 origination country independent variables identified nineteen variables that affected development level movement, eight of these variables exerted waste shipments to move to countries with higher development levels, and eleven of these variables exerted waste shipments to move to countries of lower developmental levels. Future transboundary waste researchers may use these results to determine which independent variables are important to use in their research.

2. Discussion

The first objective of this research was to examine the characteristics of waste destination counties and characteristics of waste origination countries as they relate to amounts of waste sent and received. The two characteristics of destination countries determined by this research to be related to amounts of waste received (imported) are

“total value of exports” and destination countries’ “number of ratified environmental treaties”. As the value of total exports and the number of environmental treaties ratified increases, so do the amounts of waste received (imported).

The two characteristics of origination countries determined by this research to be related to waste amounts sent (exported) are the origination country’s “total value of exports” and whether the origination country is a “net energy importer” or not. As the value of total exports increases, so do the amount of waste sent (exported). Origination countries that are not net energy importers send (export) more waste than origination countries that are net energy importers. Johnstone and Labonne (2004) postulate that waste generation is related to the size of an economy. Amounts of waste generation would reasonably be related to amount of waste exports. However, it is not clear how this result for being or rather not being a net energy importer translates into an explanation for amounts of waste sent or exported.

The second objective was to determine what country characteristics effect the economic level movement of waste shipments. The four multivariate regressions on the Destination Shipment Frequency data file and the Origination Shipment frequency data files accomplished this objective by identifying 18 in the former and 19 in the latter that affect waste shipment development level movement and determine which direction, upward or downward, how each of these affected this movement. Future transboundary waste researchers should find this information useful.

The third objective was to determine quantitatively the question of whether the more hazardous portion of waste has a transboundary movement to countries with characteristics of lower levels of development, more than to countries with characteristics

of higher levels of development. This was to be accomplished by testing our two hypotheses concerning waste movement, namely that waste hazard level affects the movement of transboundary waste (H1) and that transboundary waste with higher hazard levels moves to countries with lower levels of economic development more than to countries with higher economic levels of development (H2). The four multivariate regressions on the Destination Shipment Frequency data file and the Origination Shipment frequency data file tested and found support for these two hypotheses with each of the four regressions. A discussion on how well the results of our research support our hypotheses is as follows.

The Basel Convention “Nation Reported Imported and Exported Hazardous and Other Waste” categorizes waste according to three classification systems. These are: waste origin characteristics or Y-category waste, waste chemical/industrial descriptions or UN/H-codes, and by Disposal/Recycling codes or D and R codes. This allows the waste shipments to be categorized by each of these three waste descriptive methods and in the case of the Y-code categories and the UN/H-code categories, compare the waste categories’ movement according to relative hazard. The Disposal/Recycling codes or D and R codes allow for us to determine if recycled waste shipments went to destinations of lower economic development more often than those destinations of higher economic development, another indication or measure of relative waste hazard.

According to the results of the analysis of the waste origin or Y-category waste descriptions, and examining either destination country’s or origination country’s characteristics, the more hazardous waste shipments in each case went to countries of lower economic development more often than less hazardous waste shipments. The same

is true according to the results of the analysis of chemical/industrial or UN/H-coded category wastes. In the cases of either destination country or origination country's characteristics, and according to either waste origin/Y-category or the UN/H-coded categorization, the categories of the more hazardous waste shipments more often went to countries of lower economic development than less hazardous waste shipments. These results support both of my hypotheses. The results also lend support to the "recursive exploitive nature" thesis, as it applies to understanding global development and related environmental problems (Burns, Kick and Davis 2006).

In the Chapter IV, Section 5, I describe the construction of a dependent variable development level scale by using finer gradients of 5,000 GDP to distinguish development levels rather than the traditional world-system's levels of core, semi-core, semi-periphery, and periphery. Using development level movement scale, this research found support for a modified world-system theoretical perspective explanation for development level movement of waste.

The results of the research determining the movement of waste labeled with Disposal/Recycling codes or D and R codes by origination countries and destination countries was not so conclusive. Controlling for characteristics of destination countries indicates that waste shipments labeled for disposal and recycling do not differ in their economic level movement, but also indicates that mixed shipments or shipments of unknown recycling/disposal labeling more often move to countries of higher economic level development.

However, research results obtained when controlling for characteristics of origination countries indicate that waste shipments labeled for recycling more often move

to countries of lower economic level development than waste shipment labeled for disposal and also indicates that mixed shipments or shipments of unknown recycling/disposal labeling more often move to countries of lower economic level development than waste labeled for disposal. It could be possible that destination country characteristics along with waste characteristics exert a neutral affect on the movement of disposed/recycling waste, while origination country characteristics along with waste characteristics exert an affect toward waste shipment movement from higher economically developed countries to lower economic developed countries. Perhaps international transboundary waste movement research with methodology allowing simultaneous control of both destination country characteristics and origination country characteristics would allow determination of which of the two, destination country characteristics or origination country characteristics, prevails in affecting economic level movement of recycling/disposal transboundary waste.

The Year 2000 Basel Convention Export and Import Nation Reports were used for this research. Basel Convention data in more recent years may be more complete than the year 2000, as more nations join in with contributing data on their waste imports and waste exports. It is my hope that other research using these more recent years will be performed, so that comparisons may be made of the results of this research with those reported in this paper.

NOTES

1. I benefited greatly from Hall's (2000) and Goldfrank's (2000) essays on Wallerstein and his world-system perspective in outlining and writing this portion of the theoretical section of this chapter.
2. In the *UNCTAD Handbook of Statistics 2002*, the UNCTAD secretariat uses the Herfindahl-Hirschmann index normalized in calculating the import and export concentration and diversification indices by country. The footnotes at the end of Tables' 8.2A & 8.2B (P. 403) in the handbook may be consulted if more information is desired as to the formula and method that the secretariat uses in calculating these indices.
3. Page numbers are not given in the online version CIA's *The World Factbook 2000*.
4. Among the waste destination countries, none had raw materials among their primary imports. The origination countries only had 3 counties that had raw materials among their primary imports, thus the dummy variable for this category is omitted from both files leaving a comparison between primary importers of manufactured goods and mixed commodities.

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APPENDIX A

STATISTICAL ANALYSIS TABLES

Table 1: Waste Amounts and Waste Shipment Frequencies - Statistics for Destination Waste Amounts (DESMNTT), Origination Waste Amounts (ORGMNTT), Destination Waste Shipment Frequencies (DESRQT) and Origination Waste Shipment Frequencies (ORIFRQ) in the Country Case Data File (CCDF). Information variables .

Statistics	DESMNTT	ORGMNTT	DESRQT	ORIFRQ
Mean	145,258.919	78,681.914	78.65	42.60
Median	16,964.957	2,551.730	6.00	6.00
Mode	200.000	0.000	1	1
Std. Deviation	299,527.678	223,386.221	214.61	143.02
Minimum	73.000	0.000	1	1
Maximum	1,646,081.304	1,318,644.241	1,344	1304
Missing	0	0	0	0
Total Cases	52	96	52	96

DESMNTT - Destination Waste Shipment Frequencies..

ORGMNTT - Origination Waste Amounts.

DESRQT - Destination Waste Shipment Frequencies.

ORIFRQ- Origination Waste Shipment Frequencies.

Multiple modes exist for ORIFRQ. The smallest mode is given.

Table 2: Y - Category Waste Shipment Amounts - Statistics for Y- Category Waste Shipment Amounts (SHPAMT); Variable Created for the Destination and Origination Shipment Frequency Data Files (SFDF) from Basel Convention Data.

Statistics	SHPAMT
Mean	1,848.168
Median	58.000
Mode	0.000
Std. Deviation	13,400.049
Minimum	0.000
Maximum	493,093.000
Missing	3
Total Cases	4087

SHPAMT- Size of Y-category waste shipments in metric tones.

Table 3: Source, or Y - Category Waste Shipment Frequencies - Statistics for the Y - Category Waste Shipment Frequencies (HAZY); Variable Created for the Destination and Origination Shipment Frequency Data Files (SFDF) from Basel Convention Data.

Statistics	HAZY
Mean	20.10
Median	3.00
Mode	3.00
Std. Deviation	36.37
Minimum	1
Maximum	99
(Article 1 1(b))	143 (3.5)
(Y1 - Y18)	1,174 (28.7)
(Y19 - Y45)	1,914 (46.8)
(Y46 - Y47)	86 (2.1)
(Mixed Categories)	262 (6.4)
(Y-codes Unknown)	511 (12.5)
Missing	0 (0.0)
Total Percent	100.0
Total Cases	4090

HAZY - Shipment Frequencies for Source, or Y categories or source characteristics of wastes.

Rounding percentages may cause their sums to only approximate 100%.

Percentages in ()

Table 4: Proximity - Statistics for the Proximity of Destination and Origination Countries (PROX); Variable Created for the Destination and Origination Shipment Frequency Data Files (SFDF) from Basel Convention Data.

Statistics	PROX
Mean	2.66
Median	3.00
Mode	3
Std. Deviation	0.59
Minimum	1
Maximum	3
Out-of-region	239 (5.9)
Within Region	929 (22.8)
Adjacent	2,914 (71.4)
Missing	0 (0.0)
Total Percent	100.0
Total Cases	4090

PROX - Proximity of origination and destination countries.

Rounding percentages may cause their sums to only approximate 100%.

Percentages in ()

Table 5: Disposal/Recycling Waste - Statistics for Disposal/Recycling Waste (DSRC); Created for the Destination and Origination Shipment Frequency Data Files (SFDF), from Basel Convention Information.

Statistics	DSRC
Mean	3.14
Median	1
Mode	1
Std. Deviation	12.24
Minimum	1
Maximum	99
Disposed	2,075 (50.7)
Recycled	1,941 (47.5)
Mixed	40 (1.0)
R & D codes Unknown	34 (0.8)
Missing	0 (0.0)
Total Percent	100.0
Total Cases	4090

DSRC - Disposed verses recycled wastes.

Rounding percentages may cause their sums to only approximate 100%.

Percentages in ()

Table 6: Countries Crossed in Transit - Statistics for the Number of Countries Shipments Cross in Transit (TRAN); Variable Created for the Destination and Origination Shipment Frequency Data Files (SFDF) from Basel Convention Data.

Statistics	TRAN
Mean	1.96
Median	2.00
Mode	2
Std. Deviation	0.31
Minimum	1
Maximum	3
One Country in Transit	284 (6.9)
No Country in Transit	3,685 (90.1)
2, or more, Countries Transit	121 (3.0)
Missing	0 (0.0)
Total Percent	100.0
Total Cases	4090

TRAN - Number of countries crossed in transit.

Rounding percentages may cause their sums to only approximate 100%.

Percentages in ()

Table 7: Innate Waste Characteristics or UN Category Waste - Statistics for Chemical/Industrial Waste Characteristics or UN Category Waste Classifications (HAZH); Variable created for the Destination and Origination Shipment Frequency Data Files (SFDF) from Basel Convention Data.

Statistics	HAZH
Mean	41.98
Median	9.00
Mode	99.00
Std. Deviation	43.37
Minimum	1
Maximum	99
Explosive substance	6 (0.1)
Flammable liquids	368 (9.0)
Flammable solids	270 (6.6)
Oxidizing Subst.s or organic peroxides	52 (1.3)
Poisonous or infectious subst.s	515 (12.6)
Corrosive substances	387 (9.5)
Toxic gases, toxic subst.s or ecotoxic subst.s	800 (19.6)
Mixed substances	54 (1.3)
Mixed shipments	620 (15.2)
Unknown UN codes or Unknow H codes	1018 (24.9)
Missing	0 (0.0)
Total Percent	100.0
Total Cases	4090

HAZH- UN and H code categories for innate descriptive characteristics of wastes.

Rounding percentages may cause their sums to only approximate 100%.

Percentages in ()

Table 8: Economic Development Level - Statistics for Economic Level Development (DEVLEV); an Economic Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination DEVLEV	CCDF Origination DEVLEV	SFDF Destination DEVLEV	SFDF Origination DEVLEV
Mean	3.12	2.82	3.95	3.85
Median	4.00	3.00	4.00	4.00
Mode	4	4	4	4
Std. Deviation	1.07	1.09	0.31	0.52
Minimum	1	1	1	1
Maximum	4	4	4	4
Level 1	6 (11.5)	14 (14.6)	22 (0.5)	38 (0.9)
Level 2	8 (15.4)	24 (25.0)	34 (0.8)	167 (4.1)
Level 3	11 (21.2)	22 (22.9)	59 (1.4)	184 (4.5)
Level 4	26 (50.0)	35 (36.5)	3969 (97.0)	3695 (90.3)
Missing	1 (1.90)	1 (1.0)	6 (0.1)	6 (0.1)
Total Percent	100.0	100.0	100.0	100.0
Total Cases	52	96	4,090	4,090

DEVLEV - is a variable measuring economic development level in GDP & PPP per capita for year 2000.

Rounding percentages may cause their sums to only approximate 100%.

Percentages in ().

Level 1 = Low income country (0 to \$755 Purchasing Power Parity per capita).

Level 2 = Low Middle income country (\$755 to \$2,995 Purchasing Power Parity per capita).

Level 3 = High Middle income country (\$2,995 to \$9,995 Purchasing Power Parity per capita).

Level 4 = High income country (\$9,995 and above Purchasing Power Parity per capita).

Table 9: Internal Concentration of Income - Statistics for the Internal Concentration of Income (GINI), An Economic Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination GINI	CCDF Origination GINI	SFDF Destination GINI	SFDF Origination GINI
Mean	34.93	38.11	31.83	35.02
Median	33.10	36.00	33.10	35.90
Mode	25.00*	25.00*	33.10	40.10
Std. Deviation	8.51	10.09	4.49	5.89
Minimum	24.40	24.40	24.70	24.40
Maximum	59.30	63.00	59.30	63.00
Missing	2	17	8	125
Total Cases	50	96	4,090	4,090

GINI - Measure of internal income distribution of countries.

*In this case, GINI has multiple modes, the smallest of these is listed.

Data for year 2000, or the closest year available is used in this table.

Table 10: Export Concentration - Statistics for the Concentration of Exports (EXCOMC); An Economic Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination EXCOMC	CCDF Origination EXCOMC	SFDF Destination EXCOMC	SFDF Origination EXCOMC
Mean	0.1898	0.2650	0.1169	0.1310
Median	0.1353	0.1709	0.1050	0.0971
Mode	0.0826	0.0826	0.1327	0.0900
Std. Deviation	0.1532	0.2151	0.0447	0.0875
Minimum	0.0551	0.0551	0.0551	0.0551
Maximum	0.8642	0.9961	0.8642	0.9961
Missing	4	9	11	86
Total Cases	52	96	4,090	4,090

EXCOMC - An index for measuring the degree a country's exports are concentrated in number.

Data for year 2000, or the closest year available is used in this table.

Table 11: Import Concentration - Statistics for the Concentration of Imports (IMCOMC); An Economic Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination IMCOMC	CCDF Origination IMCOMC	SFDF Destination IMCOMC	SFDF Origination IMCOMC
Mean	0.1112	0.1196	0.0897	0.1020
Median	0.0092	0.1017	0.0884	0.1030
Mode	0.0962	0.0962*	0.0884	0.1030
Std. Deviation	0.0056	0.0614	0.0206	0.0403
Minimum	0.0542	0.0542	0.0542	0.0542
Maximum	3.1530	0.4114	0.3153	0.4114
Missing	4	10	11	89
Total Cases	52	96	4,090	4,090

IMCOMC - An index for measuring the degree a country's imports are concentrated in number.

*In this case, IMCOMC has multiple modes, the smallest of these is listed.

Data for year 2000, or the closest year available is used in this table.

**Table 12: External Debt - Statistics for the Amount of External Debt (EXTDEBT);
An Economic Variable Created for the Country Case Data File (CCDF) and Shipment
Frequency Data Files (SFDF).**

Statistics	CCDF Destination EXTDEBT	CCDF Origination EXTDEBT	SFDF Destination EXTDEBT	SFDF Origination EXTDEBT
Mean	13.53	20.34	4.88	8.87
Median	11.10	16.80	0.25	8.29
Mode	0.00	0.00	0.20	8.30
Std. Deviation	11.74	17.79	7.66	9.84
Minimum	0.00	0.00	0.00	0.00
Maximum	49.30	87.90	49.30	87.90
Missing	1	1	0	0
Total Cases	52	96	4,090	4,090

EXTDEBT - Is a measure of a country's external debt given as a percentage of GDP.

Data for year 2000, or the closest year available is used in this table.

Table 13: Unemployment - Statistics for Unemployment as a Percentage of the Total Workforce (UNEMP); An Economic Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination UNEMP	CCDF Origination UNEMP	SFDF Destination UNEMP	SFDF Origination UNEMP
Mean	9.40	12.84	7.39	6.45
Median	8.40	9.80	6.80	4.10
Mode	14.00	30.00	6.80	4.00
Std. Deviation	6.14	10.68	2.67	5.34
Minimum	1.90	1.80	1.90	1.80
Maximum	30.00	50.00	30.00	50.00
Missing	5	13	32	61
Total Cases	52	96	4,090	4,090

UNEMP - Is a measure of a country's unemployment as a percentage of their total workforce employment.

Data for year 2000, or the closest year available is used in this table.

Table 14: Military Expenditures - Statistics for Military Expenditures as a Percentage of GDP (MIL_EXPS); An Economic Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination MIL_EXPS	CCDF Origination MIL_EXPS	SFDF Destination MIL_EXPS	SFDF Origination MIL_EXPS
Mean	1.94	2.68	1.72	2.15
Median	1.50	1.71	1.40	1.70
Mode	1.20	1.20	1.30	3.20
Std. Deviation	1.44	2.57	0.69	1.14
Minimum	0.00	0.00	0.00	0.00
Maximum	9.40	13.00	9.40	13.00
Missing	2	11	18	110
Total Cases	52	96	4,090	4,090

MIL_EXPS - Is a measure of a country's military expenditures as a percentage of their country's GDP.

Data for year 2000, or the closest year available is used in this table.

Table 15: Military Imports - Statistics for Military Imports in Millions of US\$ (MIL_IM); An Economic Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination MIL_IM	CCDF Origination MIL_IM	SFDF Destination MIL_IM	SFDF Origination MIL_IM
Mean	554.31	503.83	1,052.11	910.37
Median	220.00	70.00	1,000.00	1,000.00
Mode	10.00	0.00	1,000.00	1,600.00
Std. Deviation	744.71	1,034.50	597.48	682.00
Minimum	0.00	0.00	0.00	0.00
Maximum	3,000.00	7,700.00	3,000.00	7,700.00
Missing	1	2	6	31
Total Cases	52	96	4,090	4,090

MIL_IM - Is a measure of Military Imports as valued in millions of US dollars.

Data for year 2000, or the closest year available is used in this table.

Table 16: Agricultural Economic Activity - Statistics for Agricultural Economic Activity as a Percentage of GDP (PCAGGDP); An Economic Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination PCAGGDP	CCDF Origination PCAGGDP	SFDF Destination PCAGGDP	SFDF Origination PCAGGDP
Mean	8.13	10.86	2.65	3.42
Median	4.00	7.00	3.00	2.20
Mode	4.00*	3.00	3.00	2.00
Std. Deviation	8.79	10.51	1.94	3.93
Minimum	0.00	0.00	0.00	0.00
Maximum	39.00	49.00	39.00	49.00
Missing	2	4	9	26
Total Cases	52	96	4,090	4,090

PCAGGDP - Is a measure of agriculture economic activity as a percentage of a country's GDP.

*In this case, PCAGGDP has multiple modes, the smallest of these is listed.

Data for year 2000, or the closest year available is used in this table.

Table 17: Industrial Economic Activity - Statistics for Industrial Economic Activity as a Percentage of GDP (PCINGDP); An Economic Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination PCINGDP	CCDF Origination PCINGDP	SFDF Destination PCINGDP	SFDF Origination PCINGDP
Mean	30.51	31.38	28.31	26.61
Median	30.00	30.55	30.40	26.30
Mode	35.00	35.00	31.00	18.00
Std. Deviation	5.84	8.94	4.10	7.49
Minimum	18.00	7.00	18.00	7.00
Maximum	46.00	55.00	46.00	55.00
Missing	2	4	9	26
Total Cases	52	96	4,090	4,090

PCINGDP - Is a measure of industrial economic activity as a percentage of a country's GDP.

Data for year 2000, or the closest year available is used in this table.

Table 18: Service Economic Activity - Statistics for Service Economic Activity as a Percentage of GDP (PCSERGDP); An Economic Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination PCSERGDP	CCDF Origination PCSERGDP	SFDF Destination PCSERGDP	SFDF Origination PCSERGDP
Mean	61.36	57.77	69.04	69.97
Median	63.70	59.00	68.40	70.00
Mode	60.00*	60.00	66.00	80.00
Std. Deviation	9.95	12.70	4.93	9.29
Minimum	39.00	20.00	39.00	20.00
Maximum	80.00	90.00	80.00	90.00
Missing	2	4	9	26
Total Cases	52	96	4,090	4,090

PCSERGDP - Is a measure of service economic activity as a percentage of a country's GDP.

*In this case, PCSERGDP has multiple modes, the smallest of these is listed.

Data for year 2000, or the closest year available is used in this table.

Table 19: Export Value - Statistics the the Value of a Country's Exports in Billions of US\$ (EXP_B); An Economic Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination EXP_B	CCDF Origination EXP_B	SFDF Destination EXP_B	SFDF Origination EXP_B
Mean	103.530	65.510	323.949	357.978
Median	41.200	14.550	272.300	241.100
Mode	7.600*	2.000	272.300	776.000
Std. Deviation	154.315	124.115	197.800	315.523
Minimum	0.372	0.058	0.372	0.058
Maximum	776.000	776.000	776.000	776.000
Missing	2	2	9	24
Total Cases	52	96	4,090	4,090

EXP_B - Is a measure of the value of a country's exports in billions of U.S. Dollars.

*In this case, EXP_B has multiple modes, the smallest of these is listed.

Data for year 2000, or the closest year available is used in this table.

Table 20: Import Value - Statistics the the Value of a Country's Imports in Billions of US\$ (IMP_B); An Economic Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination IMP_B	CCDF Origination IMP_B	SFDF Destination IMP_B	SFDF Origination IMP_B
Mean	99.688	63.930	313.119	483.859
Median	35.150	12.500	238.200	201.200
Mode	3.200*	2.200*	238.000	1,223.000
Std. Deviation	192.514	148.807	302.465	520.854
Minimum	0.579	0.305	0.579	0.305
Maximum	1,223.000	1,223.000	1,223.000	1,223.000
Missing	2	2	9	24
Total Cases	52	96	4,090	4,090

IMP_B - Is a measure of the value of a country's exports in billions of U.S. Dollars.

*In this case, IMP_B has multiple modes, the smallest of these is listed.

Data for year 2000, or the closest year available is used in this table.

Table 21: Total Land Area - Statistics for a Country's Total Land Area in Square Kilometers (AREA); A Geographical Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination AREA	CCDF Origination AREA	SFDF Destination AREA	SFDF Origination AREA
Mean	1,371,700.3	1,036,661.2	3,993,925.4	3,854,492.8
Median	298,170.0	207,600.0	499,542.0	349,223.0
Mode	1.9*	1.9*	9,220,970.0	9,158,960.0
Std. Deviation	3,204,472.8	2,571,921.3	4,439,824.2	4,488,738.6
Minimum	1.9	1.9	1.9	1.9
Maximum	16,995,800.0	16,995,800.0	16,995,800.0	16,995,800.0
Missing	1	1	6	7
Total Cases	52	96	4,090	4,090

AREA - Is a measure of a country's total land area in square kilometers (excludes areas under water).

*In this case, AREA has multiple modes, the smallest of these is listed.

Data for year 2000, or the closest year available is used in this table.

Table 22: Arable Land - Statistics for a Country's Arable Land as a Percentage of Total Land Area (ARB_L); A Land Use Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination ARB_L	CCDF Origination ARB_L	SFDF Destination ARB_L	SFDF Origination ARB_L
Mean	19.53	17.18	19.29	20.21
Median	17.00	12.00	19.00	19.00
Mode	10.00*	0.00	5.00	19.00
Std. Deviation	14.56	14.74	13.04	10.85
Minimum	0.00	0.00	0.00	0.00
Maximum	60.00	60.00	60.00	60.00
Missing	1	1	6	7
Total Cases	52	96	4,090	4,090

ARB_L - Is the percent of a country's land cultivated for crops that are replanted after each harvest like wheat, maize, and rice.

*In this case, ARB_L has multiple modes, the smallest of these is listed.

Data for year 2000, or the closest year available is used in this table.

Table 23: Permanent Crop Land - Statistics for a Country's Permanent Crop Land as a Percentage of Total Land Area (PERMCRP); A Land Use Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination PERMCRP	CCDF Origination PERMCRP	SFDF Destination PERMCRP	SFDF Origination PERMCRP
Mean	2.74	2.80	1.00	1.56
Median	1.00	1.00	0.00	0.00
Mode	0.00*	0.00	0.00	0.00
Std. Deviation	3.34	3.70	1.96	2.85
Minimum	0.00	0.00	0.00	0.00
Maximum	12.00	15.00	12.00	15.00
Missing	1	1	6	7
Total Cases	52	96	4,090	4,090

PERMCRP - Is the percent of a country's land cultivated for crops that are not replanted after each harvest like citrus, coffee, and rubber.

*In this case, PERMCRP has multiple modes, the smallest of these is listed.

Data for year 2000, or the closest year available is used in this table.

Table 24: Permanent Pasture Land - Statistics for a Country's Permanent Pasture Land as a Percentage of Total Land Area (PERMPST); A Land Use Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination PERMPST	CCDF Origination PERMPST	SFDF Destination PERMPST	SFDF Origination PERMPST
Mean	20.64	20.94	14.75	22.86
Median	15.00	18.00	15.00	25.00
Mode	0.00	0.00	3.00	25.00
Std. Deviation	18.42	17.65	12.58	16.21
Minimum	0.00	0.00	0.00	0.00
Maximum	68.00	68.00	68.00	68.00
Missing	1	1	6	7
Total Cases	52	96	4,090	4,090

PERMPST - Is the percent of a country's land permanently used for herbaceous forage crops.

Data for year 2000, or the closest year available is used in this table.

Table 25: Permanent Forest Land - Statistics for a Country's Permanent Forest Land as a Percentage of Total Land Area (FOREST); A Land Use Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination FOREST	CCDF Origination FOREST	SFDF Destination FOREST	SFDF Origination FOREST
Mean	30.98	27.61	36.63	28.46
Median	30.00	27.00	31.00	30.00
Mode	34.00	0.00	54.00	30.00
Std. Deviation	19.89	20.14	17.48	14.28
Minimum	0.00	0.00	0.00	0.00
Maximum	76.00	93.00	76.00	93.00
Missing	1	1	6	7
Total Cases	52	96	4,090	4,090

FOREST - Is the percent of a country's land under dense or open stands of trees.

Data for year 2000, or the closest year available is used in this table.

Table 26: Other Land - Statistics for a Country's Other (Low Productive) Land as a Percentage of Total Land Area (OTH_L); A Land Use Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination OTH_L	CCDF Origination OTH_L	SFDF Destination OTH_L	SFDF Origination OTH_L
Mean	26.12	31.42	28.33	26.90
Median	20.00	20.00	26.00	26.00
Mode	14.00*	14.00	38.00	26.00
Std. Deviation	20.16	26.23	10.17	13.94
Minimum	3.00	3.00	3.00	3.00
Maximum	100.00	100.00	100.00	100.00
Missing	1	1	6	7
Total Cases	52	96	4,090	4,090

OTH_L - Is the percent of a country's land not use as Arable Land, Permanent Crop, Permanent Pasture, or Forest; land such as urban areas, roads, desert, etc.

*In this case, OTH_L has multiple modes, the smallest of these is listed.

Data for year 2000, or the closest year available is used in this table.

Table 27: Urban Land - Statistics for a Country's Urban Land as a Percentage of Total Land Area (URB_L); A Land Use Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination URB_L	CCDF Origination URB_L	SFDF Destination URB_L	SFDF Origination URB_L
Mean	12.77	13.33	13.25	14.18
Median	8.18	6.09	13.73	8.20
Mode	0.00*	0.00*	1.00	8.00
Std. Deviation	15.00	19.37	11.98	12.75
Minimum	0.00	0.00	0.00	0.00
Maximum	91.00	98.00	91.00	98.00
Missing	1	1	6	7
Total Cases	52	96	4,090	4,090

URB_L - Is land use for urban or city use, taken as a percent of total land area.

*In this case, URB_L has multiple modes, the smallest of these is listed.

Data for year 2000, or the closest year available is used in this table.

Table 28: Extremely Low Use Land - Statistics for a Country's Extremely Low Use Land as a Percentage of Total Land Area (LOWUSL); A Land Use Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination LOWUSL	CCDF Origination LOWUSL	SFDF Destination LOWUSL	SFDF Origination LOWUSL
Mean	15.02	20.52	16.25	13.86
Median	9.17	11.56	9.03	9.90
Mode	0.00	0.00	37.00	18.00
Std. Deviation	17.50	24.91	16.02	14.12
Minimum	0.00	0.00	0.00	0.00
Maximum	67.00	96.00	67.00	96.00
Missing	2	2	9	9
Total Cases	52	96	4,090	4,090

LOWUSL - Is the percentage of land not taken up in use in Arable Land, Permanent Crop, Permanent Pasture, Forest, and Urban land use (extremely low use land).

Data for year 2000, or the closest year available is used in this table.

Table 29: Total Population - Statistics for a Country's Total Population (POP); A Demographic Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination POP	CCDF Origination POP	SFDF Destination POP	SFDF Origination POP
Mean	41,107,224	43,360,354	60,133,254	109,000,000
Median	15,981,472	10,106,017	31,592,805	31,592,805
Mode	31,842*	31,842*	31,592,805	278,058,881
Std. Deviation	58,596,292	137,000,000	69,499,246	132000000
Minimum	31,842	31,842	31,842	31,842
Maximum	278,058,881	1,270,000,000	278,058,881	1,270,000,000
Missing	1	1	6	7
Total Cases	52	96	4,090	4,090

POP - Is a country's total population as taken from the CIA's *The World Factbook 2001*.

*In this case, POP has multiple modes, the smallest of these is listed.

Data for year 2000, or the closest year available is used in this table.

Table 30: Population Density - Statistics for a Country's Population Density in People per Square Kilometer (POPDS); A Demographic Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination POPDS	CCDF Origination POPDS	SFDF Destination POPDS	SFDF Origination POPDS
Mean	570.81	438.09	140.21	209.59
Median	80.15	76.83	80.15	55.75
Mode	2.54*	2.54*	3.43	30.36
Std. Deviation	2,494.24	1,956.40	406.57	1,148.40
Minimum	2.54	2.54	2.54	2.54
Maximum	16,758.95	16,758.95	16,758.95	16,758.95
Missing	1	1	6	7
Total Cases	52	96	4,090	4,090

POPDS - Is the average number of people living per square kilometer in a country.

*In this case, POPDS has multiple modes, the smallest of these is listed.

Data for year 2000, or the closest year available is used in this table.

Table 31: Infant Mortality Rate - Statistics for a Country's Infant Mortality Rate in Deaths of Under One Year Olds per 1000 Live Births (INMR); A Demographic Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination INMR	CCDF Origination INMR	SFDF Destination INMR	SFDF Origination INMR
Mean	17.16	24.16	5.48	7.51
Median	6.76	14.65	5.02	5.55
Mode	3.47*	5.83*	5.02	6.76
Std. Deviation	19.09	24.55	4.17	8.27
Minimum	3.47	3.47	3.47	3.47
Maximum	76.5	121.12	76.50	121.12
Missing	1	1	7	7
Total Cases	52	96	4,090	4,090

INMR - Is the number of deaths of infants under 1 year old in a given year per 1,000 live births.

*In this case, INMR has multiple modes, the smallest of these is listed.

Data for year 2000, or the closest year available is used in this table.

Table 32: Life Expectancy - Statistics for Average Life Expectancy at Birth (LIFE); A Demographic Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination LIFE	CCDF Origination LIFE	SFDF Destination LIFE	SFDF Origination LIFE
Mean	73.29	70.99	78.14	76.90
Median	75.08	73.42	78.43	77.26
Mode	48.09*	75.94	79.16	77.26
Std. Deviation	6.37	9.26	1.91	3.31
Minimum	48.09	37.08	48.09	37.08
Maximum	80.80	83.47	80.80	83.47
Missing	1	1	7	7
Total Cases	52	96	4,090	4,090

LIFE - (expectancy at birth) is average number of years lived by people born in a cohort.

*In this case, LIFE has multiple modes, the smallest of these is listed.

Data for year 2000, or the closest year available is used in this table.

Table 33: Fertility Rate - Statistics for Total Fertility Rate as the Average Children Born per Woman (TFR); A Demographic Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination TFR	CCDF Origination TFR	SFDF Destination TFR	SFDF Origination TFR
Mean	1.81	2.40	1.61	1.79
Median	1.70	1.82	1.60	1.75
Mode	1.15*	1.25	1.60	2.06
Std. Deviation	0.62	1.36	0.23	0.41
Minimum	1.13	1.13	1.13	1.13
Maximum	3.42	6.97	3.42	6.97
Missing	1	1	7	7
Total Cases	52	96	4,090	4,090

TFR - Total Birth Rate is the average number of children born per women in a country during their child bearing years.

*In this case, TFR has multiple modes, the smallest of these is listed.

Data for year 2000, or the closest year available is used in this table.

Table 34: Non-urban Population Density - Statistics for Non-urban Population Density in People per Square Kilometer (NURBPD); A Demographic Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination NURBPD	CCDF Origination NURBPD	SFDF Destination NURBPD	SFDF Origination NURBPD
Mean	33.36	211.74	20.32	44.59
Median	24.31	27.05	15.06	15.06
Mode	0.00	0.00	0.73	7.48
Std. Deviation	36.42	1,623.05	22.29	497.77
Minimum	0.00	0.00	0.00	0.00
Maximum	188.96	15,847.48	188.96	15,847.48
Missing	1	1	6	7
Total Cases	52	96	4,090	4,090

NURBD - Is the average number of people per square kilometer living in a country's non-urban areas.

Data for year 2000, or the closest year available is used in this table.

Table 35: Electricity Consumption - Statistics for a Country's Electricity Consumed in Kilowatt-hours of Electricity per Capita (ELCPC); An Energy Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination ELCPC	CCDF Origination ELCPC	SFDF Destination ELCPC	SFDF Origination ELCPC
Mean	5,436.40	4,426.29	10,194.20	9,270.13
Median	4,417.03	2,937.05	7,563.60	7,563.60
Mode	285.31*	56.77*	15,648.64	12,398.96
Std. Deviation	4,655.85	4,772.62	4,703.88	4,648.54
Minimum	285.31	56.77	285.31	56.77
Maximum	24,389.45	24,690.39	24,389.45	24,690.39
Missing	2	11	9	82
Total Cases	52	96	4,090	4,090

ELCPC - Is a country's kilowatt-hours of electricity consumed per capita.

*In this case, ELCPC has multiple modes, the smallest of these is listed.

Data for year 2000, or the closest year available is used in this table.

Table 36: Energy Consumption - Statistics for a Country's Energy Consumption in Kilograms of Oil Equivalent per Capita (ENGYPC); An Energy Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination ENGYPC	CCDF Origination ENGYPC	SFDF Destination ENGYPC	SFDF Origination ENGYPC
Mean	3,383.16	3,037.48	5,929.62	5,777.57
Median	3,226.09	2,473.95	5,785.31	5,743.04
Mode	347.40*	216.65*	8,154.32	8,158.85
Std. Deviation	1,963.60	2,515.12	1,991.13	2,408.21
Minimum	347.40	216.65	347.40	216.65
Maximum	8,408.68	11,544.48	8,408.68	11,544.48
Missing	2	11	9	82
Total Cases	52	96	4,090	4,090

ENGYPC - Is a country's energy consumption in kilograms of oil per capita.

*In this case, ENGYPC has multiple modes, the smallest of these is listed.

Data for year 2000, or the closest year available is used in this table.

Table 37: Total Electricity Consumption - Statistics for a Country's Total Electricity Consumed in Kilowatt-hours of Electricity (ELECCON); An Energy Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination ELECCON	CCDF Origination ELECCON	SFDF Destination ELECCON	SFDF Origination ELECCON
Mean	267,600,000,000	182,900,000,000	627,300,000,000	1,321,000,000,000
Median	62,960,000,000	36,300,000,000	481,500,000,000	385,100,000,000
Mode	1,276,000,000	347,160,660*	481,500,000,000	3,499,000,000,000
Std. Deviation	654,300,000,000	523,000,000,000	881,400,000,000	15,700,000,000
Minimum	1,276,000,000	347,160,660	1,276,000,000	347,160,660
Maximum	3,499,000,000,000	3,488,000,000,000	3,499,000,000,000	3,499,000,000,000
Missing	2	11	9	82
Total Cases	52	96	4,090	4,090

ELECCON - Is a country's kilowatt-hours of electricity consumed in a year.

*In this case, ELECCON has multiple modes, the smallest of these is listed.

Data for year 2000, or the closest year available is used in this table.

Table 38: Total Energy Consumption - Statistics for a Country's Energy Consumption in Kilograms of Oil Equivalent (ENGYCON); An Energy Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination ENGYCON	CCDF Origination ENGYCON	SFDF Destination ENGYCON	SFDF Origination ENGYCON
Mean	156,300,000,000	141,100,000,000	386,100,000,000	843,600,000,000
Median	49,280,000,000	25,330,000,000	250,900,000,000	250,900,000,000
Mode	991,479,600*	99,149,600*	250,900,000,000	2,303,000,000,000
Std. Deviation	345,700,000,000	295,200,000,000	570,500,000,000	1,022,000,000,000
Minimum	991,479,600	99,149,600	991,479,600	1,106,214,100
Maximum	2,303,000,000,000	2,303,000,000,000	2,303,000,000,000	2,303,000,000,000
Missing	2	11	9	82
Total Cases	52	96	4,090	4,090

ENGYCON - Is the total kilograms of oil energy equivalent consumed by a country in a year.

*In this case, ENGYCON has multiple modes, the smallest of these is listed.

Data for year 2000, or the closest year available is used in this table.

Table 39: Environmental Impact - Statistics for a Country's Environmental Consumption Impact in Global Hectares per Capita (ECOFTPPC); An Environmental Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination ECOFTPPC	CCDF Origination ECOFTPPC	SFDF Destination ECOFTPPC	SFDF Origination ECOFTPPC
Mean	4.18	3.42	6.48	6.58
Median	3.94	3.17	5.74	5.34
Mode	3.26*	3.26*	8.56	9.57
Std. Deviation	2.12	2.19	2.09	2.55
Minimum	0.76	0.64	0.76	0.64
Maximum	9.57	9.57	9.57	9.57
Missing	4	15	12	133
Total Cases	52	96	4,090	4,090

ECOFTPPC - Is a country's environmental consumption impact given in global hectares per capita.

*In this case, ECOFTPPC has multiple modes, the smallest of these is listed.

Data for year 2000, or the closest year available is used in this table.

Table 40: Total Environmental Impact - Statistics for a Country's Environmental Consumption Impact in Total Global Hectares (ECOFTP); An Environmental Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination ECOFTP	CCDF Origination ECOFTP	SFDF Destination ECOFTP	SFDF Origination ECOFTP
Mean	172,000,000	137,000,000	425,000,000	966,000,000
Median	59,316,165	38,310,021	270,000,000	207,000,000,000
Mode	2,263,587*	625,320*	270,434,411	2,660,000,000
Std. Deviation	392,000,000	358,000,000	664,000,000	1,200,000,000
Minimum	2,263,587	625,320	2,263,587	625,320
Maximum	2,660,000,000	2,660,000,000	2,660,000,000	2,660,000,000
Missing	4	15	12	133
Total Cases	52	96	4,090	4,090

ECOFTP - Measures a country's environmental consumption impact in total global hectares.

*In this case, ECOFTP has multiple modes, the smallest of these is listed.

Data for year 2000, or the closest year available is used in this table.

Table 41: Total Environmental Treaties - Statistics for the number of Environmental Treaties a Country has Both Agreed to and Ratified (E_TT_PNR); An Environmental Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination E_TT_PNR	CCDF Origination E_TT_PNR	SFDF Destination E_TT_PNR	SFDF Origination E_TT_PNR
Mean	18.4	14.92	25.17	22.79
Median	20.0	14.00	26.00	24.00
Mode	20.0	11.00*	26.00	24.00
Std. Deviation	6.0	6.50	2.11	4.49
Minimum	5	0	5	0
Maximum	27	27	27	27
Missing	1	1	7	7
Total Cases	52	96	4,090	4,090

E_TT_PNR - Is the total number of environmental treaties a country has preliminary agreement, plus these it has ratified.
Data for year 2000, or the closest year available is used in this table.

Table 42: Environmental Treaties Ratified - Statistics for the number of Environmental Treaties a Country has Ratified (E_TRT_P); An Environmental Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination E_TRT_P	CCDF Origination E_TRT_P	SFDF Destination E_TRT_P	SFDF Origination E_TRT_P
Mean	16.37	13.33	21.90	19.42
Median	17.00	12.00	22.00	19.00
Mode	12	9.00*	21	19
Std. Deviation	5.42	5.77	2.30	4.09
Minimum	6	0	6	0
Maximum	25	25	25	25
Missing	1	1	7	7
Total Cases	52	96	4,090	4,090

E_TRT_P - Is the total number of environmental treaties a country has ratified.

Data for year 2000, or the closest year available is used in this table.

Table 43: Environmental Issues - Statistics for the number of Environmental Issues a Country is Experiencing (EV_ISS); An Environmental Variable Created for the Country Case Data File (CCDF) and Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination EV_ISS	CCDF Origination EV_ISS	SFDF Destination EV_ISS	SFDF Origination EV_ISS
Mean	3.86	3.81	3.59	3.52
Median	4.00	4.00	3.00	4.00
Mode	3	3.00	3	4
Std. Deviation	1.29	1.33	1.20	1.16
Minimum	1	1	1	1
Maximum	7	8	7	8
Missing	2	2	9	24
Total Cases	52	96	4,090	4,090

EV_ISS - Is the total number of a country's environmental issues as listed in the CIA's *The World Factbook 2001*.

*In this case, EV_ISS has multiple modes, the smallest of these is listed.

Data for year 2000, or the closest year available is used in this table.

Table 44: Net Energy Exporter - Statistics for Energy Exportation (EXEG); A Traditional Trade Variable Created for the Country Case Data File (CCDF) and the Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination EXEG	CCDF Origination EXEG	SFDF Destination EXEG	SFDF Origination EXEG
Mean	1.75	1.78	1.65	1.88
Median	2.00	2.00	2.00	2.00
Mode	2	2	2	2
Std. Deviation	0.42	0.41	0.48	0.32
Minimum	1	1	1	1
Maximum	2	2	2	2
Yes, Net Energy Exporter	11 (21.2)	20 (20.8)	1,412 (34.5)	474 (11.6)
No, Not Net Energy Exporter	38 (73.1)	72 (75.0)	2,665 (65.2)	3,551 (86.8)
Missing	3 (5.8)	4 (4.2)	18 (0.3)	65 (1.6)
Total Percent	100.0	100.0	100.0	100.0
Total Cases	52	96	4,090	4,090

EXEG - A variable measuring if a country is a net energy exporter.

Rounding percentages may cause their sums to only approximate 100%.

Percentages in ()

Table 45: Net Energy Importer - Statistics for Energy Importation (IMEG); A Traditional Trade Variable Created for the Country Case Data File (CCDF) and the Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination IMEG	CCDF Origination IMEG	SFDF Destination IMEG	SFDF Origination IMEG
Mean	1.32	1.34	1.29	1.23
Median	1.00	1.00	1.00	1.00
Mode	1	1	1	1
Std. Deviation	0.47	0.48	0.45	0.42
Minimum	1	1	1	1
Maximum	2	2	2	2
Yes, Net Energy Importer	34 (65.4)	61 (63.5)	2,917 (71.3)	3,097 (75.7)
No, Not Net Energy Importer	16 (30.8)	31 (32.3)	1,164 (28.5)	937 (23.0)
Missing	2 (3.8)	4 (4.2)	9 0.2	54 (1.3)
Total Percent	100.0	100.0	100.0	100.0
Total Cases	52	96	4,090	4,090

IMEG - A variable measuring if a country is a net energy importer.

Rounding percentages may cause their sums to only approximate 100%.

Percentages in ()

Table 46: Primary Exports - Statistics for Type of Exports (EXCM); A Traditional Trade Variable Created for the Country Case Data File (CCDF) and the Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination EXCM	CCDF Origination EXCM	SFDF Destination EXCM	SFDF Origination EXCM
Mean	1.88	1.67	1.91	1.96
Median	2.00	2.00	2.00	2.00
Mode	2	1	2	2
Std. Deviation	0.59	0.68	0.31	0.31
Minimum	1	1	1	1
Maximum	3	3	3	3
Primarily Raw Materials	12 (23.1)	41 (42.7)	395 (9.7)	276 (6.7)
Primarily Manufactured Goods	32 (61.5)	40 (41.7)	3650 (89.2)	3638 (88.9)
Mixture of Raw Materials & Manufactured Goods	6 (11.5)	11 (11.5)	36 (0.9)	122 (3.0)
Missing	2 (3.8)	4 (4.2)	9 (0.2)	54 (1.3)
Total Percent	100.0	100.0	100.0	100.0
Total Cases	52	96	4,090	4,090

EXCM - Measure of the type of exports for countries.

Rounding percentages may cause their sums to only approximate 100%.

Percentages in ()

Table 47: Primary Imports - Statistics for Type of Imports (IMCM); A Traditional Trade Variable Created for the Country Case Data File (CCDF) and the Shipment Frequency Data Files (SFDF).

Statistics	CCDF Destination IMCM	CCDF Origination IMCM	SFDF Destination IMCM	SFDF Origination IMCM
Mean	2.24	2.2	2.11	2.42
Median	2.00	2.00	2.00	2.00
Mode	2	2	2	2
Std. Deviation	0.43	0.43	0.31	0.50
Minimum	2	1	2	1
Maximum	3	3	3	3
Primarily Raw Materials	0 (0.0)	1 (1.0)	0 (0.0)	3 (0.1)
Primarily Manufactured Goods	38 (73.1)	71 (74.0)	3,642 (89.0)	2310 (56.5)
Mixture of Raw Materials & Manufactured Goods	12 (23.1)	19 (19.8)	439 (10.7)	1693 (41.4)
Missing	2 (3.8)	5 (5.2)	9 (0.2)	84 (2.1)
Total Percent	100.0	100.0	100.0	100.0
Total Cases	52	96	4,090	4,090

IMCM - Measure of the type of imports for countries.

Rounding percentages may cause their sums to only approximate 100%.

Percentages in ()

Table 48: Export Trading Partners - Statistics for Export Trading Partners (EXTP); A Traditional Trade Variable Created for the Country Case Data File (CCDF) and the Shipment Frequency Data Files (SFDF).

Statistics	SFDF Destination EXTP	SFDF Origination EXTP
Mean	1.32	1.16
Median	1.00	1.00
Mode	1	1
Std. Deviation	0.47	0.37
Minimum	1	1
Maximum	2	2
Yes, Export Trading Partners	2,760 (67.5)	3,414 (83.5)
No, Not Export Trading Partners	1,312 (32.1)	660 (16.1)
Missing	18 (0.4)	16 (0.4)
Total Percent	100.0	100.0
Total Cases	4,090	4,090

EXTP - A variable measuring trade networks, if the other country in the waste exchange is an ordinary export-trading partner.

Rounding percentages may cause their sums to only approximate 100%.

Percentages in ()

Table 49: Import Trading Partners - Statistics for Import Trading Partners (IMTP); A Traditional Trade Variable Created for the Country Case Data File (CCDF) and the Shipment Frequency Data Files (SFDF).

Statistics	SFDF Destination IMTP	SFDF Origination IMTP
Mean	1.36	1.16
Median	1.00	1.00
Mode	1	1
Std. Deviation	0.48	0.37
Minimum	1	1
Maximum	2	2
Yes, Import Trading Partners	2,604 (63.7)	3,412 (83.4)
No, Not Import Trading Partners	1,468 (35.9)	662 (16.2)
Missing	18 (0.4)	16 (0.4)
Total Percent	100.0	100.0
Total Cases	4,090	4,090

IMTP - A variable measuring trade networks, if the other country in the waste exchange is an ordinary import-trading partner.

Rounding percentages may cause their sums to only approximate 100%.

Percentages in ()

Table 50: Development Level Movement Scale - Statistics for the Variable Development Level Movement ((ECONSCL); An Dependent Variable (scale) Created for the Destination and Origination Country Shipment Frequency Data Files (SFDF).

Statistics	ECONSCL
Mean	-0.34
Median	0.00
Mode	0
Std. Deviation	1.62
Minimum	-5
Maximum	+5
Moved down five development levels.	10 (0.2)
Moved down four development levels.	7 (0.2)
Moved down three development levels.	20 (0.5)
Moved down two development levels.	1,461 (35.7)
Moved down one development level.	118 (2.9)
Moved to same development level.	1,589 (38.9)
Moved up one development level.	262 (6.4)
Moved up two development levels.	393 (9.6)
Moved up three development levels.	115 (2.8)
Moved up four development levels.	91 (2.2)
Moved up five development levels.	11 (0.3)
Missing	13 (0.3)
Total Percent	100.0
Total Cases	4,090

ECONSCL - Is a dependent variable (scale) measuring the development level change of waste shipments.

Rounding percentages may cause their sums to only approximate 100%.

Percentages in ()

TABLE 51 (Part a): Bivariate Correlations for Destination Country Characteristic Variables and for DESMNTT, or Total Country Waste Amounts.

ID No.	Variables	(1) DEVLEV	(2) GINI	(3) EXCONC	(4) IMCONC	(5) EXDEBT	(6) UNEMP	(7) MIL_EXPS
(1)	DEVLEV	1.000	-0.143	-.295*	-.366*	0.074	-.572**	0.132
(2)	GINI	-0.143	1.000	0.253	.334*	0.054	0.262	0.089
(3)	EXCONC	-.295*	0.253	1.000	0.141	-0.036	0.154	0.129
(4)	IMCONC	-.366*	.334*	0.141	1.000	-0.002	0.008	0.272
(5)	EXDEBT	0.074	0.054	-0.036	-0.002	1.000	0.094	.290*
(6)	UNEMP	-.572**	0.262	0.154	0.008	0.094	1.000	0.066
(7)	MIL_EXPS	0.132	0.089	0.129	0.272	.290*	0.066	1.000
(8)	MIL_IM	.427**	-0.072	-0.131	0.099	0.018	-.306*	.484**
(9)	PCAGGDP	-.837**	0.147	.356*	.294*	-0.029	.383**	-0.073
(10)	PCINDGDP	-0.038	-0.038	-0.064	.338*	0.005	0.025	0.099
(11)	PCSERGDP	.762**	-0.108	-0.230	-.423**	0.022	-.352*	0.007
(12)	EXP_B	.408**	-0.037	-0.251	-0.042	-.324*	-0.281	0.029
(13)	IMP_B	.332*	0.021	-0.223	-0.043	-0.238	-0.256	0.072
(14)	AREA	-0.043	.349*	0.026	.300*	0.095	-0.027	0.006
(15)	ARAB_L	-0.048	-.421**	-.375**	-0.141	-0.095	0.118	-0.025
(16)	PERMCRP	-0.079	0.157	0.082	0.252	0.132	0.096	0.152
(17)	PERMPST	-0.056	0.248	-0.029	-0.246	0.152	0.231	-0.080
(18)	FOREST	0.032	-0.041	-0.160	0.094	0.173	-0.075	-0.169
(19)	OTH_L	0.067	0.103	.506**	0.221	-0.263	-0.229	0.232
(20)	URB_L	.467**	-0.157	-0.150	0.076	-0.222	-.386**	0.254
(21)	LOWUSL	-.304*	0.203	.681**	0.171	-0.123	0.071	0.050
(22)	POP	-0.169	.327*	-0.053	0.168	-0.087	0.116	0.026
(23)	POPDS	0.162	0.100	0.057	.288*	-0.161	-0.210	-0.077
(24)	INMR	-.771**	.356*	.316*	0.171	-0.055	.557**	-0.093
(25)	LIFE	.740**	-.475**	-0.186	-0.276	0.071	-.632**	0.136
(26)	TFR	-.375**	.438**	.350*	0.247	0.122	0.209	0.156
(27)	NURBPD	-0.206	-0.120	-0.102	0.092	-0.163	0.167	0.060
(28)	ELCPC	.627**	-.349*	-0.037	-0.220	-0.036	-.476**	0.031
(29)	ENGYPC	.686**	-.321*	-0.172	-0.127	-0.063	-.519**	0.024
(30)	ELECCON	0.247	-0.053	0.064	-0.039	-0.205	-0.269	0.076
(31)	ENGYPON	0.187	0.050	-0.037	0.057	-0.174	-0.221	0.093
(32)	ECOFTPPC	.707**	-.295*	-0.203	-0.280	0.098	-.497**	0.009
(33)	ECOFTP	0.131	0.178	-0.127	0.082	-0.137	-0.136	0.104
(34)	E_TT_PNR	.649**	-.309*	-.448**	-0.268	-0.052	-0.285	-0.105
(35)	E_TRT_P	.654**	-0.259	-.438**	-0.244	-0.061	-.290*	-0.141
(36)	ENV_ISS	-.386**	.378**	.350*	.315*	0.028	.474**	-0.012
(37)	DESMNTT	.294*	-0.139	-0.186	-0.149	-.278*	-0.129	-0.057
(38)	DESMNTT	.316*	-0.119	-0.254	-0.189	-.292*	-0.094	-0.032

** Significant at the 0.01 level.

* Significant at the 0.05 level.

Variable definitions:

DEVELEV - is a variable measuring economic development level in GDP & PPP per capita for year 2000.

GINI - Measure of internal income distribution of countries.

EXCONC - An index for measuring the degree a country's exports are concentrated in number.

IMCONC - An index for measuring the degree a country's imports are concentrated in number.

EXTDEBT - Is a measure of a country's external debt given as a percentage of GDP.

UNEMP - Is a measure of a country's unemployment as a percentage of their total workforce employment.

MIL_EXPS - Is a measure of a country's military expenditures as a percentage of their country's GDP.

Table 51 and variable definitions continued on next page.

TABLE 51 (Part b): Bivariate Correlations for Destination Country Characteristic Variables and for DESMNTT, or Total Country Waste Amounts.

ID No.	Variables	(8) MIL_IM	(9) PCAGGDP	(10) PCINDGDP	(11) PCSERGDP	(12) EXP_B	(13) IMP_B	(14) AREA
(1)	DEVLEV	.427**	-.837**	-0.038	.762**	.408**	.332*	-0.043
(2)	GINI	-0.072	0.147	-0.038	-0.108	-0.037	0.021	.349*
(3)	EXCONC	-0.131	.356*	-0.064	-0.23	-0.251	-0.223	0.026
(4)	IMCONC	0.099	.294*	.338*	-.423**	-0.042	-0.043	.300*
(5)	EXDEBT	0.018	-0.029	0.005	0.022	-.324*	-0.238	0.095
(6)	UNEMP	-.306*	.383**	0.025	-.352*	-0.281	-0.256	-0.027
(7)	MIL_EXPS	.484**	-0.073	0.099	0.007	0.029	0.072	0.006
(8)	MIL_IM	1.000	-.326*	0.033	0.268	.583**	.496**	0.083
(9)	PCAGGDP	-.326*	1.000	-0.120	-.813**	-.355*	-.288*	-0.074
(10)	PCINDGDP	0.033	-0.12	1.000	-.481**	-0.207	-0.258	-0.119
(11)	PCSERGDP	0.268	-.813**	-.481**	1.000	.436**	.406**	0.135
(12)	EXP_B	.583**	-.355*	-0.207	.436**	1.000	.911**	0.274
(13)	IMP_B	.496**	-.288*	-0.258	.406**	.911**	1.000	.310*
(14)	AREA	0.083	-0.074	-0.119	0.135	0.274	.310*	1.000
(15)	ARAB_L	-0.119	-0.182	0.114	0.094	0.002	-0.005	-0.264
(16)	PERMCRP	0.04	0.156	0.246	-.282*	-0.14	-0.121	-0.197
(17)	PERMPST	-0.079	0.143	-.328*	0.066	-0.103	-0.035	0.005
(18)	FOREST	0.096	-0.132	.355*	-0.092	0.089	0.038	0.166
(19)	OTH_L	0.056	0.117	-0.197	0.012	0.035	0.023	0.056
(20)	URB_L	.312*	-.412**	0.011	.358*	0.217	0.15	-0.270
(21)	LOWUSL	-0.171	.483**	-0.209	-.302*	-0.155	-0.11	0.263
(22)	POP	0.258	0.072	-0.104	-0.003	.576**	.609**	.555**
(23)	POPDS	-0.048	-0.15	0.016	0.123	0.067	0.042	-0.095
(24)	INMR	-.353*	.784**	-0.207	-.571**	-.322*	-0.252	0.055
(25)	LIFE	.450**	-.574**	-0.021	.519**	.384**	.296*	-0.121
(26)	TFR	-0.056	.540**	-0.097	-.420**	-0.099	-0.052	-0.011
(27)	NURBPD	0.2	0.229	.329*	-.395**	0.055	0.003	-.279*
(28)	ELCPC	0.245	-.516**	-0.235	.593**	.308*	.284*	0.134
(29)	ENGYPC	.320*	-.648**	-0.195	.687**	.471**	.450**	0.267
(30)	ELECCON	.293*	-0.223	-.313*	.381**	.604**	.685**	.341*
(31)	ENGYPCON	.347*	-0.195	-.307*	.352*	.755**	.863**	.501**
(32)	ECOFTPPC	0.233	-.651**	-.301*	.724**	.371**	.389**	0.250
(33)	ECOFTP	.321*	-0.154	-.305*	.308*	.766**	.889**	.539**
(34)	E_TT_PNR	.285*	-.635**	-0.141	.644**	.443**	.345*	0.167
(35)	E_TRT_P	.307*	-.617**	-0.168	.644**	.450**	.319*	0.154
(36)	ENV_ISS	-0.125	0.197	-0.089	-0.121	0.026	0.03	.312*
(37)	DESFRTQ	0.252	-0.238	-0.143	.294*	.544**	.422**	.309*
(38)	DESMNTT	0.167	-0.263	-0.158	.325*	.569**	.309*	0.028

** Significant at the 0.01 level.

* Significant at the 0.05 level.

Variable definitions:

MIL_IM - Is a measure of Military Imports as valued in millions of US dollars.

PCAGGDP - Is a measure of agriculture economic activity as a percentage of a country's GDP.

PCINDGDP - Is a measure of industrial economic activity as a percentage of a country's GDP.

PCSERGDP - Is a measure of service economic activity as a percentage of a country's GDP.

EXP_B - Is a measure of the value of a country's exports in billions of U.S. Dollars.

IMP_B - Is a measure of the value of a country's exports in billions of U.S. Dollars.

AREA - Is a measure of a country's total land area in square kilometers excludes areas under water.

Table 51 and variable definitions continued on next page.

TABLE 51 (Part c): Bivariate Correlations for Destination Country Characteristic Variables and for DESMNTT, or Total Country Waste Amounts.

ID No.	Variables	(15) ARAB_L	(16) PERMCRP	(17) PERMPST	(18) FOREST	(19) OTH_L	(20) URB_L	(21) LOWUSL
(1)	DEVLEV	-0.048	-0.079	-0.056	0.032	0.067	.467**	-.304*
(2)	GINI	-.421**	0.157	0.248	-0.041	0.103	-0.157	0.203
(3)	EXCONC	-.375**	0.082	-0.029	-0.16	.506**	-0.15	.681**
(4)	IMCONC	-0.141	0.252	-0.246	0.094	0.221	0.076	0.171
(5)	EXDEBT	-0.095	0.132	0.152	0.173	-0.263	-0.222	-0.123
(6)	UNEMP	0.118	0.096	0.231	-0.075	-0.229	-.386**	0.071
(7)	MIL_EXPS	-0.025	0.152	-0.08	-0.169	0.232	0.254	0.050
(8)	MIL_IM	-0.119	0.04	-0.079	0.096	0.056	.312*	-0.171
(9)	PCAGGDP	-0.182	0.156	0.143	-0.132	0.117	-.412**	.483**
(10)	PCINDGDP	0.114	0.246	-.328*	.355*	-0.197	0.011	-0.209
(11)	PCSERGDP	0.094	-.282*	0.066	-0.092	0.012	.358*	-.302*
(12)	EXP_B	0.002	-0.14	-0.103	0.089	0.035	0.217	-0.155
(13)	IMP_B	-0.005	-0.121	-0.035	0.038	0.023	0.15	-0.110
(14)	AREA	-0.264	-0.197	0.005	0.166	0.056	-0.27	0.263
(15)	ARAB_L	1.000	-0.005	-0.144	-0.147	-.445**	0.019	-.506**
(16)	PERMCRP	-0.005	1.000	-0.074	0.056	-0.153	0.065	-0.231
(17)	PERMPST	-0.144	-0.074	1.000	-.529**	-0.275	-0.262	-0.121
(18)	FOREST	-0.147	0.056	-.529**	1.000	-.406**	-0.25	-0.219
(19)	OTH_L	-.445**	-0.153	-0.275	-.406**	1.000	.460**	.731**
(20)	URB_L	0.019	0.065	-0.262	-0.25	.460**	1.000	-0.264
(21)	LOWUSL	-.506**	-0.231	-0.121	-0.219	.731**	-0.264	1.000
(22)	POP	-0.107	0.004	-0.086	0.255	-0.097	-0.192	0.032
(23)	POPDS	-0.234	-0.05	-0.221	-.277*	.653**	.483**	.339*
(24)	INMR	-0.256	0.091	.426**	-0.235	0.013	-.418**	.327*
(25)	LIFE	0.034	-0.061	-.315*	0.113	0.163	.468**	-0.174
(26)	TFR	-.402**	0.177	0.241	-0.121	0.159	-.305*	.386**
(27)	NURBPD	0.148	.318*	-0.235	0.166	-0.109	0.011	-0.117
(28)	ELCPC	-0.224	-.314*	-0.217	0.19	0.264	0.172	0.146
(29)	ENGYPC	-0.079	-.320*	-0.146	0.105	0.165	.365**	-0.115
(30)	ELECCON	-0.156	-0.214	-0.155	0.073	0.254	-0.047	.309*
(31)	ENGYCON	-0.092	-0.195	-0.102	0.083	0.13	-0.042	0.169
(32)	ECOFTPPC	-0.081	-0.277	-0.015	0.081	0.058	0.13	-0.044
(33)	ECOFTP	-0.056	-0.149	-0.013	0.059	0.029	-0.048	0.042
(34)	E TT_PNR	.283*	-0.177	-0.129	0.203	-0.257	0.082	-.339*
(35)	E TRT_P	0.174	-0.194	-0.113	0.226	-0.212	0.117	-.316*
(36)	ENV_ISS	-0.075	0.152	0.001	-0.121	0.168	-0.204	.334*
(37)	DESFRQT	-0.006	-0.191	-0.12	0.107	0.041	0.012	0.027
(38)	DESMNTT	0.179	0.014	-0.087	-0.018	-0.035	0.104	-0.142

** Significant at the 0.01 level.

* Significant at the 0.05 level.

Variable definitions:

ARAB_L - Is the percent of a country's land cultivated for crops that are replanted after each harvest like wheat, maize, and rice.

PERMCRP - Is the percent of a country's land cultivated for crops that are not replanted after each harvest like citrus, coffee, and rubber.

PERMPST - Is the percent of a country's land permanently used for herbaceous forage crops.

FOREST - Is the percent of a country's land under dense or open stands of trees.

OTH_L - Is the percent of a country's land not use as Arable Land, Permanent Crop, Permanent Pasture, or Forest; land such as urban areas, roads, desert, etc.

URB_L - Is land use for urban or city use, taken as a percent of total land area.

LOWUSL - extremely low use land Is the percentage of land not taken up in previous four types of land use.

Table 51 and variable definitions continued on next page.

TABLE 51 (Part d): Bivariate Correlations for Destination Country Characteristic Variables and for DESMNTT, or Total Country Waste Amounts.

ID No.	Variables	(22) POP	(23) POPDS	(24) INMR	(25) LIFE	(26) TFR	(27) NURBPD	(28) ELCPC
(1)	DEVLEV	-0.169	0.162	-.771**	.740**	-.375**	-0.206	.627**
(2)	GINI	.327*	0.1	.356*	-.475**	.438**	-0.12	-.349*
(3)	EXCONC	-0.053	0.057	.316*	-0.186	.350*	-0.102	-0.037
(4)	IMCONC	0.168	.288*	0.171	-0.276	0.247	0.092	-0.220
(5)	EXDEBT	-0.087	-0.161	-0.055	0.071	0.122	-0.163	-0.036
(6)	UNEMP	0.116	-0.21	.557**	-.632**	0.209	0.167	-.476**
(7)	MIL_EXPS	0.026	-0.077	-0.093	0.136	0.156	0.06	0.031
(8)	MIL_IM	0.258	-0.048	-.353*	.450**	-0.056	0.2	0.245
(9)	PCAGGDP	0.072	-0.15	.784**	-.574**	.540**	0.229	-.516**
(10)	PCINDGDP	-0.104	0.016	-0.207	-0.021	-0.097	.329*	-0.235
(11)	PCSERGDP	-0.003	0.123	-.571**	.519**	-.420**	-.395**	.593**
(12)	EXP_B	.576**	0.067	-.322*	.384**	-0.099	0.055	.308*
(13)	IMP_B	.609**	0.042	-0.252	.296*	-0.052	0.003	.284*
(14)	AREA	.555**	-0.095	0.055	-0.121	-0.011	-.279*	0.134
(15)	ARAB_L	-0.107	-0.234	-0.256	0.034	-.402**	0.148	-0.224
(16)	PERMCRP	0.004	-0.05	0.091	-0.061	0.177	.318*	-.314*
(17)	PERMPST	-0.086	-0.221	.426**	-.315*	0.241	-0.235	-0.217
(18)	FOREST	0.255	-.277*	-0.235	0.113	-0.121	0.166	0.190
(19)	OTH_L	-0.097	.653**	0.013	0.163	0.159	-0.109	0.264
(20)	URB_L	-0.192	.483**	-.418**	.468**	-.305*	0.011	0.172
(21)	LOWUSL	0.032	.339*	.327*	-0.174	.386**	-0.117	0.146
(22)	POP	1.000	-0.125	0.136	-0.152	0.218	0.181	-0.106
(23)	POPDS	-0.125	1.000	-0.129	0.19	-0.061	-0.14	0.032
(24)	INMR	0.136	-0.129	1.000	-.838**	.633**	0.009	-.514**
(25)	LIFE	-0.152	0.19	-.838**	1.000	-.399**	0.007	.563**
(26)	TFR	0.218	-0.061	.633**	-.399**	1.000	0.161	-0.252
(27)	NURBPD	0.181	-0.14	0.009	0.007	0.161	1.000	-.303*
(28)	ELCPC	-0.106	0.032	-.514**	.563**	-0.252	-.303*	1.000
(29)	ENGYPC	-0.026	0.165	-.613**	.608**	-.380**	-.334*	.837**
(30)	ELECCON	.479**	-0.054	-0.2	0.236	-0.022	-0.135	.614**
(31)	ENGYPCON	.682**	-0.047	-0.167	0.183	-0.016	-0.102	.399**
(32)	ECOFTPPC	-0.066	-0.241	-.612**	.568**	-.372**	-.453**	.824**
(33)	ECOFTP	.764**	-0.073	-0.085	0.08	0.035	-0.095	0.193
(34)	E_TT_PNR	0.09	-0.195	-.663**	.552**	-.473**	-0.039	.602**
(35)	E_TRT_P	0.079	-0.17	-.607**	.520**	-.421**	-0.039	.617**
(36)	ENV_ISS	.282*	0.009	.391**	-.420**	0.263	0.118	-.314*
(37)	DESMNTT	0.122	-0.065	-0.231	.288*	-0.118	-0.135	.390**
(38)	DESMNTT	0.147	-0.064	-0.261	.287*	-0.142	0.001	0.218

** Significant at the 0.01 level.

* Significant at the 0.05 level.

Variable definitions:

POP - Is a country's total population as taken from the CIA's *The World Factbook 2001*.

POPDS - Is the average number of people living per square kilometer in a country.

INMR - Is the number of deaths of infants under 1 year old in a given year per 1,000 live births.

LIFE - expectancy at birth is the median number of years lived by people born in a cohort.

TFR - Total Birth Rate is the average number of children born per women in a country during their child bearing years.

NURBD - Is the average number of people per square kilometer living in a country's non-urban areas.

ELCPC - Is a country's kilowatt-hours of electricity consumed per capita.

Table 51 and variable definitions continued on next page.

TABLE 51 (Part e): Bivariate Correlations for Destination Country Characteristic Variables and for DESMNTT, or Total Country Waste Amounts.

ID No.	Variables	(29) ENGYPC	(30) ELECCON	(31) ENGYCON	(32) ECOFTPPC	(33) ECOFTP	(34) E_TT_PNR	(35) E_TRT_P
(1)	DEVLEV	.686**	0.247	0.187	.707**	0.131	.649**	.654**
(2)	GINI	-.321*	-0.053	0.05	-.295*	0.178	-.309*	-0.259
(3)	EXCONC	-0.172	0.064	-0.037	-0.203	-0.127	-.448**	-.438**
(4)	IMCONC	-0.127	-0.039	0.057	-0.28	0.082	-0.268	-0.244
(5)	EXDEBT	-0.063	-0.205	-0.174	0.098	-0.137	-0.052	-0.061
(6)	UNEMP	-.519**	-0.269	-0.221	-.497**	-0.136	-0.285	-.290*
(7)	MIL_EXPS	0.024	0.076	0.093	0.009	0.104	-0.105	-0.141
(8)	MIL_IM	.320*	.293*	.347*	0.233	.321*	.285*	.307*
(9)	PCAGGDP	-.648**	-0.223	-0.195	-.651**	-0.154	-.635**	-.617**
(10)	PCINDGDP	-0.195	-.313*	-.307*	-.301*	-.305*	-0.141	-0.168
(11)	PCSERGDP	.687**	.381**	.352*	.724**	.308*	.644**	.644**
(12)	EXP_B	.471**	.604**	.755**	.371**	.766**	.443**	.450**
(13)	IMP_B	.450**	.685**	.863**	.389**	.889**	.345*	.319*
(14)	AREA	0.267	.341*	.501**	0.25	.539**	0.167	0.154
(15)	ARAB_L	-0.079	-0.156	-0.092	-0.081	-0.056	.283*	0.174
(16)	PERMCRP	-.320*	-0.214	-0.195	-0.277	-0.149	-0.177	-0.194
(17)	PERMPST	-0.146	-0.155	-0.102	-0.015	-0.013	-0.129	-0.113
(18)	FOREST	0.105	0.073	0.083	0.081	0.059	0.203	0.226
(19)	OTH_L	0.165	0.254	0.13	0.058	0.029	-0.257	-0.212
(20)	URB_L	.365**	-0.047	-0.042	0.13	-0.048	0.082	0.117
(21)	LOWUSL	-0.115	.309*	0.169	-0.044	0.042	-.339*	-.316*
(22)	POP	-0.026	.479**	.682**	-0.066	.764**	0.09	0.079
(23)	POPDS	0.165	-0.054	-0.047	-0.241	-0.073	-0.195	-0.170
(24)	INMR	-.613**	-0.2	-0.167	-.612**	-0.085	-.663**	-.607**
(25)	LIFE	.608**	0.236	0.183	.568**	0.08	.552**	.520**
(26)	TFR	-.380**	-0.022	-0.016	-.372**	0.035	-.473**	-.421**
(27)	NURBPD	-.334*	-0.135	-0.102	-.453**	-0.095	-0.039	-0.039
(28)	ELCPC	.837**	.614**	.399**	.824**	0.193	.602**	.617**
(29)	ENGYPC	1.000	.455**	.443**	.841**	.361*	.613**	.602**
(30)	ELECCON	.455**	1.000	.901**	.521**	.733**	.347*	.332*
(31)	ENGYCON	.443**	.901**	1.000	.455**	.948**	.301*	0.265
(32)	ECOFTPPC	.841**	.521**	.455**	1.000	.353*	.639**	.593**
(33)	ECOFTP	.361*	.733**	.948**	.353*	1.000	0.217	0.170
(34)	E_TT_PNR	.613**	.347*	.301*	.639**	0.217	1.000	.975**
(35)	E_TRT_P	.602**	.332*	0.265	.593**	0.17	.975**	1.000
(36)	ENV_ISS	-0.252	-0.032	0.074	-.297*	0.127	-0.275	-0.240
(37)	DESMNTT	.494**	0.21	0.253	.423**	0.252	.421**	.385**
(38)	DESMNTT	.284*	0.200	0.228	0.261	0.219	.446**	.478**

** Significant at the 0.01 level.

* Significant at the 0.05 level.

Variable definitions:

ENGYPC - Is a country's energy consumption in kilograms of oil per capita.

ELECCON - Is a country's kilowatt-hours of electricity consumed in a year.

ENGYCON - Is the total kilograms of oil energy equivalent consumed by a country in a year.

ECOFTPPC - Is a country's environmental consumption impact given in global hectares per capita.

ECOFTP - Measures a country's environmental consumption impact in total global hectares.

E_TT_PNR - Is the total number of environmental treaties a country has preliminary agreement, plus these it has ratified.

E_TRT_P - Is the total number of environmental treaties a country has ratified.

Table 51 and variable definitions continued on next page.

TABLE 51 (Part f): Bivariate Correlations for Destination Country Characteristic Variables and for DESMNTT, or Total Country Waste Amounts.

ID No.	Variables	(36) ENV_ISS	(37) DESMNTT	(38) DESMNTT				
(1)	DEVLEV	-.386**	.294*	.316*				
(2)	GINI	.378**	-0.139	-0.119				
(3)	EXCONC	.350*	-0.186	-0.254				
(4)	IMCONC	.315*	-0.149	-0.189				
(5)	EXDEBT	0.028	-.278*	-.292*				
(6)	UNEMP	.474**	-0.129	-0.094				
(7)	MIL_EXPS	-0.012	-0.057	-0.032				
(8)	MIL_IM	-0.125	0.252	0.167				
(9)	PCAGGDP	0.197	-0.238	-0.263				
(10)	PCINDGDP	-0.089	-0.143	-0.158				
(11)	PCSERGDP	-0.121	.294*	.325*				
(12)	EXP_B	0.026	.544**	.569**				
(13)	IMP_B	0.03	.422**	.309*				
(14)	AREA	.312*	.309*	0.028				
(15)	ARAB_L	-0.075	-0.006	0.179				
(16)	PERMCRP	0.152	-0.191	0.014				
(17)	PERMPST	0.001	-0.12	-0.087				
(18)	FOREST	-0.121	0.107	-0.018				
(19)	OTH_L	0.168	0.041	-0.035				
(20)	URB_L	-0.204	0.012	0.104				
(21)	LOWUSL	.334*	0.027	-0.142				
(22)	POP	.282*	0.122	0.147				
(23)	POPDS	0.009	-0.065	-0.064				
(24)	INMR	.391**	-0.231	-0.261				
(25)	LIFE	-.420**	.288*	.287*				
(26)	TFR	0.263	-0.118	-0.142				
(27)	NURBPD	0.118	-0.135	0.001				
(28)	ELCPC	-.314*	.390**	0.218				
(29)	ENGYP	-0.252	.494**	.284*				
(30)	ELECCON	-0.032	0.21	0.2				
(31)	ENGYP	0.074	0.253	0.228				
(32)	ECOFTPPC	-.297*	.423**	0.261				
(33)	ECOFTP	0.127	0.252	0.219				
(34)	E_TT_PNR	-0.275	.421**	.446**				
(35)	E_TRT_P	-0.24	.385**	.478**				
(36)	ENV_ISS	1.000	-0.081	-0.073				
(37)	DESMNTT	-0.081	1.000	.522**				
(38)	DESMNTT	-0.073	.522**	1.000				

** Significant at the 0.01 level.

* Significant at the 0.05 level.

Variable definitions:

ENV_ISS - Is the total number of a country's environmental issues as listed in the CIA's *The World Factbook 2001*.

DESMNTT - Destination Total Frequencies of Y type Wastes.

DESMNTT - Destination Total Amounts of Y type Wastes.

End of Table 51.

TABLE 52 (Part a): Bivariate Correlations for Origination Country Characteristic Variables and for ORGMNTT, or Total Country Waste Amounts.

ID No.	Variables	(1) DEVLEV	(2) GINI	(3) EXCONC	(4) IMCONC	(5) EXDEBT	(6) UNEMP	(7) MIL_EXPS
(1)	DEVLEV	1.000	-.244*	-.358**	-.268*	-.237*	-.458**	-0.015
(2)	GINI	-.244*	1	.353**	0.155	.252*	.312**	-0.003
(3)	EXCONC	-.358**	.353**	1	0.142	.239*	.304**	.542**
(4)	IMCONC	-.268*	0.155	0.142	1	0.068	0.032	0.059
(5)	EXDEBT	-.237*	.252*	.239*	0.068	1	0.202	0.178
(6)	UNEMP	-.458**	.312**	.304**	0.032	0.202	1	0.163
(7)	MIL_EXPS	-0.015	-0.003	.542**	0.059	0.178	0.163	1
(8)	MIL_IM	.278**	-0.19	0.024	-0.061	-0.148	-.325**	.436**
(9)	PCAGGDP	-.809**	.256*	.367**	0.129	.283**	.355**	-0.06
(10)	PCINDGDP	-0.015	0.089	.311**	.240*	-0.056	0.12	.343**
(11)	PCSERGDP	.680**	-.273*	-.513**	-.268*	-0.194	-.360**	-0.182
(12)	EXP_B	.399**	-0.142	-.300**	-0.095	-.330**	-.293**	-0.089
(13)	IMP_B	.328**	-0.065	-.268*	-0.091	-.257*	-.246*	-0.068
(14)	AREA	-0.032	0.189	-0.072	0.119	-0.061	-0.077	-0.045
(15)	ARAB_L	-0.099	-.385**	-.358**	-0.101	-0.17	-0.111	-0.197
(16)	PERMCRP	-0.18	-0.038	0.034	0.193	0.032	-0.067	0.008
(17)	PERMPST	-0.183	.313**	0.141	-.300**	0.12	.349**	-0.024
(18)	FOREST	0.027	0.052	-.242*	0.078	-0.049	-0.007	-.393**
(19)	OTH_L	0.188	-0.041	.312**	0.195	0.055	-0.162	.432**
(20)	URB_L	.441**	-0.181	-0.122	.245*	-0.147	-0.133	0.063
(21)	LOWUSL	-0.069	0.057	.400**	-0.02	0.12	0.004	.411**
(22)	POP	-0.119	0.107	-0.12	-0.01	-0.151	-0.111	-0.052
(23)	POPDS	0.192	0.052	-0.064	0.164	-0.114	-0.17	-0.073
(24)	INMR	-.736**	.387**	.512**	0.14	0.201	.479**	0.11
(25)	LIFE	.668**	-.456**	-.480**	-0.141	-0.169	-.508**	0.003
(26)	TFR	-.487**	.423**	.704**	0.112	.315**	.407**	.485**
(27)	NURBPD	0.109	-0.109	-0.018	-0.025	-0.047	-0.023	0.057
(28)	ELCPC	.669**	-.407**	-0.082	-0.119	-0.14	-.419**	-0.094
(29)	ENGYPC	.669**	-.414**	-0.011	0.104	-0.161	-.417**	0.061
(30)	ELECCON	.245*	-0.083	-0.086	-0.076	-.228*	-0.214	-0.069
(31)	ENGYPCON	0.175	-0.005	-0.153	-0.016	-.235*	-0.2	-0.064
(32)	ECOFTPPC	.765**	-.400**	-.249*	-.305**	-.226*	-.434**	0.005
(33)	ECOFTP	0.124	0.062	-0.185	-0.002	-0.209	-0.168	-0.018
(34)	E_TT_PNR	.428**	-.305**	-.429**	-.255*	-.230*	-.411**	-.328**
(35)	E_TRT_P	.424**	-.275*	-.408**	-.226*	-.212*	-.375**	-.326**
(36)	ENV_ISS	-.337**	0.218	0.101	0.145	0.107	0.148	-0.015
(37)	ORIFRQT	.283**	-0.099	-0.194	-0.089	-0.195	-0.191	-0.065
(38)	ORGMNTT	.309**	-.228*	-.249*	-0.118	-.307**	-.231*	-0.149

** Significant at the 0.01 level.

* Significant at the 0.05 level.

Variable definitions:

DEVELEV - is a variable measuring economic development level in GDP & PPP per capita for year 2000.

GINI - Measure of internal income distribution of countries.

ECOMC - An index for measuring the degree a country's exports are concentrated in number.

IMCOMC - An index for measuring the degree a country's imports are concentrated in number.

EXTDEBT - Is a measure of a country's external debt given as a percentage of GDP.

UNEMP - Is a measure of a country's unemployment as a percentage of their total workforce employment.

MIL_EXPS - Is a measure of a country's military expenditures as a percentage of their country's GDP.

Table 52 and variable definitions continued on next page.

TABLE 52 (Part b): Bivariate Correlations for Origination Country Characteristic Variables and for ORGMNTT, or Total Country Waste Amounts.

ID No.	Variables	(8) MIL_IM	(9) PCAGGDP	(10) PCINDGDP	(11) PCSERGDP	(12) EXP_B	(13) IMP_B	(14) AREA
(1)	DEVLEV	.278**	-.809**	-0.015	.680**	.399**	.328**	-0.032
(2)	GINI	-0.19	.256*	0.089	-.273*	-0.142	-0.065	0.189
(3)	EXCONC	0.024	.367**	.311**	-.513**	-.300**	-.268*	-0.072
(4)	IMCONC	-0.061	0.129	.240*	-.268*	-0.095	-0.091	0.119
(5)	EXDEBT	-0.148	.283**	-0.056	-0.194	-.330**	-.257*	-0.061
(6)	UNEMP	-.325**	.355**	0.12	-.360**	-.293**	-.246*	-0.077
(7)	MIL_EXPS	.436**	-0.06	.343**	-0.182	-0.089	-0.068	-0.045
(8)	MIL_IM	1.000	-.215*	0.191	0.047	.373**	.298**	0.101
(9)	PCAGGDP	-.215*	1.000	-0.155	-.718**	-.335**	-.270**	-0.04
(10)	PCINDGDP	0.191	-0.155	1.000	-.576**	-0.085	-0.139	0.02
(11)	PCSERGDP	0.047	-.718**	-.576**	1.000	.337**	.322**	0.019
(12)	EXP_B	.373**	-.335**	-0.085	.337**	1.000	.915**	.336**
(13)	IMP_B	.298**	-.270**	-0.139	.322**	.915**	1.000	.346**
(14)	AREA	0.101	-0.04	0.02	0.019	.336**	.346**	1.000
(15)	ARAB_L	-0.051	-0.016	-0.014	0.023	0.054	0.038	-0.188
(16)	PERMCRP	-0.082	0.132	0.068	-0.157	-0.124	-0.107	-0.187
(17)	PERMPST	0.063	.237*	-0.085	-0.136	-0.074	-0.03	0.103
(18)	FOREST	-0.044	0.015	-0.069	0.036	0.11	0.084	0.094
(19)	OTH_L	0.031	-0.187	0.108	0.079	-0.05	-0.053	-0.01
(20)	URB_L	0.052	-.404**	-0.047	.367**	0.139	0.105	-.215*
(21)	LOWUSL	0.002	0.068	0.117	-0.138	-0.169	-0.144	0.12
(22)	POP	0.089	0.076	0.177	-0.188	.327**	.294**	.496**
(23)	POPDS	-0.034	-0.184	-0.141	.252*	0.149	0.122	-0.083
(24)	INMR	-0.067	.741**	-0.007	-.608**	-.297**	-.244*	0.034
(25)	LIFE	0.183	-.612**	-0.043	.536**	.304**	.247*	-0.044
(26)	TFR	0.088	.525**	0.13	-.526**	-.224*	-0.186	-0.038
(27)	NURBPD	-0.047	-0.069	-0.174	0.179	-0.055	-0.045	-0.048
(28)	ELCPC	0.149	-.476**	-0.056	.447**	.296**	.259*	0.083
(29)	ENGYP	.224*	-.561**	0.192	.339**	.312**	.280**	0.117
(30)	ELECCON	0.18	-0.206	-0.145	.281**	.629**	.695**	.400**
(31)	ENGYCON	.218*	-0.169	-0.081	0.203	.748**	.825**	.576**
(32)	ECOFTPPC	0.218	-.646**	0.073	.537**	.404**	.381**	0.195
(33)	ECOFTP	0.191	-0.118	-0.03	0.128	.733**	.813**	.618**
(34)	E_TT_PNR	0.043	-.380**	-0.101	.385**	.438**	.357**	.235*
(35)	E_TRT_P	0.049	-.373**	-0.124	.395**	.439**	.337**	.223*
(36)	ENV_ISS	0.02	.207*	-0.017	-0.159	0.034	0.029	.250*
(37)	ORIFRQT	0.119	-.217*	-0.163	.294**	.713**	.854**	.331**
(38)	ORGMNTT	0.117	-.266*	-0.119	.304**	.627**	.581**	0.126

** Significant at the 0.01 level.

* Significant at the 0.05 level.

Variable definitions:

MIL_IM - Is a measure of Military Imports as valued in millions of US dollars.

PCAGGDP - Is a measure of agriculture economic activity as a percentage of a country's GDP.

PCINDGDP - Is a measure of industrial economic activity as a percentage of a country's GDP.

PCSERGDP - Is a measure of service economic activity as a percentage of a country's GDP.

EXP_B - Is a measure of the value of a country's exports in billions of U.S. Dollars.

IMP_B - Is a measure of the value of a country's exports in billions of U.S. Dollars.

AREA - Is a measure of a country's total land area in square kilometers excludes areas under water.

Table 52 and variable definitions continued on next page.

TABLE 52 (Part c): Bivariate Correlations for Origination Country Characteristic Variables and for ORGMNTT, or Total Country Waste Amounts.

ID No.	Variables	(15) ARAB_L	(16) PERMCRP	(17) PERMPST	(18) FOREST	(19) OTH_L	(20) URB_L	(21) LOWUSL
(1)	DEVLEV	-0.099	-0.180	-0.183	0.027	0.188	.441**	-0.069
(2)	GINI	-.385**	-0.038	.313**	0.052	-0.041	-0.181	0.057
(3)	EXCONC	-.358**	0.034	0.141	-.242*	.312**	-0.122	.400**
(4)	IMCONC	-0.101	0.193	-.300**	0.078	0.195	.245*	-0.02
(5)	EXDEBT	-0.170	0.032	0.12	-0.049	0.055	-0.147	0.120
(6)	UNEMP	-0.111	-0.067	.349**	-0.007	-0.162	-0.133	0.004
(7)	MIL_EXPS	-0.197	0.008	-0.024	-.393**	.432**	0.063	.411**
(8)	MIL_IM	-0.051	-0.082	0.063	-0.044	0.031	0.052	0.002
(9)	PCAGGDP	-0.016	0.132	.237*	0.015	-0.187	-.404**	0.068
(10)	PCINDGDP	-0.014	0.068	-0.085	-0.069	0.108	-0.047	0.117
(11)	PCSERGDP	0.023	-0.157	-0.136	0.036	0.079	.367**	-0.138
(12)	EXP_B	0.054	-0.124	-0.074	0.110	-0.050	0.139	-0.169
(13)	IMP_B	0.038	-0.107	-0.030	0.084	-0.053	0.105	-0.144
(14)	AREA	-0.188	-0.187	0.103	0.094	-0.010	-.215*	0.120
(15)	ARAB_L	1.000	0.19	-0.148	-0.013	-.485**	0.032	-.508**
(16)	PERMCRP	0.19	1.000	-0.094	0.036	-.214*	-0.018	-.239*
(17)	PERMPST	-0.148	-0.094	1.000	-.273**	-.365**	-.267**	-0.195
(18)	FOREST	-0.013	0.036	-.273**	1.000	-.583**	-0.155	-.467**
(19)	OTH_L	-.485**	-.214*	-.365**	-.583**	1.000	.286**	.812**
(20)	URB_L	0.032	-0.018	-.267**	-0.155	.286**	1.000	-.282**
(21)	LOWUSL	-.508**	-.239*	-0.195	-.467**	.812**	-.282**	1.000
(22)	POP	-0.031	-0.081	0.114	-0.012	-0.040	-0.116	0.026
(23)	POPDS	-0.156	-0.048	-.213*	-0.184	.379**	.406**	0.085
(24)	INMR	-0.139	-0.004	.311**	-0.102	-0.055	-.360**	0.162
(25)	LIFE	0.033	0.017	-.291**	-0.018	0.191	.358**	-0.019
(26)	TFR	-.373**	-0.061	.249*	-.206*	.210*	-.305**	.394**
(27)	NURBPD	0.144	-0.069	-0.102	-0.081	0.06	.472**	-0.095
(28)	ELCPC	-0.209	-.311**	-.216*	0.059	.273*	0.205	0.159
(29)	ENGYPC	-0.199	-.305**	-.218*	-0.091	.380**	.382**	0.167
(30)	ELECCON	-0.087	-0.19	-0.081	0.11	0.052	-0.044	0.081
(31)	ENGYPON	-0.047	-0.186	-0.014	0.098	-0.009	-0.051	0.022
(32)	ECOFTPPC	-0.067	-.258*	-0.1	-0.012	0.181	.242*	0.076
(33)	ECOFTP	-0.027	-0.157	0.057	0.005	-0.004	-0.038	0.005
(34)	E TT_PNR	.226*	-0.094	-0.044	.225*	-.255*	-0.156	-.209*
(35)	E TRT_P	0.165	-0.104	-0.035	.246*	-.241*	-0.136	-.209*
(36)	ENV_ISS	-0.068	0.134	0.162	-0.077	-0.035	-0.164	0.079
(37)	ORIFRQT	0.062	-0.101	0.033	0.013	-0.053	0.013	-0.082
(38)	ORGMNTT	0.148	-0.111	-0.012	-0.008	-0.052	0.105	-0.155

** Significant at the 0.01 level.

* Significant at the 0.05 level.

Variable definitions:

ARAB_L - Is the percent of a country's land cultivated for crops that are replanted after each harvest like wheat, maize, and rice.

PERMCRP - Is the percent of a country's land cultivated for crops that are not replanted after each harvest like citrus, coffee, and rubber.

PERMPST - Is the percent of a country's land permanently used for herbaceous forage crops.

FOREST - Is the percent of a country's land under dense or open stands of trees.

OTH_L - Is the percent of a country's land not use as Arable Land, Permanent Crop, Permanent Pasture, or Forest; land such as urban areas, roads, desert, etc.

URB_L - Is land use for urban or city use, taken as a percent of total land area.

LOWUSL - extremely low use land Is the percentage of land not taken up in previous four types of land use.

Table 52 and variable definitions continued on next page.

TABLE 52 (Part d): Bivariate Correlations for Origination Country Characteristic Variables and for ORGMNTT, or Total Country Waste Amounts.

ID No.	Variables	(22) POP	(23) POPDS	(24) INMR	(25) LIFE	(26) TFR	(27) NURBPD	(28) ELCPC
(1)	DEVLEV	-0.119	0.192	-.736**	.668**	-.487**	0.109	.669**
(2)	GINI	0.107	0.052	.387**	-.456**	.423**	-0.109	-.407**
(3)	EXCONC	-0.12	-0.064	.512**	-.480**	.704**	-0.018	-0.082
(4)	IMCONC	-0.01	0.164	0.14	-0.141	0.112	-0.025	-0.119
(5)	EXDEBT	-0.151	-0.114	0.201	-0.169	.315**	-0.047	-0.14
(6)	UNEMP	-0.111	-0.17	.479**	-.508**	.407**	-0.023	-.419**
(7)	MIL_EXPS	-0.052	-0.073	0.11	0.003	.485**	0.057	-0.094
(8)	MIL_IM	0.089	-0.034	-0.067	0.183	0.088	-0.047	0.149
(9)	PCAGGDP	0.076	-0.184	.741**	-.612**	.525**	-0.069	-.476**
(10)	PCINDGDP	0.177	-0.141	-0.007	-0.043	0.13	-0.174	-0.056
(11)	PCSERGDP	-0.188	.252*	-.608**	.536**	-.526**	0.179	.447**
(12)	EXP_B	.327**	0.149	-.297**	.304**	-.224*	-0.055	.296**
(13)	IMP_B	.294**	0.122	-.244*	.247*	-0.186	-0.045	.259*
(14)	AREA	.496**	-0.083	0.034	-0.044	-0.038	-0.048	0.083
(15)	ARAB_L	-0.031	-0.156	-0.139	0.033	-.373**	0.144	-0.209
(16)	PERMCRP	-0.081	-0.048	-0.004	0.017	-0.061	-0.069	-.311**
(17)	PERMPST	0.114	-.213*	.311**	-.291**	.249*	-0.102	-.216*
(18)	FOREST	-0.012	-0.184	-0.102	-0.018	-.206*	-0.081	0.059
(19)	OTH_L	-0.04	.379**	-0.055	0.191	.210*	0.06	.273*
(20)	URB_L	-0.116	.406**	-.360**	.358**	-.305**	.472**	0.205
(21)	LOWUSL	0.026	0.085	0.162	-0.019	.394**	-0.095	0.159
(22)	POP	1.000	-0.048	0.068	-0.028	-0.028	-0.03	-0.109
(23)	POPDS	-0.048	1.000	-0.142	0.164	-0.117	0.009	0.057
(24)	INMR	0.068	-0.142	1.000	-.897**	.749**	-0.05	-.501**
(25)	LIFE	-0.028	0.164	-.897**	1.000	-.629**	0.026	.501**
(26)	TFR	-0.028	-0.117	.749**	-.629**	1.000	-0.059	-.274*
(27)	NURBPD	-0.03	0.009	-0.05	0.026	-0.059	1.000	-0.104
(28)	ELCPC	-0.109	0.057	-.501**	.501**	-.274*	-0.104	1.000
(29)	ENGYPC	-0.116	0.082	-.480**	.465**	-0.208	0.047	.841**
(30)	ELECCON	.330**	-0.047	-0.19	0.203	-0.131	-0.083	.475**
(31)	ENGYCON	.565**	-0.045	-0.15	0.159	-0.131	-0.054	.288**
(32)	ECOFTPPC	-0.105	-0.14	-.571**	.499**	-.364**	-.405**	.860**
(33)	ECOFTP	.693**	-0.008	-0.098	0.108	-0.11	-0.005	0.156
(34)	E_TT_PNR	0.126	-0.141	-.414**	.338**	-.406**	-0.121	.462**
(35)	E_TRT_P	0.12	-0.126	-.386**	.311**	-.375**	-0.123	.460**
(36)	ENV_ISS	0.167	-0.093	.377**	-.343**	.248*	-0.059	-.323**
(37)	ORIFRQT	0.146	-0.037	-.205*	0.193	-0.134	-0.031	.320**
(38)	ORGMNTT	0.087	-0.026	-.251*	.234*	-.208*	-0.038	.249*

** Significant at the 0.01 level.

* Significant at the 0.05 level.

Variable definitions:

POP - Is a country's total population as taken from the CIA's *The World Factbook 2001*.

POPDS - Is the average number of people living per square kilometer in a country.

INMR - Is the number of deaths of infants under 1 year old in a given year per 1,000 live births.

LIFE - expectancy at birth is the median number of years lived by people born in a cohort.

TFR - Total Birth Rate is the average number of children born per women in a country during their child bearing years.

NURBD - Is the average number of people per square kilometer living in a country's non-urban areas.

ELCPC - Is a country's kilowatt-hours of electricity consumed per capita.

Table 52 and variable definitions continued on next page.

TABLE 52 (Part e): Bivariate Correlations for Origination Country Characteristic Variables and for ORGMNTT, or Total Country Waste Amounts.

ID No.	Variables	(29) ENGYPC	(30) ELECCON	(31) ENGYCON	(32) ECOFTPPC	(33) ECOFTP	(34) E_TT_PNR	(35) E_TRT_P
(1)	DEVLEV	.669**	.245*	0.175	.765**	0.124	.428**	.424**
(2)	GINI	-.414**	-0.083	-0.005	-.400**	0.062	-.305**	-.275*
(3)	EXCONC	-0.011	-0.086	-0.153	-.249*	-0.185	-.429**	-.408**
(4)	IMCONC	0.104	-0.076	-0.016	-.305**	-0.002	-.255*	-.226*
(5)	EXDEBT	-0.161	-.228*	-.235*	-.226*	-0.209	-.230*	-.212*
(6)	UNEMP	-.417**	-0.214	-0.2	-.434**	-0.168	-.411**	-.375**
(7)	MIL_EXPS	0.061	-0.069	-0.064	0.005	-0.018	-.328**	-.326**
(8)	MIL_IM	.224*	0.18	.218*	0.218	0.191	0.043	0.049
(9)	PCAGGDP	-.561**	-0.206	-0.169	-.646**	-0.118	-.380**	-.373**
(10)	PCINDGDP	0.192	-0.145	-0.081	0.073	-0.03	-0.101	-0.124
(11)	PCSERGDP	.339**	.281**	0.203	.537**	0.128	.385**	.395**
(12)	EXP_B	.312**	.629**	.748**	.404**	.733**	.438**	.439**
(13)	IMP_B	.280**	.695**	.825**	.381**	.813**	.357**	.337**
(14)	AREA	0.117	.400**	.576**	0.195	.618**	.235*	.223*
(15)	ARAB_L	-0.199	-0.087	-0.047	-0.067	-0.027	.226*	0.165
(16)	PERMCRP	-.305**	-0.19	-0.186	-.258*	-0.157	-0.094	-0.104
(17)	PERMPST	-.218*	-0.081	-0.014	-0.1	0.057	-0.044	-0.035
(18)	FOREST	-0.091	0.11	0.098	-0.012	0.005	.225*	.246*
(19)	OTH_L	.380**	0.052	-0.009	0.181	-0.004	-.255*	-.241*
(20)	URB_L	.382**	-0.044	-0.051	.242*	-0.038	-0.156	-0.136
(21)	LOWUSL	0.167	0.081	0.022	0.076	0.005	-.209*	-.209*
(22)	POP	-0.116	.330**	.565**	-0.105	.693**	0.126	0.12
(23)	POPDS	0.082	-0.047	-0.045	-0.14	-0.008	-0.141	-0.126
(24)	INMR	-.480**	-0.19	-0.15	-.571**	-0.098	-.414**	-.386**
(25)	LIFE	.465**	0.203	0.159	.499**	0.108	.338**	.311**
(26)	TFR	-0.208	-0.131	-0.131	-.364**	-0.11	-.406**	-.375**
(27)	NURBPD	0.047	-0.083	-0.054	-.405**	-0.005	-0.121	-0.123
(28)	ELCPC	.841**	.475**	.288**	.860**	0.156	.462**	.460**
(29)	ENGYPC	1.000	.273*	.236*	.854**	0.196	.307**	.295**
(30)	ELECCON	.273*	1.000	.892**	.442**	.721**	.386**	.374**
(31)	ENGYCON	.236*	.892**	1.000	.352**	.949**	.343**	.317**
(32)	ECOFTPPC	.854**	.442**	.352**	1.000	.243*	.539**	.496**
(33)	ECOFTP	0.196	.721**	.949**	.243*	1.000	.267*	.235*
(34)	E_TT_PNR	.307**	.386**	.343**	.539**	.267*	1.000	.983**
(35)	E_TRT_P	.295**	.374**	.317**	.496**	.235*	.983**	1.000
(36)	ENV_ISS	-.298**	-0.006	0.082	-.278*	0.122	-0.083	-0.068
(37)	ORIFRQT	.343**	.685**	.779**	.459**	.740**	.366**	.320**
(38)	ORGMNTT	.272*	.314**	.374**	.333**	.337**	.493**	.491**

** Significant at the 0.01 level.

* Significant at the 0.05 level.

Variable definitions:

ENGYPC - Is a country's energy consumption in kilograms of oil per capita.

ELECCON - Is a country's kilowatt-hours of electricity consumed in a year.

ENGYCON - Is the total kilograms of oil energy equivalent consumed by a country in a year.

ECOFTPPC - Is a country's environmental consumption impact given in global hectares per capita.

ECOFTP - Measures a country's environmental consumption impact in total global hectares.

E_TT_PNR - Is the total number of environmental treaties a country has preliminary agreement, plus these it has ratified.

E_TRT_P - Is the total number of environmental treaties a country has ratified.

Table 52 and variable definitions continued on next page.

TABLE 52 (Part f): Bivariate Correlations for Origination Country Characteristic Variables and for ORGMNTT, or Total Country Waste Amounts.

ID No.	Variables	(36) ENV_ISS	(37) ORIFRQT	(38) ORGMNTT				
(1)	DEVLEV	-.337**	.283**	.309**				
(2)	GINI	0.218	-0.099	-.228*				
(3)	EXCONC	0.101	-0.194	-.249*				
(4)	IMCONC	0.145	-0.089	-0.118				
(5)	EXDEBT	0.107	-0.195	-.307**				
(6)	UNEMP	0.148	-0.191	-.231*				
(7)	MIL_EXPS	-0.015	-0.065	-0.149				
(8)	MIL_IM	0.02	0.119	0.117				
(9)	PCAGGDP	.207*	-.217*	-.266*				
(10)	PCINDGDP	-0.017	-0.163	-0.119				
(11)	PCSERGDP	-0.159	.294**	.304**				
(12)	EXP_B	0.034	.713**	.627**				
(13)	IMP_B	0.029	.854**	.581**				
(14)	AREA	.250*	.331**	0.126				
(15)	ARAB_L	-0.068	0.062	0.148				
(16)	PERMCRP	0.134	-0.101	-0.111				
(17)	PERMPST	0.162	0.033	-0.012				
(18)	FOREST	-0.077	0.013	-0.008				
(19)	OTH_L	-0.035	-0.053	-0.052				
(20)	URB_L	-0.164	0.013	0.105				
(21)	LOWUSL	0.079	-0.082	-0.155				
(22)	POP	0.167	0.146	0.087				
(23)	POPDS	-0.093	-0.037	-0.026				
(24)	INMR	.377**	-.205*	-.251*				
(25)	LIFE	-.343**	0.193	.234*				
(26)	TFR	.248*	-0.134	-.208*				
(27)	NURBPD	-0.059	-0.031	-0.038				
(28)	ELCPC	-.323**	.320**	.249*				
(29)	ENGYPC	-.298**	.343**	.272*				
(30)	ELECCON	-0.006	.685**	.314**				
(31)	ENGYCON	0.082	.779**	.374**				
(32)	ECOFTPPC	-.278*	.459**	.333**				
(33)	ECOFTP	0.122	.740**	.337**				
(34)	E_TT_PNR	-0.083	.366**	.493**				
(35)	E_TRT_P	-0.068	.320**	.491**				
(36)	ENV_ISS	1.000	-0.066	0.057				
(37)	ORIFRQT	-0.066	1000.000	.572**				
(38)	ORGMNTT	0.057	.572**	1.000				

** Significant at the 0.01 level.

* Significant at the 0.05 level.

Variable definitions:

ENV_ISS - Is the total number of a country's environmental issues as listed in the CIA's *The World Factbook 2001*.

ORIFRQT - Origination Total Frequencies of Y type Wastes.

ORGMNTT - Origination Total Amounts of Y type Wastes.

End of Table 52.

TABLE 53 Part a: Bivariate Correlations for Destination Shipment Frequency non-category variables and ECONSC, or waste shipment development level change.

ID No.	Variables	1 DEVLEV	2 GINI	3 EXCONC	4 IMCONC	5 EXDEBT	6 UNEMP	7 MIL_EXPS
1	DEVLEV	1.000	-.135**	-.275**	-.495**	-.174**	-.268**	0.015
2	GINI	-.135**	1.000	-.040*	.225**	-.234**	-.276**	.504**
3	EXCONC	-.275**	-.040*	1.000	.248**	.116**	.036*	-.161**
4	IMCONC	-.495**	.225**	.248**	1.000	-.110**	.060**	.035*
5	EXDEBT	-.174**	-.234**	.116**	-.110**	1.000	.113**	.231**
6	UNEMP	-.268**	-.276**	.036*	.060**	.113**	1.000	-.272**
7	MIL_EXPS	0.015	.504**	-.161**	.035*	.231**	-.272**	1.000
8	MIL_IM	.174**	.453**	-.202**	.149**	-.447**	-.255**	.504**
9	PCAGGDP	-.799**	.206**	.309**	.223**	.154**	.186**	-.063**
10	PCINDGDP	-.208**	-.314**	.309**	.190**	-.216**	.385**	-.671**
11	PCSERGDP	.487**	.181**	-.370**	-.240**	.119**	-.396**	.586**
12	EXP_B	.209**	.315**	-.324**	.309**	-.318**	-.062**	.432**
13	IMP_B	.137**	.446**	-.227**	.335**	-.147**	-.282**	.493**
14	AREA	.036*	.537**	.189**	.182**	-.300**	.313**	-.063**
15	ARAB_L	-0.024	-.302**	-.464**	-.073**	.112**	.308**	.198**
16	PERMCRP	-.155**	-.039*	-.051**	.054**	.153**	.469**	-.116**
17	PERMPST	-0.009	.280**	-.407**	-.102**	-0.015	-.081**	.516**
18	FOREST	-0.022	0.019	.430**	.111**	.093**	.051**	-.318**
19	OTH_L	.111**	0.016	.374**	0.02	-.315**	-.472**	-.324**
20	URB_L	.102**	-.473**	-.359**	-.122**	.168**	.034*	0.017
21	LOWUSL	-0.008	.320**	.485**	.090**	-.291**	-.296**	-.236**
22	POP	-.046**	.566**	-.234**	.320**	-0.005	-.179**	.650**
23	POPDS	0.011	-.318**	-.237**	.107**	-0.022	-.039*	-.039*
24	INMR	-.795**	.325**	.235**	.325**	.111**	.237**	.059**
25	LIFE	.772**	-.218**	-.109**	-.455**	-.180**	-.265**	-.148**
26	TFR	-.172**	.533**	-0.001	-.054**	.165**	-.462**	.609**
27	NURBPD	-.147**	-.177**	-.281**	.096**	-.077**	0.004	.112**
28	ELCPC	.251**	.177**	.424**	-.078**	-.120**	-.375**	-.152**
29	ENGYP	.275**	.285**	.171**	-0.001	-.226**	-.420**	-.089**
30	ELECCON	.084**	.533**	-0.008	.215**	0.027	-.386**	.611**
31	ENGYP	.063**	.560**	-.134**	.247**	.033*	-.352**	.635**
32	ECOFTPPC	.266**	.394**	.207**	-.097**	-.049**	-.391**	.090**
33	ECOFTP	.055**	.590**	-.197**	.232**	.036*	-.321**	.644**
34	E_TT_PNR	.688**	-.315**	-.154**	-.209**	-.315**	-.067**	-.303**
35	E_TRT_P	.532**	-.572**	-.195**	-.190**	-.063**	.154**	-.205**
36	ENV_ISS	-.116**	-.140**	-0.007	.515**	-.077**	.503**	-.114**
37	SHPAMT	-.070**	.033*	-0.008	0.005	.032*	.042**	0.024
38	ECONSC	.078**	0.002	-.226**	.074**	.197**	-.091**	.480**

** Significant at the 0.01 level.

* Significant at the 0.05 Level.

Variable definitions:

DEVELEV - is a variable measuring economic development level in GDP & PPP per capita for year 2000.

GINI - Measure of internal income distribution of countries.

ECOMC - An index for measuring the degree a country's exports are concentrated in number.

IMCOMC - An index for measuring the degree a country's imports are concentrated in number.

EXTDEBT - Is a measure of a country's external debt given as a percentage of GDP.

UNEMP - Is a measure of a country's unemployment as a percentage of their total workforce employment.

MIL_EXPS - Is a measure of a country's military expenditures as a percentage of their country's GDP.

Table 53 and variable definitions continued on next page.

TABLE 53 Part b: Bivariate Correlations for Destination Shipment Frequency non-category variables and ECONSC, or waste shipment development level change.

ID No.	Variables	8 MIL_IM	9 PCAGGDP	10 PCINDGDP	11 PCSERGDP	12 EXP_B	13 IMP_B	14 AREA
1	DEVLEV	.174**	-.799**	-.208**	.487**	.209**	.137**	.036*
2	GINI	.453**	.206**	-.314**	.181**	.315**	.446**	.537**
3	EXCONC	-.202**	.309**	.309**	-.370**	-.324**	-.227**	.189**
4	IMCONC	.149**	.223**	.190**	-.240**	.309**	.335**	.182**
5	EXDEBT	-.447**	.154**	-.216**	.119**	-.318**	-.147**	-.300**
6	UNEMP	-.255**	.186**	.385**	-.396**	-.062**	-.282**	-.313**
7	MIL_EXPS	.504**	-.063**	-.671**	.586**	.432**	.493**	-.063**
8	MIL_IM	1.000	-.267**	-.231**	.297**	.515**	.494**	.075**
9	PCAGGDP	-.267**	1.000	.232**	-.586**	-.367**	-.287**	.113**
10	PCINDGDP	-.231**	.232**	1.000	-.924**	-.420**	-.574**	.057**
11	PCSERGDP	.297**	-.586**	-.924**	1.000	.493**	.591**	-.092**
12	EXP_B	.515**	-.367**	-.420**	.493**	1.000	.883**	.177**
13	IMP_B	.494**	-.287**	-.574**	.591**	.883**	1.000	.297**
14	AREA	.075**	.113**	.057**	-.092**	.177**	.297**	1.000
15	ARAB_L	.038*	-.164**	-.269**	.288**	.197**	.051**	-.743**
16	PERMCRP	-.221**	.283**	.151**	-.237**	-.218**	-.216**	-.413**
17	PERMPST	.495**	-.136**	-.560**	.520**	.187**	.247**	-.494**
18	FOREST	-.230**	.174**	.524**	-.505**	-.142**	-.134**	.614**
19	OTH_L	-.223**	0.025	.110**	-.101**	-.200**	-.100**	.589**
20	URB_L	-.051**	-.299**	-.292**	.360**	-.099**	-.096**	-.755**
21	LOWUSL	-.108**	.227**	.277**	-.319**	-.100**	-0.019	.877**
22	POP	.446**	-.084**	-.636**	.563**	.831**	.915**	.247**
23	POPDS	0.000	-.196**	-.095**	.156**	-0.002	-.057**	-.277**
24	INMR	-.082**	.720**	-0.001	-.282**	-.079**	0.013	.048**
25	LIFE	.084**	-.476**	.047**	.148**	-0.005	-.096**	.195**
26	TFR	.175**	.278**	-.617**	.405**	.190**	.346**	.260**
27	NURBPD	.178**	.067**	0.017	-.040**	0.02	-.087**	-.688**
28	ELCPC	-.104**	-.034*	.112**	-.080**	-.051**	.064**	.822**
29	ENGYP	-0.02	-.110**	-.047**	.082**	.147**	.270**	.895**
30	ELECCON	.317**	-.133**	-.670**	.611**	.704**	.872**	.405**
31	ENGYP	.348**	-.133**	-.694**	.630**	.754**	.914**	.378**
32	ECOFTPPC	-0.007	-.050**	-.156**	.149**	.144**	.294**	.878**
33	ECOFTP	.356**	-.120**	-.697**	.627**	.755**	.910**	.383**
34	E_TT_PNR	-.043**	-.564**	-0.012	.232**	.119**	-0.014	.137**
35	E_TRT_P	-.068**	-.554**	-0.024	.238**	0.015	-.201**	-.481**
36	ENV_ISS	0.007	-.125**	.144**	-.071**	.549**	.375**	-.225**
37	SHPAMT	-.058**	.061**	0.012	-.034*	-.031*	-.043**	-.076**
38	ECONSC	.204**	-.215**	-.507**	.507**	.401**	.420**	-.389**

** Significant at the 0.01 level.

* Significant at the 0.05 Level.

Variable definitions:

MIL_IM - Is a measure of Military Imports as valued in millions of US dollars.

PCAGGDP - Is a measure of agriculture economic activity as a percentage of a country's GDP.

PCINDGDP - Is a measure of industrial economic activity as a percentage of a country's GDP.

PCSERGDP - Is a measure of service economic activity as a percentage of a country's GDP.

EXP_B - Is a measure of the value of a country's exports in billions of U.S. Dollars.

IMP_B - Is a measure of the value of a country's exports in billions of U.S. Dollars.

AREA - Is a measure of a country's total land area in square kilometers excludes areas under water.

Table 53 and variable definitions continued on next page.

TABLE 53 Part c: Bivariate Correlations for Destination Shipment Frequency non-category variables and ECONSCL, or waste shipment development level change.

ID No.	Variables	15 ARAB_L	16 PERMCRP	17 PERMPST	18 FOREST	19 OTH_L	20 URB_L	21 LOWUSL
1	DEVLEV	-0.024	-.155**	-0.009	-0.022	.111**	.102**	-0.008
2	GINI	-.302**	-.039*	.280**	0.019	0.016	-.473**	.320**
3	EXCONC	-.464**	-.051**	-.407**	.430**	.374**	-.359**	.485**
4	IMCONC	-.073**	.054**	-.102**	.111**	0.02	-.122**	.090**
5	EXDEBT	.112**	.153**	-0.015	.093**	-.315**	.168**	-.291**
6	UNEMP	.308**	.469**	-.081**	.051**	-.472**	.034*	-.296**
7	MIL_EXPS	.198**	-.116**	.516**	-.318**	-.324**	0.017	-.236**
8	MIL_IM	.038*	-.221**	.495**	-.230**	-.223**	-.051**	-.108**
9	PCAGGDP	-.164**	.283**	-.136**	.174**	0.025	-.299**	.227**
10	PCINDGDP	-.269**	.151**	-.560**	.524**	.110**	-.292**	.277**
11	PCSERGDP	.288**	-.237**	.520**	-.505**	-.101**	.360**	-.319**
12	EXP_B	.197**	-.218**	.187**	-.142**	-.200**	-.099**	-.100**
13	IMP_B	.051**	-.216**	.247**	-.134**	-.100**	-.096**	-0.019
14	AREA	-.743**	-.413**	-.494**	.614**	.589**	-.755**	.877**
15	ARAB_L	1.000	.343**	.477**	-.750**	-.650**	.604**	-.835**
16	PERMCRP	.343**	1.000	.194**	-.260**	-.426**	.246**	-.405**
17	PERMPST	.477**	.194**	1.000	-.815**	-.487**	.542**	-.660**
18	FOREST	-.750**	-.260**	-.815**	1.000	.301**	-.742**	.695**
19	OTH_L	-.650**	-.426**	-.487**	.301**	1.000	-.217**	.770**
20	URB_L	.604**	.246**	.542**	-.742**	-.217**	1.000	-.782**
21	LOWUSL	-.835**	-.405**	-.660**	.695**	.770**	-.782**	1.000
22	POP	.125**	-.097**	.304**	-.154**	-.253**	-.138**	-.088**
23	POPDS	.165**	.083**	.152**	-.294**	.090**	.364**	-.191**
24	INMR	-.050**	.143**	.165**	-.056**	-.071**	-.130**	.045**
25	LIFE	-.279**	-.139**	-.284**	.266**	.279**	-.110**	.252**
26	TFR	-.156**	-.299**	.248**	-.130**	.175**	-.098**	.159**
27	NURBPD	.561**	.441**	.448**	-.557**	-.401**	.550**	-.642**
28	ELCPC	-.838**	-.509**	-.661**	.748**	.715**	-.684**	.906**
29	ENGYPC	-.759**	-.537**	-.524**	.599**	.705**	-.556**	.819**
30	ELECCON	-.099**	-.217**	.134**	-0.023	.042**	-.245**	.173**
31	ENGYCON	-0.027	-.189**	.201**	-.075**	-.050**	-.196**	.082**
32	ECOFTPPC	-.715**	-.476**	-.482**	.622**	.546**	-.700**	.806**
33	ECOFTP	-0.009	-.172**	.228**	-.083**	-.096**	-.196**	.054**
34	E TT_PNR	-.062**	-.165**	-.275**	.084**	.306**	.031*	.153**
35	E TRT_P	.323**	.066**	.063**	-.254**	-.069**	.479**	-.383**
36	ENV_ISS	.406**	.271**	-.037*	-.081**	-.393**	.033*	-.297**
37	SHPAMT	.058**	.129**	0.029	-.050**	-.049**	0.031	-.053**
38	ECONSCL	.467**	.120**	.451**	-.444**	-.417**	.374**	-.527**

** Significant at the 0.01 level.

* Significant at the 0.05 Level.

Variable definitions:

ARAB_L - Is the percent of a country's land cultivated for crops that are replanted after each harvest like wheat, maize, and rice.

PERMCRP - Is the percent of a country's land cultivated for crops that are not replanted after each harvest like citrus, coffee, and rubber.

PERMPST - Is the percent of a country's land permanently used for herbaceous forage crops.

FOREST - Is the percent of a country's land under dense or open stands of trees.

OTH_L - Is the percent of a country's land not use as Arable Land, Permanent Crop, Permanent Pasture, or Forest; land such as urban areas, roads, desert, etc.

URB_L - Is land use for urban or city use, taken as a percent of total land area.

LOWUSL - extremely low use land Is the percentage of land not taken up in previous four types of land use.

Table 53 and variable definitions continued on next page.

TABLE 53 Part d: Bivariate Correlations for Destination Shipment Frequency non-category variables and ECONSCL, or waste shipment development level change.

ID No.	Variables	22 POP	23 POPDS	24 INMR	25 LIFE	26 TFR	27 NURBPD	28 ELCPC
1	DEVLEV	-.046**	0.011	-.795**	.772**	-.172**	-.147**	.251**
2	GINI	.566**	-.318**	.325**	-.218**	.533**	-.177**	.177**
3	EXCONC	-.234**	-.237**	.235**	-.109**	-0.001	-.281**	.424**
4	IMCONC	.320**	.107**	.325**	-.455**	-.054**	.096**	-.078**
5	EXDEBT	-0.005	-0.022	.111**	-.180**	.165**	-.077**	-.120**
6	UNEMP	-.179**	-.039*	.237**	-.265**	-.462**	0.004	-.375**
7	MIL_EXPS	.650**	-.039*	.059**	-.148**	.609**	.112**	-.152**
8	MIL_IM	.446**	0.000	-.082**	.084**	.175**	.178**	-.104**
9	PCAGGDP	-.084**	-.196**	.720**	-.476**	.278**	.067**	-.034*
10	PCINDGDP	-.636**	-.095**	-0.001	.047**	-.617**	0.017	.112**
11	PCSERGDP	.563**	.156**	-.282**	.148**	.405**	-.040**	-.080**
12	EXP_B	.831**	-0.002	-.079**	-0.005	.190**	0.02	-.051**
13	IMP_B	.915**	-.057**	0.013	-.096**	.346**	-.087**	.064**
14	AREA	.247**	-.277**	.048**	.195**	.260**	-.688**	.822**
15	ARAB_L	.125**	.165**	-.050**	-.279**	-.156**	.561**	-.838**
16	PERMCRP	-.097**	.083**	.143**	-.139**	-.299**	.441**	-.509**
17	PERMPST	.304**	.152**	.165**	-.284**	.248**	.448**	-.661**
18	FOREST	-.154**	-.294**	-.056**	.266**	-.130**	-.557**	.748**
19	OTH_L	-.253**	.090**	-.071**	.279**	.175**	-.401**	.715**
20	URB_L	-.138**	.364**	-.130**	-.110**	-.098**	.550**	-.684**
21	LOWUSL	-.088**	-.191**	.045**	.252**	.159**	-.642**	.906**
22	POP	1.000	-.067**	.172**	-.225**	.491**	-0.022	-.045**
23	POPDS	-.067**	1.000	-0.03	-.037*	-.048**	.240**	-.590**
24	INMR	.172**	-0.03	1.000	-.811**	.403**	.039*	-.192**
25	LIFE	-.225**	-.037*	-.811**	1.000	-.225**	-.208**	.447**
26	TFR	.491**	-.048**	.403**	-.225**	1.000	-.127**	.169**
27	NURBPD	-0.022	.240**	.039*	-.208**	-.127**	1.000	-.738**
28	ELCPC	-.045**	-.590**	-.192**	.447**	.169**	-.738**	1.000
29	ENGYP	.142**	-.491**	-.190**	.404**	.264**	-.724**	.913**
30	ELECCON	.902**	-.245**	.048**	-.059**	.541**	-.226**	.270**
31	ENGYP	.950**	-.200**	.069**	-.103**	.540**	-.175**	.172**
32	ECOFTPPC	.243**	-.808**	-.159**	.395**	.336**	-.795**	.912**
33	ECOFTP	.958**	-.252**	.095**	-.119**	.555**	-.180**	.140**
34	E_TT_PNR	-.199**	-.125**	-.670**	.666**	-.331**	-.171**	.326**
35	E_TRT_P	-.313**	.071**	-.560**	.423**	-.433**	.275**	-.211**
36	ENV_ISS	.326**	.145**	.122**	-.281**	-.369**	.236**	-.380**
37	SHPAMT	-0.003	.038*	.057**	-.086**	0.011	.081**	-.080**
38	ECONSCL	.475**	.130**	-.055**	-.155**	.135**	.374**	-.412**

** Significant at the 0.01 level.

* Significant at the 0.05 Level.

Variable definitions:

POP - Is a country's total population as taken from the CIA's *The World Factbook 2001*.

POPDS - Is the average number of people living per square kilometer in a country.

INMR - Is the number of deaths of infants under 1 year old in a given year per 1,000 live births.

LIFE - expectancy at birth is the median number of years lived by people born in a cohort.

TFR - Total Birth Rate is the average number of children born per women in a country during their child bearing years.

NURBD - Is the average number of people per square kilometer living in a country's non-urban areas.

ELCPC - Is a country's kilowatt-hours of electricity consumed per capita.

Table 53 and variable definitions continued on next page.

TABLE 53 Part e: Bivariate Correlations for Destination Shipment Frequency non-category variables and ECONSCL, or waste shipment development level change.

ID No.	Variables	29 ENGYPC	30 ELECCON	31 ENGYCON	32 ECOFTPPC	33 ECOFTP	34 E_TT_PNR	35 E_TRT_P
1	DEVLEV	.275**	.084**	.063**	.266**	.055**	.688**	.532**
2	GINI	.285**	.533**	.560**	.394**	.590**	-.315**	-.572**
3	EXCONC	.171**	-0.008	-.134**	.207**	-.197**	-.154**	-.195**
4	IMCONC	-0.001	.215**	.247**	-.097**	.232**	-.209**	-.190**
5	EXDEBT	-.226**	0.027	.033*	-.049**	.036*	-.315**	-.063**
6	UNEMP	-.420**	-.386**	-.352**	-.391**	-.321**	-.067**	.154**
7	MIL_EXPS	-.089**	.611**	.635**	.090**	.644**	-.303**	-.205**
8	MIL_IM	-0.02	.317**	.348**	-0.007	.356**	-.043**	-.068**
9	PCAGGDP	-.110**	-.133**	-.133**	-.050**	-.120**	-.564**	-.554**
10	PCINDGDP	-.047**	-.670**	-.694**	-.156**	-.697**	-0.012	-0.024
11	PCSERGDP	.082**	.611**	.630**	.149**	.627**	.232**	.238**
12	EXP_B	.147**	.704**	.754**	.144**	.755**	.119**	0.015
13	IMP_B	.270**	.872**	.914**	.294**	.910**	-0.014	-.201**
14	AREA	.895**	.405**	.378**	.878**	.383**	.137**	-.481**
15	ARAB_L	-.759**	-.099**	-0.027	-.715**	-0.009	-.062**	.323**
16	PERMCRP	-.537**	-.217**	-.189**	-.476**	-.172**	-.165**	.066**
17	PERMPST	-.524**	.134**	.201**	-.482**	.228**	-.275**	.063**
18	FOREST	.599**	-0.023	-.075**	.622**	-.083**	.084**	-.254**
19	OTH_L	.705**	.042**	-.050**	.546**	-.096**	.306**	-.069**
20	URB_L	-.556**	-.245**	-.196**	-.700**	-.196**	.031*	.479**
21	LOWUSL	.819**	.173**	.082**	.806**	.054**	.153**	-.383**
22	POP	.142**	.902**	.950**	.243**	.958**	-.199**	-.313**
23	POPDS	-.491**	-.245**	-.200**	-.808**	-.252**	-.125**	.071**
24	INMR	-.190**	.048**	.069**	-.159**	.095**	-.670**	-.560**
25	LIFE	.404**	-.059**	-.103**	.395**	-.119**	.666**	.423**
26	TFR	.264**	.541**	.540**	.336**	.555**	-.331**	-.433**
27	NURBPD	-.724**	-.226**	-.175**	-.795**	-.180**	-.171**	.275**
28	ELCPC	.913**	.270**	.172**	.912**	.140**	.326**	-.211**
29	ENGYPC	1.000	.386**	.343**	.920**	.335**	.343**	-.252**
30	ELECCON	.386**	1.000	.983**	.506**	.961**	-.090**	-.329**
31	ENGYCON	.343**	.983**	1.000	.449**	.994**	-.119**	-.338**
32	ECOFTPPC	.920**	.506**	.449**	1.000	.442**	.227**	-.363**
33	ECOFTP	.335**	.961**	.994**	.442**	1.000	-.147**	-.372**
34	E_TT_PNR	.343**	-.090**	-.119**	.227**	-.147**	1.000	.768**
35	E_TRT_P	-.252**	-.329**	-.338**	-.363**	-.372**	.768**	1.000
36	ENV_ISS	-.348**	.127**	.170**	-.361**	.162**	0.003	.172**
37	SHPAMT	-.099**	-0.015	-0.017	-.080**	-0.018	-.088**	-0.02
38	ECONSCL	-.331**	.397**	.432**	-.264**	.425**	-.127**	.127**

** Significant at the 0.01 level.

* Significant at the 0.05 Level.

Variable definitions:

ENGYPC - Is a country's energy consumption in kilograms of oil per capita.

ELECCON - Is a country's kilowatt-hours of electricity consumed in a year.

ENGYCON - Is the total kilograms of oil energy equivalent consumed by a country in a year.

ECOFTPPC - Is a country's environmental consumption impact given in global hectares per capita.

ECOFTP - Measures a country's environmental consumption impact in total global hectares.

E_TT_PNR - Is the total number of environmental treaties a country has preliminary agreement, plus these it has ratified.

E_TRT_P - Is the total number of environmental treaties a country has ratified.

Table 53 and variable definitions continued on next page.

TABLE 53 Part f: Bivariate Correlations for Destination Shipment Frequency non-category variables and ECONSCL, or waste shipment development level change.

ID No.	Variables	36 ENV_ISS	37 SHPAMT	38 ECONSCL				
1	DEVLEV	-.116**	-.070**	.078**				
2	GINI	-.140**	.033*	0.002				
3	EXCONC	-0.007	-0.008	-.226**				
4	IMCONC	.515**	0.005	.074**				
5	EXDEBT	-.077**	.032*	.197**				
6	UNEMP	.503**	.042**	-.091**				
7	MIL_EXPS	-.114**	0.024	.480**				
8	MIL_IM	0.007	-.058**	.204**				
9	PCAGGDP	-.125**	.061**	-.215**				
10	PCINDGDP	.144**	0.012	-.507**				
11	PCSERGDP	-.071**	-.034*	.507**				
12	EXP_B	.549**	-.031*	.401**				
13	IMP_B	.375**	-.043**	.420**				
14	AREA	-.225**	-.076**	-.389**				
15	ARAB_L	.406**	.058**	.467**				
16	PERMCRP	.271**	.129**	.120**				
17	PERMPST	-.037*	0.029	.451**				
18	FOREST	-.081**	-.050**	-.444**				
19	OTH_L	-.393**	-.049**	-.417**				
20	URB_L	.033*	0.031	.374**				
21	LOWUSL	-.297**	-.053**	-.527**				
22	POP	.326**	-0.003	.475**				
23	POPDS	.145**	.038*	.130**				
24	INMR	.122**	.057**	-.055**				
25	LIFE	-.281**	-.086**	-.155**				
26	TFR	-.369**	0.011	.135**				
27	NURBPD	.236**	.081**	.374**				
28	ELCPC	-.380**	-.080**	-.412**				
29	ENGYPC	-.348**	-.099**	-.331**				
30	ELECCON	.127**	-0.015	.397**				
31	ENGYCON	.170**	-0.017	.432**				
32	ECOFTPPC	-.361**	-.080**	-.264**				
33	ECOFTP	.162**	-0.018	.425**				
34	E_TT_PNR	0.003	-.088**	-.127**				
35	E_TRT_P	.172**	-0.02	.127**				
36	ENV_ISS	1.000	0.01	.252**				
37	SHPAMT	0.01	1.000	0.005				
38	ECONSCL	.252**	0.005	1.000				

** Significant at the 0.01 level.

* Significant at the 0.05 Level.

Variable definitions:

EV_ISS - Is the total number of a country's environmental issues as listed in the CIA's *The World Factbook 2001*.

SHPAMT- Size of waste shipment in metric tones.

ECONSCL - Is a dependent variable scale measuring the development level change of waste shipments.

The end of table 53.

TABLE 54 (Part a): Bivariate Correlations for Origination Shipment Frequency non-category variables and ECONSC, or waste shipment development level change.

ID No.	Variables	(1) DEVLEV	(2) GINI	(3) EXCONC	(4) IMCONC	(5) EXDEBT	(6) UNEMP	(7) MIL_EXPS
(1)	DEVLEV	1.000	-.109**	-.340**	-.448**	-.457**	-.658**	-0.022
(2)	GINI	-.109**	1.000	-.071**	.332**	.060**	-.190**	.506**
(3)	EXCONC	-.340**	-.071**	1.000	.506**	.275**	.130**	-0.022
(4)	IMCONC	-.448**	.332**	.506**	1.000	.251**	.228**	.219**
(5)	EXDEBT	-.457**	.060**	.275**	.251**	1.000	.461**	.237**
(6)	UNEMP	-.658**	-.190**	.130**	.228**	.461**	1.000	-.044**
(7)	MIL_EXPS	-0.022	.506**	-0.022	.219**	.237**	-.044**	1.000
(8)	MIL_IM	.279**	.395**	-.374**	-.088**	-.212**	-.257**	.639**
(9)	PCAGGDP	-.834**	.106**	.324**	.205**	.504**	.569**	-.071**
(10)	PCINDGDP	-.255**	-.328**	.405**	.247**	.145**	.250**	-.512**
(11)	PCSERGDP	.559**	.221**	-.465**	-.287**	-.330**	-.429**	.455**
(12)	EXP_B	.310**	.482**	-.432**	-.041*	-.230**	-.290**	.559**
(13)	IMP_B	.262**	.554**	-.388**	-0.01	-.143**	-.315**	.608**
(14)	AREA	.133**	.581**	-.267**	.067**	-.129**	-.259**	.502**
(15)	ARAB_L	-.056**	-.292**	-.427**	-.271**	-0.011	.143**	-.046**
(16)	PERMCRP	-.160**	-0.029	-.064**	-.064**	0.03	.254**	-.079**
(17)	PERMPST	.068**	.297**	.068**	.159**	.153**	-.114**	-.141**
(18)	FOREST	-0.025	-0.03	-.149**	-.203**	-.065**	.097**	0.023
(19)	OTH_L	0.028	-.115**	.444**	.260**	-.110**	-.129**	.197**
(20)	URB_L	.113**	-.440**	.063**	.226**	-.109**	0.001	-.083**
(21)	LOWUSL	-.058**	.202**	.363**	0.015	-.034*	-.111**	.214**
(22)	POP	.081**	.601**	-.342**	0.027	-.088**	-.272**	.569**
(23)	POPDS	0.019	-.066**	.102**	.228**	-.048**	-.040*	-.100**
(24)	INMR	-.750**	.344**	.317**	.297**	.326**	.470**	.140**
(25)	LIFE	.716**	-.354**	-.285**	-.315**	-.293**	-.466**	-.068**
(26)	TFR	-.253**	.564**	.356**	.330**	.257**	-.084**	.494**
(27)	NURBPD	-0.014	-.216**	.067**	.052**	0.017	.045**	.076**
(28)	ELCPC	.423**	.047**	.115**	-.113**	-.260**	-.410**	.216**
(29)	ENGYP	.433**	.244**	-.132**	.080**	-.264**	-.443**	.367**
(30)	ELECCON	.220**	.543**	-.204**	0.006	-.103**	-.337**	.636**
(31)	ENGYP	.204**	.592**	-.300**	0.028	-.085**	-.324**	.645**
(32)	ECOFTPPC	.454**	.397**	-.199**	-.087**	-.118**	-.446**	.542**
(33)	ECOFTP	.186**	.618**	-.347**	.093**	-.035*	-.303**	.705**
(34)	E_TT_PNR	.674**	-.237**	-.419**	-.507**	-.543**	-.475**	-.170**
(35)	E_TRT_P	.576**	-.436**	-.318**	-.471**	-.524**	-.321**	-.313**
(36)	ENV_ISS	-.106**	.185**	-.260**	-0.022	-.147**	.105**	.265**
(37)	SHPAMT	-0.022	-.065**	-0.015	-0.006	-.053**	-0.012	-.059**
(38)	ECONSC	-.521**	-.276**	.290**	.089**	.277**	.578**	-.417**

** Significant at the 0.01 level.

* Significant at the 0.05 level.

Variable definitions:

DEVLEV - is a variable measuring economic development level in GDP & PPP per capita for year 2000.

GINI - Measure of internal income distribution of countries.

EXCONC - An index for measuring the degree a country's exports are concentrated in number.

IMCONC - An index for measuring the degree a country's imports are concentrated in number.

EXTDEBT - Is a measure of a country's external debt given as a percentage of GDP.

UNEMP - Is a measure of a country's unemployment as a percentage of their total workforce employment.

MIL_EXPS - Is a measure of a country's military expenditures as a percentage of their country's GDP.

(Table 54 and variable definitions continued on next page).

TABLE 54 (Part b): Bivariate Correlations for Origination Shipment Frequency non-category variables and ECONSCl, or waste shipment development level change.

ID No.	Variables	(8) MIL_IM	(9) PCAGGDP	(10) PCINDGDP	(11) PCSERGDP	(12) EXP_B	(13) IMP_B	(14) AREA
(1)	DEVLEV	.279**	-.834**	-.255**	.559**	.310**	.262**	.133**
(2)	GINI	.395**	.106**	-.328**	.221**	.482**	.554**	.581**
(3)	EXCONC	-.374**	.324**	.405**	-.465**	-.432**	-.388**	-.267**
(4)	IMCONC	-.088**	.205**	.247**	-.287**	-.041*	-0.01	.067**
(5)	EXDEBT	-.212**	.504**	.145**	-.330**	-.230**	-.143**	-.129**
(6)	UNEMP	-.257**	.569**	.250**	-.429**	-.290**	-.315**	-.259**
(7)	MIL_EXPS	.639**	-.071**	-.512**	.455**	.559**	.608**	.502**
(8)	MIL_IM	1.000	-.263**	-.625**	.631**	.809**	.774**	.659**
(9)	PCAGGDP	-.263**	1.000	.248**	-.624**	-.357**	-.310**	-.204**
(10)	PCINDGDP	-.625**	.248**	1.000	-.912**	-.758**	-.787**	-.618**
(11)	PCSERGDP	.631**	-.624**	-.912**	1.000	.763**	.766**	.585**
(12)	EXP_B	.809**	-.357**	-.758**	.763**	1.000	.972**	.788**
(13)	IMP_B	.774**	-.310**	-.787**	.766**	.972**	1.000	.816**
(14)	AREA	.659**	-.204**	-.618**	.585**	.788**	.816**	1.000
(15)	ARAB_L	-0.022	0.008	-0.004	0.000	-0.005	-.051**	-.311**
(16)	PERMCRP	-.265**	.262**	.325**	-.373**	-.389**	-.377**	-.440**
(17)	PERMPST	-.076**	.048**	.120**	-.117**	-0.002	.039*	-.104**
(18)	FOREST	.146**	-0.012	-.125**	.106**	.116**	.096**	.357**
(19)	OTH_L	0.012	-.113**	-.083**	.115**	-.033*	-0.027	.088**
(20)	URB_L	-.247**	-.237**	.191**	-.054**	-.292**	-.302**	-.492**
(21)	LOWUSL	.179**	.084**	-.234**	.153**	.171**	.193**	.464**
(22)	POP	.680**	-.155**	-.645**	.586**	.856**	.882**	.778**
(23)	POPDS	-.111**	-.071**	.102**	-.052**	-.143**	-.159**	-.136**
(24)	INMR	-.086**	.734**	.086**	-.380**	-.158**	-.110**	-.036*
(25)	LIFE	.227**	-.607**	-.133**	.365**	.187**	.130**	.085**
(26)	TFR	.219**	.274**	-.288**	.116**	.298**	.368**	.329**
(27)	NURBPD	-.062**	0.014	-0.003	-0.004	-.066**	-.059**	-.064**
(28)	ELCPC	.367**	-.414**	-.505**	.578**	.442**	.462**	.599**
(29)	ENGYP	.508**	-.501**	-.616**	.703**	.665**	.688**	.750**
(30)	ELECCON	.708**	-.275**	-.820**	.778**	.900**	.949**	.807**
(31)	ENGYP	.731**	-.263**	-.822**	.774**	.933**	.980**	.832**
(32)	ECOFTPPC	.617**	-.460**	-.702**	.768**	.769**	.805**	.849**
(33)	ECOFTP	.730**	-.253**	-.832**	.786**	.935**	.983**	.836**
(34)	E_TT_PNR	.348**	-.606**	-.304**	.502**	.379**	.284**	.263**
(35)	E_TRT_P	.188**	-.531**	-.166**	.359**	.161**	.040*	-0.009
(36)	ENV_ISS	.453**	-.073**	-.307**	.278**	.461**	.395**	.294**
(37)	SHPAMT	-0.014	-0.009	.034*	-0.023	-.033*	-.047**	-.059**
(38)	ECONSCl	-.461**	.550**	.617**	-.729**	-.661**	-.699**	-.420**

** Significant at the 0.01 level.

* Significant at the 0.05 level.

Variable definitions:

MIL_IM - Is a measure of Military Imports as valued in millions of US dollars.

PCAGGDP - Is a measure of agriculture economic activity as a percentage of a country's GDP.

PCINDGDP - Is a measure of industrial economic activity as a percentage of a country's GDP.

PCSERGDP - Is a measure of service economic activity as a percentage of a country's GDP.

EXP_B - Is a measure of the value of a country's exports in billions of U.S. Dollars.

IMP_B - Is a measure of the value of a country's exports in billions of U.S. Dollars.

AREA - Is a measure of a country's total land area in square kilometers (excludes areas under water).

(Table 54 and variable definitions continued on next page).

TABLE 54 (Part c): Bivariate Correlations for Origination Shipment Frequency non-category variables and ECONSCL, or waste shipment development level change.

ID No.	Variables	(15) ARAB_L	(16) PERMCRP	(17) PERMPST	(18) FOREST	(19) OTH_L	(20) URB_L	(21) LOWUSL
(1)	DEVLEV	-.056**	-.160**	.068**	-0.025	0.028	.113**	-.058**
(2)	GINI	-.292**	-0.029	.297**	-0.03	-.115**	-.440**	.202**
(3)	EXCONC	-.427**	-.064**	.068**	-.149**	.444**	.063**	.363**
(4)	IMCONC	-.271**	-.064**	.159**	-.203**	.260**	.226**	0.015
(5)	EXDEBT	-0.011	0.03	.153**	-.065**	-.110**	-.109**	-.034*
(6)	UNEMP	.143**	.254**	-.114**	.097**	-.129**	0.001	-.111**
(7)	MIL_EXPS	-.046**	-.079**	-.141**	0.023	.197**	-.083**	.214**
(8)	MIL_IM	-0.022	-.265**	-.076**	.146**	0.012	-.247**	.179**
(9)	PCAGGDP	0.008	.262**	.048**	-0.012	-.113**	-.237**	.084**
(10)	PCINDGDP	-0.004	.325**	.120**	-.125**	-.083**	.191**	-.234**
(11)	PCSERGDP	0.000	-.373**	-.117**	.106**	.115**	-.054**	.153**
(12)	EXP_B	-0.005	-.389**	-0.002	.116**	-.033*	-.292**	.171**
(13)	IMP_B	-.051**	-.377**	.039*	.096**	-0.027	-.302**	.193**
(14)	AREA	-.311**	-.440**	-.104**	.357**	.088**	-.492**	.464**
(15)	ARAB_L	1.000	.286**	-.110**	-.270**	-.434**	.233**	-.602**
(16)	PERMCRP	.286**	1.000	-.183**	-0.019	-.197**	.203**	-.343**
(17)	PERMPST	-.110**	-.183**	1.000	-.595**	-.429**	-.126**	-.328**
(18)	FOREST	-.270**	-0.019	-.595**	1.000	-.119**	-.391**	.241**
(19)	OTH_L	-.434**	-.197**	-.429**	-.119**	1.000	.325**	.674**
(20)	URB_L	.233**	.203**	-.126**	-.391**	.325**	1.000	-.458**
(21)	LOWUSL	-.602**	-.343**	-.328**	.241**	.674**	-.458**	1.000
(22)	POP	-.050**	-.322**	.066**	.084**	-.059**	-.337**	.190**
(23)	POPDS	-.113**	0.02	-.125**	-.200**	.434**	.311**	.154**
(24)	INMR	-.057**	.090**	.036*	-.041**	0.022	-.136**	.126**
(25)	LIFE	-.083**	-.137**	-.075**	.082**	.099**	.114**	0.004
(26)	TFR	-.282**	-.336**	.212**	-.152**	.197**	-.190**	.316**
(27)	NURBPD	.052**	0.012	-.041**	-.065**	.072**	.268**	-.057**
(28)	ELCPC	-.470**	-.532**	-.304**	.421**	.434**	-.259**	.654**
(29)	ENGYPC	-.340**	-.581**	-.155**	.274**	.310**	-.093**	.394**
(30)	ELECCON	-.150**	-.409**	-0.006	.117**	.097**	-.372**	.377**
(31)	ENGYCON	-.105**	-.398**	.034*	.106**	0.017	-.356**	.287**
(32)	ECOFTPPC	-.348**	-.527**	-.100**	.301**	.243**	-.467**	.498**
(33)	ECOFTP	-.100**	-.390**	.047**	.077**	.032*	-.386**	.258**
(34)	E TT_PNR	.107**	-.181**	-.074**	.115**	-.074**	-.095**	-0.008
(35)	E TRT_P	.156**	-.072**	-.133**	.071**	-0.022	.091**	-.099**
(36)	ENV_ISS	.238**	.095**	-.412**	.271**	-0.003	-.057**	.036*
(37)	SHPAMT	.039*	0.004	-0.021	-0.012	0.007	.052**	-.040*
(38)	ECONSCL	-.041**	.307**	-.169**	.127**	.033*	-.042**	.064**

** Significant at the 0.01 level.

* Significant at the 0.05 level.

Variable definitions:

ARAB_L - Is the percent of a country's land cultivated for crops that are replanted after each harvest like wheat, maize, and rice.

PERMCRP - Is the percent of a country's land cultivated for crops that are not replanted after each harvest like citrus, coffee, and rubber.

PERMPST - Is the percent of a country's land permanently used for herbaceous forage crops.

FOREST - Is the percent of a country's land under dense or open stands of trees.

OTH_L - Is the percent of a country's land not use as Arable Land, Permanent Crop, Permanent Pasture, or Forest; land such as urban areas, roads, desert, etc.

URB_L - Is land use for urban or city use, taken as a percent of total land area.

LOWUSL - (extremely low use land) Is the percentage of land not taken up in previous four types of land use.

(Table 54 and variable definitions continued on next page).

TABLE 54 (Part d): Bivariate Correlations for Origination Shipment Frequency non-category variables and ECONSCL, or waste shipment development level change.

ID No.	Variables	(22) POP	(23) POPDS	(24) INMR	(25) LIFE	(26) TFR	(27) NURBPD	(28) ELCPC
(1)	DEVLEV	.081**	0.019	-.750**	.716**	-.253**	-0.014	.423**
(2)	GINI	.601**	-.066**	.344**	-.354**	.564**	-.216**	.047**
(3)	EXCONC	-.342**	.102**	.317**	-.285**	.356**	.067**	.115**
(4)	IMCONC	0.027	.228**	.297**	-.315**	.330**	.052**	-.113**
(5)	EXDEBT	-.088**	-.048**	.326**	-.293**	.257**	0.017	-.260**
(6)	UNEMP	-.272**	-.040*	.470**	-.466**	-.084**	.045**	-.410**
(7)	MIL_EXPS	.569**	-.100**	.140**	-.068**	.494**	.076**	.216**
(8)	MIL_IM	.680**	-.111**	-.086**	.227**	.219**	-.062**	.367**
(9)	PCAGGDP	-.155**	-.071**	.734**	-.607**	.274**	0.014	-.414**
(10)	PCINDGDP	-.645**	.102**	.086**	-.133**	-.288**	-0.003	-.505**
(11)	PCSERGDP	.586**	-.052**	-.380**	.365**	.116**	-0.004	.578**
(12)	EXP_B	.856**	-.143**	-.158**	.187**	.298**	-.066**	.442**
(13)	IMP_B	.882**	-.159**	-.110**	.130**	.368**	-.059**	.462**
(14)	AREA	.778**	-.136**	-.036*	.085**	.329**	-.064**	.599**
(15)	ARAB_L	-.050**	-.113**	-.057**	-.083**	-.282**	.052**	-.470**
(16)	PERMCRP	-.322**	0.02	.090**	-.137**	-.336**	0.012	-.532**
(17)	PERMPST	.066**	-.125**	.036*	-.075**	.212**	-.041**	-.304**
(18)	FOREST	.084**	-.200**	-.041**	.082**	-.152**	-.065**	.421**
(19)	OTH_L	-.059**	.434**	0.022	.099**	.197**	.072**	.434**
(20)	URB_L	-.337**	.311**	-.136**	.114**	-.190**	.268**	-.259**
(21)	LOWUSL	.190**	.154**	.126**	0.004	.316**	-.057**	.654**
(22)	POP	1.000	-.112**	0.029	0.005	.377**	-.050**	.342**
(23)	POPDS	-.112**	1.000	-0.023	.059**	-.049**	0.017	-.166**
(24)	INMR	0.029	-0.023	1.000	-.892**	.538**	.036*	-.327**
(25)	LIFE	0.005	.059**	-.892**	1.000	-.423**	-.050**	.413**
(26)	TFR	.377**	-.049**	.538**	-.423**	1.000	-0.006	.196**
(27)	NURBPD	-.050**	0.017	.036*	-.050**	-0.006	1.000	-.324**
(28)	ELCPC	.342**	-.166**	-.327**	.413**	.196**	-.324**	1.000
(29)	ENGYP	.542**	-.102**	-.300**	.354**	.329**	-.204**	.840**
(30)	ELECCON	.861**	-.198**	-.078**	.107**	.459**	-.312**	.598**
(31)	ENGYP	.900**	-.190**	-.060**	.082**	.464**	-.299**	.514**
(32)	ECOFTPPC	.665**	-.608**	-.290**	.338**	.333**	-.722**	.806**
(33)	ECOFTP	.912**	-.461**	-.039*	.063**	.479**	-.484**	.473**
(34)	E_TT_PNR	.181**	-.206**	-.556**	.544**	-.315**	-.138**	.417**
(35)	E_TRT_P	-.031*	-.147**	-.499**	.492**	-.414**	-.116**	.251**
(36)	ENV_ISS	.403**	0.004	.177**	-.168**	-0.02	-0.016	-0.002
(37)	SHPAMT	-.034*	0.01	-0.01	0.006	-.063**	-0.002	-.051**
(38)	ECONSCL	-.569**	.039*	.355**	-.304**	-.185**	.067**	-.419**

** Significant at the 0.01 level.

* Significant at the 0.05 level.

Variable definitions:

POP - Is a country's total population as taken from the CIA's *The World Factbook 2001*.

POPDS - Is the average number of people living per square kilometer in a country.

INMR - Is the number of deaths of infants under 1 year old in a given year per 1,000 live births.

LIFE - (expectancy at birth) is the median number of years lived by people born in a cohort.

TFR - Total Birth Rate is the average number of children born per women in a country during their child bearing years.

NURBD - Is the average number of people per square kilometer living in a country's non-urban areas.

ELCPC - Is a country's kilowatt-hours of electricity consumed per capita.

(Table 54 and variable definitions continued on next page).

TABLE 54 (Part e): Bivariate Correlations for Origination Shipment Frequency non-category variables and ECONSCL, or waste shipment development level change.

ID No.	Variables	(29) ENGYPC	(30) ELECCON	(31) ENGYCON	(32) ECOFTPPC	(33) ECOFTP	(34) E_TT_PNR	(35) E_TRT_P
(1)	DEVLEV	.433**	.220**	.204**	.454**	.186**	.674**	.576**
(2)	GINI	.244**	.543**	.592**	.397**	.618**	-.237**	-.436**
(3)	EXCONC	-.132**	-.204**	-.300**	-.199**	-.347**	-.419**	-.318**
(4)	IMCONC	.080**	0.006	0.028	-.087**	.093**	-.507**	-.471**
(5)	EXDEBT	-.264**	-.103**	-.085**	-.118**	-.035*	-.543**	-.524**
(6)	UNEMP	-.443**	-.337**	-.324**	-.446**	-.303**	-.475**	-.321**
(7)	MIL_EXPS	.367**	.636**	.645**	.542**	.705**	-.170**	-.313**
(8)	MIL_IM	.508**	.708**	.731**	.617**	.730**	.348**	.188**
(9)	PCAGGDP	-.501**	-.275**	-.263**	-.460**	-.253**	-.606**	-.531**
(10)	PCINDGDP	-.616**	-.820**	-.822**	-.702**	-.832**	-.304**	-.166**
(11)	PCSERGDP	.703**	.778**	.774**	.768**	.786**	.502**	.359**
(12)	EXP_B	.665**	.900**	.933**	.769**	.935**	.379**	.161**
(13)	IMP_B	.688**	.949**	.980**	.805**	.983**	.284**	.040*
(14)	AREA	.750**	.807**	.832**	.849**	.836**	.263**	-0.009
(15)	ARAB_L	-.340**	-.150**	-.105**	-.348**	-.100**	.107**	.156**
(16)	PERMCRP	-.581**	-.409**	-.398**	-.527**	-.390**	-.181**	-.072**
(17)	PERMPST	-.155**	-0.006	.034*	-.100**	.047**	-.074**	-.133**
(18)	FOREST	.274**	.117**	.106**	.301**	.077**	.115**	.071**
(19)	OTH_L	.310**	.097**	0.017	.243**	.032*	-.074**	-0.022
(20)	URB_L	-.093**	-.372**	-.356**	-.467**	-.386**	-.095**	.091**
(21)	LOWUSL	.394**	.377**	.287**	.498**	.258**	-0.008	-.099**
(22)	POP	.542**	.861**	.900**	.665**	.912**	.181**	-.031*
(23)	POPDS	-.102**	-.198**	-.190**	-.608**	-.461**	-.206**	-.147**
(24)	INMR	-.300**	-.078**	-.060**	-.290**	-.039*	-.556**	-.499**
(25)	LIFE	.354**	.107**	.082**	.338**	.063**	.544**	.492**
(26)	TFR	.329**	.459**	.464**	.333**	.479**	-.315**	-.414**
(27)	NURBPD	-.204**	-.312**	-.299**	-.722**	-.484**	-.138**	-.116**
(28)	ELCPC	.840**	.598**	.514**	.806**	.473**	.417**	.251**
(29)	ENGYPC	1.000	.697**	.695**	.877**	.711**	.351**	.131**
(30)	ELECCON	.697**	1.000	.985**	.854**	.964**	.240**	-0.015
(31)	ENGYCON	.695**	.985**	1.000	.837**	.995**	.215**	-.051**
(32)	ECOFTPPC	.877**	.854**	.837**	1.000	.821**	.383**	.062**
(33)	ECOFTP	.711**	.964**	.995**	.821**	1.000	.171**	-.115**
(34)	E_TT_PNR	.351**	.240**	.215**	.383**	.171**	1.000	.935**
(35)	E_TRT_P	.131**	-0.015	-.051**	.062**	-.115**	.935**	1.000
(36)	ENV_ISS	.075**	.306**	.330**	.106**	.335**	.171**	.190**
(37)	SHPAMT	-.054**	-.062**	-.060**	-.069**	-.060**	.033*	.061**
(38)	ECONSCL	-.609**	-.695**	-.706**	-.613**	-.703**	-.364**	-.215**

** Significant at the 0.01 level.

* Significant at the 0.05 level.

Variable definitions:

ENGYPC - Is a country's energy consumption in kilograms of oil per capita.

ELECCON - Is a country's kilowatt-hours of electricity consumed in a year.

ENGYCON - Is the total kilograms of oil energy equivalent consumed by a country in a year.

ECOFTPPC - Is a country's environmental consumption impact given in global hectares per capita.

ECOFTP - Measures a country's environmental consumption impact in total global hectares.

E_TT_PNR - Is the total number of environmental treaties a country has preliminary agreement, plus these it has ratified.

E_TRT_P - Is the total number of environmental treaties a country has ratified.

(Table 54 and variable definitions continued on next page).

TABLE 54 (Part f): Bivariate Correlations for Origination Shipment Frequency non-category variables and ECONSCL, or waste shipment development level change.

ID No.	Variables	(36) ENV_ISS	(37) SHPAMT	(38) ECONSCL				
(1)	DEVLEV	-.106**	-0.022	-.521**				
(2)	GINI	.185**	-.065**	-.276**				
(3)	EXCONC	-.260**	-0.015	.290**				
(4)	IMCONC	-0.022	-0.006	.089**				
(5)	EXDEBT	-.147**	-.053**	.277**				
(6)	UNEMP	.105**	-0.012	.578**				
(7)	MIL_EXPS	.265**	-.059**	-.417**				
(8)	MIL_IM	.453**	-0.014	-.461**				
(9)	PCAGGDP	-.073**	-0.009	.550**				
(10)	PCINDGDP	-.307**	.034*	.617**				
(11)	PCSERGDP	.278**	-0.023	-.729**				
(12)	EXP_B	.461**	-.033*	-.661**				
(13)	IMP_B	.395**	-.047**	-.699**				
(14)	AREA	.294**	-.059**	-.420**				
(15)	ARAB_L	.238**	.039*	-.041**				
(16)	PERMCRP	.095**	0.004	.307**				
(17)	PERMPST	-.412**	-0.021	-.169**				
(18)	FOREST	.271**	-0.012	.127**				
(19)	OTH_L	-0.003	0.007	.033*				
(20)	URB_L	-.057**	.052**	-.042**				
(21)	LOWUSL	.036*	-.040*	.064**				
(22)	POP	.403**	-.034*	-.569**				
(23)	POPDS	0.004	0.01	.039*				
(24)	INMR	.177**	-0.01	.355**				
(25)	LIFE	-.168**	0.006	-.304**				
(26)	TFR	-0.02	-.063**	-.185**				
(27)	NURBPD	-0.016	-0.002	.067**				
(28)	ELCPC	-0.002	-.051**	-.419**				
(29)	ENGYPC	.075**	-.054**	-.609**				
(30)	ELECCON	.306**	-.062**	-.695**				
(31)	ENGYPCON	.330**	-.060**	-.706**				
(32)	ECOFTPPC	.106**	-.069**	-.613**				
(33)	ECOFTP	.335**	-.060**	-.703**				
(34)	E_TT_PNR	.171**	.033*	-.364**				
(35)	E_TRT_P	.190**	.061**	-.215**				
(36)	ENV_ISS	1.000	.060**	-.146**				
(37)	SHPAMT	.060**	1.000	0.005				
(38)	ECONSCL	-.146**	0.005	1.000				

** Significant at the 0.01 level.

* Significant at the 0.05 level.

Variable definitions:

ENV_ISS - Is the total number of a country's environmental issues as listed in the CIA's *The World Factbook 2001*.

SHPAMT- Size of waste shipment in metric tones.

ECONSCL - Is a dependent variable (scale) measuring the development level change of waste shipments.

End of table 54.

TABLE 55: Destination Country Characteristics and Waste Receiving (Import) Amounts - Multivariate regression results for Country Case Destination Variables with Destination Amounts (DESMNTT) as the Dependent Variable.

Independent Variables	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	-26457.542	660187.877		-0.040	0.968
DEVLEV	45997.253	68843.740	0.161	0.668	0.508
EXDEBT	-6363.302	4180.708	-0.221	-1.522	0.136
EXP_B	769.683	301.784	0.391	2.550	0.015
LIFE	-472.244	10317.171	-0.010	-0.046	0.964
ENGYPC	-28.326	28.765	-0.180	-0.985	0.331
E_TRT_P	21917.045	9846.013	0.390	2.226	0.032
EXEGDUM2	-6275.440	105418.045	-0.009	-0.060	0.953
IMEGDUM2	-40485.361	88082.592	-0.062	-0.460	0.648
EXCMDUM2	-214127.023	109576.384	-0.335	-1.954	0.058
EXCMDUM3	-222685.147	150209.195	-0.240	-1.483	0.147
IMCMDUM3	-19237.006	89816.618	-0.027	-0.214	0.832

Adjusted R² for Model 4 = .332

DEVELEV - is a variable measuring economic development level in GDP & PPP per capita for year 2000.

EXTDEBT - Is a measure of a country's external debt given as a percentage of GDP.

EXP_B - Is a measure of the value of a country's exports in billions of U.S. Dollars.

LIFE - (expectancy at birth) is the median number of years lived by people born in a cohort.

ENGYPC - Is a country's energy consumption in kilograms of oil per capita.

E_TRT_P - Is the total number of environmental treaties a country has ratified.

EXEG - A variable measuring if a country is a net energy exporter.

(Yes, a net energy exporter is the comparison category)

EXEGDUM2 - No, not a net energy exporter.

IMEG - A variable measuring if a country is a net energy importer.

(Yes, a net energy importer is the comparison category)

IMEGDUM2 - No, not a net energy importer.

EXCM - A variable measuring the type of exports for countries.

(Raw materials primary exports is the comparison category)

EXCMDUM2 - Manufactured products primary exports.

EXCMDUM3 - Mixed raw materials and manufactured products primary exports.

IMCM - A variable measuring the type of imports for countries

(No cases for raw material primary imports)

(Manufactured products primary imports is the comparison category)

IMCMDUM3 - Mixed raw materials and manufactured products primary imports.

End of Table 55

TABLE 56: Origination Country Characteristics and Waste Sending (Export) Amounts -
Multivariate regression results for Country Case Origination Variables with Origination
Amounts (ORGMNTT) as the Dependent Variable.

Independent Variables	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	65437.493	601579.835		0.109	0.914
DEVLEV	-47662.875	72505.311	-0.179	-0.657	0.514
GINI	174.114	4391.140	0.006	0.040	0.969
EXCONC	667.607	229178.460	0.000	0.003	0.998
EXDEBT	-371.901	2540.715	-0.021	-0.146	0.884
UNEMP	-4875.271	5822.883	-0.151	-0.837	0.407
PCSERGDP	4903.652	5236.474	0.183	0.936	0.354
EXP_B	1298.398	403.419	0.688	3.218	0.002
LIFE	-2727.005	7270.018	-0.079	-0.375	0.709
ENGYPC	0.335	30.633	0.003	0.011	0.991
ECOFTPPC	-5501.292	27469.611	-0.043	-0.200	0.842
ECOFTP	0.000	0.000	-0.195	-0.952	0.346
E_TRT_P	9227.418	8856.034	0.176	1.042	0.303
EXEGDUM2	85269.466	93897.222	0.117	0.908	0.369
IMEGDUM1	-183914.164	72407.320	-0.299	-2.540	0.015
EXCMDUM2	14445.902	93383.182	0.026	0.155	0.878
EXCMDUM3	-61959.838	143464.309	-0.063	-0.432	0.668
IMCMDUM3	-12928.569	79725.568	-0.021	-0.162	0.872

Adjusted R² = 0.405 .

DEVLEV - is a variable measuring economic development level in GDP & PPP per capita for year 2000.

GINI - Measure of internal income distribution of countries.

ECOMC - An index for measuring the degree a country's exports are concentrated in number.

EXTDEBT - Is a measure of a country's external debt given as a percentage of GDP.

UNEMP - Is a measure of a country's unemployment as a percentage of their total workforce employment.

PCSERGDP - Is a measure of service economic activity as a percentage of a country's GDP.

EXP_B - Is a measure of the value of a country's exports in billions of U.S. Dollars.

LIFE - (expectancy at birth) is the median number of years lived by people born in a cohort.

ENGYPC - Is a country's energy consumption in kilograms of oil per capita.

ECOFTPPC - Is a country's environmental consumption impact given in global hectares per capita.

ECOFTP - Measures a country's environmental consumption impact in total global hectares.

E_TRT_P - Is the total number of environmental treaties a country has ratified.

EXEG - A variable measuring if a country is a net energy exporter.

(Yes, a net energy exporter is the comparison category)

EXEGDUM2 - No, not a net energy exporter.

IMEG - A variable measuring if a country is a net energy importer.

(Yes, a net energy importer is the comparison category)

IMEGDUM2 - No, not a net energy importer.

EXCM - A variable measuring the type of exports for countries.

(Raw materials primary exports is the comparison category)

EXCMDUM2 - Manufactured products primary exports.

EXCMDUM3 - Mixed raw materials and manufactured products primary exports.

IMCM - A variable measuring the type of imports for countries

(No cases for raw material primary imports)

(Manufactured products primary imports is the comparison category)

IMCMDUM3 - Mixed raw materials and manufactured products primary imports.

End of Table 56.

TABLE 57 (Part a): Waste Source Characteristics, Destination Country Characteristics and Development Level Movement - Multivariate regression results for Shipment Frequency Destination Variables for Y coded and Other Independent Variables, with Development Level Movement (ECONSCL) as the Dependent Variable.

Independent Variables	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	-4.285	1.910		-2.244	0.025
SHPAMT	0.000	0.000	0.012	1.386	0.166
HAZYCAT1	-0.064	0.084	-0.007	-0.759	0.448
HAZYCAT3	-0.036	0.036	-0.011	-1.006	0.314
HAZYCAT4	-0.399	0.096	-0.035	-4.149	0.000
HAZYCAT5	-0.002	0.062	0.000	-0.036	0.971
HAZYCAT6	-0.034	0.048	-0.007	-0.707	0.480
PROXDUM2	0.636	0.043	0.166	14.767	0.000
PROXDUM3	1.369	0.069	0.198	19.748	0.000
DSRCDUM2	-0.045	0.033	-0.014	-1.343	0.179
DSRCDUM3	0.912	0.154	0.055	5.920	0.000
DSRCDUM4	1.134	0.191	0.053	5.950	0.000
TRANDUM2	-0.176	0.065	-0.028	-2.711	0.007
TRANDUM3	1.737	0.086	0.184	20.178	0.000
DEVLEV	0.681	0.149	0.098	4.560	0.000
EXCONC	4.838	0.531	0.132	9.118	0.000
EXTDEBT	-0.016	0.005	-0.074	-3.063	0.002
UNEMP	-0.064	0.015	-0.107	-4.411	0.000
MIL_EXPS	-0.330	0.069	-0.137	-4.784	0.000
MIL_IM	0.000	0.000	-0.067	-2.816	0.005
PCSERGDP	0.009	0.014	0.027	0.658	0.511
EXP_B	0.000	0.000	0.020	0.341	0.733
URB_L	-0.011	0.005	-0.080	-2.203	0.028
POP	0.000	0.000	0.169	1.689	0.091
LIFE	0.002	0.023	0.002	0.081	0.935
NURBPD	0.008	0.002	0.112	3.694	0.000
ENGYPC	0.000	0.000	0.132	2.375	0.018
ECOFTP	0.000	0.000	0.333	2.932	0.003
E_TRT_P	-0.055	0.019	-0.074	-2.972	0.003
ENV_ISS	-0.096	0.069	-0.071	-1.402	0.161
EXTPDUM2	-0.308	0.082	-0.090	-3.752	0.000
IMTPDUM2	0.811	0.080	0.243	10.143	0.000
EXEGDUM2	2.307	0.208	0.685	11.094	0.000
IMEGDUM2	0.162	0.094	0.045	1.730	0.084
EXCMDUM2	-0.482	0.107	-0.089	-4.504	0.000
EXCMDUM3	-0.920	0.460	-0.027	-2.001	0.045
IMCMDUM3	-0.554	0.136	-0.106	-4.066	0.000

Adjusted R² for Model 2 = 0.735

Variable definitions (in order of appearance):

SHPAMT- Size of shipment in metric tones.

Table 57 and variable definitions continue on next page.

TABLE 57 (Part b): Waste Source Characteristics, Destination Country Characteristics and Development Level Movement - Multivariate regression results for Shipment Frequency Destination Variables for Y coded and Other Independent Variables, with Development Level Movement (ECONSCL) as the Dependent Variable (continued).

HAZY - Category variable for source description or Y type waste.

(Y1 to Y18 Waste streams is the comparison category)

HAZYCAT1 - Article 1 1(b) - Not Basel regulated, but domestically regulated waste.

HAZYCAT3 - Y19 to Y45 Waste having as constituents.

HAZYCAT4 - Y46 to Y47 Special consideration waste.

HAZYCAT5 - Mixed Categories.

HAZYCAT6 - Y codes not reported, or Unknown.

PROX - Category variable for proximity of shipment sending and receiving countries.

(Origination and destination countries are adjacent to each other is the comparison category)

PROXDUM2 - Origination and destination countries are not adjacent, but are in-region with each other.

PROXDUM3 - Origination and destination countries are out-of-region to each other.

DSRC - Category variable for deposal versus recycling of waste.

(Disposed waste is the comparison category)

DSRCDUM2 - Recycled waste.

DSRCDUM3 - Mixed disposed & recycled waste.

DSRCDUM4 - Disposal or Recycled Unknown.

TRAN - Category variable for number of countries shipment crossed in transit.

(Shipment traveled direct from one country to another is the comparison category)

TRANDUM2 - Shipment crossed one country in transit.

TRANDUM3 - Shipment crossed two, or more countries in transit.

DEVELEV - is a variable measuring economic development level in GDP & PPP per capita for year 2000.

ECOMC - An index for measuring the degree a country's exports are concentrated in number.

EXTDEBT - Is a measure of a country's external debt given as a percentage of GDP.

UNEMP - Is a measure of a country's unemployment as a percentage of their total workforce employment.

MIL_EXPS - Is a measure of a country's military expenditures as a percentage of their country's GDP.

MIL_IM - Is a measure of Military Imports as valued in millions of US dollars.

PCSERGDP - Is a measure of service economic activity as a percentage of a country's GDP.

EXP_B - Is a measure of the value of a country's exports in billions of U.S. Dollars.

URB_L - Is land use for urban or city use, taken as a percent of total land area.

POP - Is a country's total population as taken from the CIA's *The World Factbook 2001*.

LIFE - (expectancy at birth) is the median number of years lived by people born in a cohort.

NURBD - Is the average number of people per square kilometer living in a country's non-urban areas.

ENGYPG - Is a country's energy consumption in kilograms of oil per capita.

ECOFTP - Measures a country's environmental consumption impact in total global hectares.

E_TRT_P - Is the total number of environmental treaties a country has ratified.

EV_ISS - Is the total number of a country's environmental issues as listed in the CIA's *The World Factbook 2001*.

EXTP - A variable measuring if the other country in the waste exchange is an ordinary export-trading partner.

(Yes, export trading partners is the comparison category)

EXTPDUM2 - No, not export trading partners.

IMTP - A variable measuring if the other country in the waste exchange is an ordinary import-trading partner.

(Yes, import trading partners is the comparison category)

IMTPDUM2 - No, not import trading partners.

Table 57 and variable definitions continue on next page.

TABLE 57 (Part c): Waste Source Characteristics, Destination Country Characteristics and Development Level Movement - Multivariate regression results for Shipment Frequency Destination Variables for Y coded and Other Independent Variables, with Development Level Movement (ECONSCL) as the Dependent Variable (continued).

EXEG - A variable measuring if a country is a net energy exporter.

(Yes, a net energy exporter is the comparison category)

EXEGDUM2 - No, not a net energy exporter.

IMEG - A variable measuring if a country is a net energy importer.

(Yes, a net energy importer is the comparison category)

IMEGDUM2 - No, not a net energy importer.

EXCM - A variable measuring the type of exports for countries.

(Raw materials primary exports is the comparison category)

EXCMDUM2 - Manufactured products primary exports.

EXCMDUM3 - Mixed raw materials and manufactured products primary exports.

IMCM - A variable measuring the type of imports for countries

(No cases for raw material primary imports)

(Manufactured products primary imports is the comparison category)

IMCMDUM3 - Mixed raw materials and manufactured products primary imports.

End of Table 57.

TABLE 58 (Part a): Waste Chemical/Industrial Characteristics, Destination Country Characteristics and Development Level Movement - Multivariate regression results for Shipment Frequency Destination Variables for H coded and Other Independent Variables, with Development Level Movement (ECONSCL) as the Dependent Variable.

Independent Variables	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	-4.135	1.930		-2.142	0.032
SHPAMT	0.000	0.000	0.009	1.105	0.269
HAZHDUM1	-0.674	0.341	-0.016	-1.976	0.048
HAZHDUM3	-0.035	0.069	-0.005	-0.506	0.613
HAZHDUM4	-0.108	0.124	-0.008	-0.871	0.384
HAZHDUM5	-0.182	0.058	-0.038	-3.148	0.002
HAZHDUM6	-0.072	0.061	-0.013	-1.172	0.241
HAZHDUM7	-0.134	0.054	-0.033	-2.481	0.013
HAZHDUM8	0.060	0.134	0.004	0.447	0.655
HAZHDUM9	-0.096	0.057	-0.022	-1.688	0.091
HAZHDUM10	-0.138	0.064	-0.037	-2.143	0.032
PROXDUM2	0.664	0.044	0.173	15.196	0.000
PROXDUM3	1.409	0.070	0.204	20.165	0.000
DSRCDUM2	-0.059	0.033	-0.018	-1.767	0.077
DSRCDUM3	0.900	0.154	0.054	5.833	0.000
DSRCDUM4	1.137	0.191	0.054	5.953	0.000
TRANDUM2	-0.184	0.066	-0.029	-2.809	0.005
TRANDUM3	1.740	0.087	0.185	20.104	0.000
DEVLEV	0.686	0.150	0.098	4.570	0.000
EXCONC	4.775	0.529	0.130	9.022	0.000
EXTDEBT	-0.017	0.005	-0.082	-3.367	0.001
UNEMP	-0.063	0.015	-0.104	-4.285	0.000
MIL_EXPS	-0.328	0.069	-0.136	-4.727	0.000
MIL_IM	0.000	0.000	-0.065	-2.660	0.008
PCSERGDP	0.010	0.014	0.029	0.685	0.494
EXP_B	0.000	0.000	0.001	0.019	0.985
URB_L	-0.010	0.005	-0.071	-1.935	0.053
POP	0.000	0.000	0.171	1.693	0.091
LIFE	0.000	0.023	0.000	-0.012	0.991
NURBPD	0.008	0.002	0.114	3.705	0.000
ENGYPG	0.000	0.000	0.140	2.446	0.014
ECOFTP	0.000	0.000	0.344	2.973	0.003
E_TRT_P	-0.054	0.019	-0.072	-2.886	0.004
ENV_ISS	-0.087	0.069	-0.065	-1.260	0.208
EXTPDUM2	-0.338	0.082	-0.099	-4.114	0.000
IMTPDUM2	0.831	0.080	0.249	10.408	0.000
EXEGDUM2	2.297	0.209	0.682	10.967	0.000
IMEGDUM2	0.168	0.094	0.047	1.792	0.073
EXCMDUM2	-0.520	0.110	-0.097	-4.729	0.000
EXCMDUM3	-0.941	0.460	-0.028	-2.044	0.041
IMCMDUM3	-0.566	0.137	-0.108	-4.140	0.000

Adjusted R² = 0.735

Table 58 and variable definitions continue on next page.

TABLE 58 (Part b): Waste Chemical/Industrial Characteristics, Destination Country Characteristics and Development Level Movement - Multivariate regression results for Shipment Frequency Destination Variables for H coded and Other Independent Variables, with Development Level Movement (ECONSL) as the Dependent Variable (continued).

Variable definitions (in order of appearance):

SHPAMT - Size of shipment in metric tones.

HAZH - Category variable for innate and descriptive characteristics of waste.

(Flammable liquids is the comparison category)

HAZHDUM1 - Explosive substance.

HAZHDUM3 - Flammable solids.

HAZHDUM4 - Oxidizing Subst.s or organic peroxides.

HAZHDUM5 - Poisonous or infectious substances.

HAZHDUM6 - Corrosive substances.

HAZHDUM7 - Toxic gases, toxic subst.s or ecotoxic substances.

HAZHDUM8 - Mixed substances.

HAZHDUM9 - Mixed shipments.

HAZHDUM10 - Unknown UN codes or Unknown H codes.

PROX - Category variable for proximity of shipment sending and receiving countries.

(Origination and destination countries are adjacent to each other is the comparison category)

PROXDUM2 - Origination and destination countries are not adjacent, but are in-region with each other.

PROXDUM3 - Origination and destination countries are out-of-region to each other.

DSRC - Category variable for disposal versus recycling of waste.

(Disposed waste is the comparison category)

DSRCDUM2 - Recycled waste.

DSRCDUM3 - Mixed disposed & recycled waste.

DSRCDUM4 - Disposal or Recycled Unknown.

TRAN - Category variable for number of countries shipment crossed in transit.

(Shipment traveled direct from one country to another is the comparison category)

TRANDUM2 - Shipment crossed one country in transit.

TRANDUM3 - Shipment crossed two, or more countries in transit.

DEVELEV - is a variable measuring economic development level in GDP & PPP per capita for year 2000.

ECOMC - An index for measuring the degree a country's exports are concentrated in number.

EXTDEBT - Is a measure of a country's external debt given as a percentage of GDP.

UNEMP - Is a measure of a country's unemployment as a percentage of their total workforce employment.

MIL_EXPS - Is a measure of a country's military expenditures as a percentage of their country's GDP.

MIL_IM - Is a measure of Military Imports as valued in millions of US dollars.

PCSERGDP - Is a measure of service economic activity as a percentage of a country's GDP.

EXP_B - Is a measure of the value of a country's exports in billions of U.S. Dollars.

URB_L - Is land use for urban or city use, taken as a percent of total land area.

POP - Is a country's total population as taken from the CIA's *The World Factbook 2001*.

LIFE - (expectancy at birth) is the median number of years lived by people born in a cohort.

NURBD - Is the average number of people per square kilometer living in a country's non-urban areas.

ENGYPC - Is a country's energy consumption in kilograms of oil per capita.

ECONFT - Measures a country's environmental consumption impact in total global hectares.

E_TRT_P - Is the total number of environmental treaties a country has ratified.

EV_ISS - Is the total number of a country's environmental issues as listed in the CIA's *The World Factbook 2001*.

EXTP - A variable measuring if the other country in the waste exchange is an ordinary export-trading partner.

(Yes, export trading partners is the comparison category)

EXTPDUM2 - No, not export trading partners.

Table 58 and variable definitions continue on next page.

TABLE 58 (Part c): Waste Chemical/Industrial Characteristics, Destination Country Characteristics and Development Level Movement - Multivariate regression results for Shipment Frequency Destination Variables for H coded and Other Independent Variables, with Development Level Movement (ECONSCL) as the Dependent Variable (continued).

IMTP - A variable measuring if the other country in the waste exchange is an ordinary import-trading partner.

(Yes, import trading partners is the comparison category)

IMTPDUM2 - No, not import trading partners.

EXEG - A variable measuring if a country is a net energy exporter.

(Yes, a net energy exporter is the comparison category)

EXEGDUM2 - No, not a net energy exporter.

IMEG - A variable measuring if a country is a net energy importer.

(Yes, a net energy importer is the comparison category)

IMEGDUM2 - No, not a net energy importer.

EXCM - A variable measuring the type of exports for countries.

(Raw materials primary exports is the comparison category)

EXCMDUM2 - Manufactured products primary exports.

EXCMDUM3 - Mixed raw materials and manufactured products primary exports.

IMCM - A variable measuring the type of imports for countries

(No cases for raw material primary imports)

(Manufactured products primary imports is the comparison category)

IMCMDUM3 - Mixed raw materials and manufactured products primary imports.

End of Table 58.

TABLE 59 (Part a): Waste Source Characteristics, Origination Country Characteristics and Development Level Movement - Multivariate regression results for Shipment Frequency Origination Variables for Y coded and Other Independent Variables, with Development Level Movement (ECONSCL) as the Dependent Variable.

Independent Variables	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	7.198	0.626		11.503	0.000
HAZYCAT1	0.002	0.048	0.000	0.047	0.963
HAZYCAT3	-0.059	0.023	-0.020	-2.509	0.012
HAZYCAT4	-0.319	0.063	-0.030	-5.075	0.000
HAZYCAT5	0.014	0.040	0.002	0.353	0.724
HAZYCAT6	-0.071	0.031	-0.016	-2.272	0.023
PROXDUM2	0.235	0.030	0.065	7.859	0.000
PROXDUM3	0.690	0.060	0.092	11.545	0.000
DSRCDUM2	-0.144	0.022	-0.049	-6.605	0.000
DSRCDUM3	-1.449	0.177	-0.053	-8.165	0.000
DSRCDUM4	-0.731	0.126	-0.034	-5.809	0.000
TRANDUM2	-0.132	0.040	-0.022	-3.290	0.001
TRANDUM3	-0.126	0.081	-0.009	-1.559	0.119
DEVLEV	-0.734	0.053	-0.169	-13.947	0.000
GINI	-0.017	0.004	-0.066	-4.664	0.000
EXCONC	-2.775	0.197	-0.137	-14.121	0.000
EXTDEBT	0.015	0.002	0.073	7.216	0.000
UNEMP	0.075	0.005	0.180	15.381	0.000
MIL_EXPS	0.016	0.017	0.011	0.938	0.348
PCSERGDP	-0.066	0.004	-0.357	-18.381	0.000
EXP_B	0.000	0.000	-0.056	-2.672	0.008
URB_L	0.002	0.003	0.015	0.818	0.413
POPDS	0.000	0.000	-0.013	-1.096	0.273
LIFE	0.019	0.008	0.035	2.547	0.011
NURBPD	0.003	0.001	0.059	3.456	0.001
ENGYPC	0.000	0.000	-0.033	-1.430	0.153
E_TRT_P	0.030	0.007	0.067	4.154	0.000
ENV_ISS	0.050	0.016	0.038	3.164	0.002
EXTPDUM2	-0.125	0.059	-0.030	-2.107	0.035
IMTPDUM2	-0.166	0.059	-0.040	-2.818	0.005
EXEGDUM2	-1.890	0.070	-0.389	-27.044	0.000
IMEGDUM2	-0.457	0.040	-0.130	-11.462	0.000
EXCMDUM2	0.298	0.051	0.045	5.834	0.000
EXCMDUM3	1.429	0.181	0.075	7.916	0.000
IMCMDUM3	-0.847	0.046	-0.285	-18.215	0.000

Adjusted R² = 0.874

Table 59 and variable definitions continue on next page.

TABLE 59 (Part b): Waste Source Characteristics, Origination Country Characteristics and Development Level Movement - Multivariate regression results for Shipment Frequency Origination Variables for Y coded and Other Independent Variables, with Development Level Movement (ECONSCL) as the Dependent Variable (continued).

Variable definitions (in order of appearance):

HAZY - Category variable for source description or Y type waste.

(Y1 to Y18 Waste streams is the comparison category)

HAZYCAT1 - Article 1 1(b) - Not Basel regulated, but domestically regulated waste.

HAZYCAT3 - Y19 to Y45 Waste having as constituents.

HAZYCAT4 - Y46 to Y47 Special consideration waste.

HAZYCAT5 - Mixed Categories.

HAZYCAT6 - Y codes not reported, or Unknown.

PROX - Category variable for proximity of shipment sending and receiving countries.

(Origination and destination countries are adjacent to each other is the comparison category)

PROXDUM2 - Origination and destination countries are not adjacent, but are in-region with each other.

PROXDUM3 - Origination and destination countries are out-of-region to each other.

DSRC - Category variable for deposal versus recycling of waste.

(Disposed waste is the comparison category)

DSRCDUM2 - Recycled waste.

DSRCDUM3 - Mixed disposed & recycled waste.

DSRCDUM4 - Disposal or Recycled Unknown.

TRAN - Category variable for number of countries shipment crossed in transit.

(Shipment traveled direct from one country to another is the comparison category)

TRANDUM2 - Shipment crossed one country in transit.

TRANDUM3 - Shipment crossed two, or more countries in transit.

DEVELEV - is a variable measuring economic development level in GDP & PPP per capita for year 2000.

GINI - Measure of internal income distribution of countries.

ECOMC - An index for measuring the degree a country's exports are concentrated in number.

EXTDEBT - Is a measure of a country's external debt given as a percentage of GDP.

UNEMP - Is a measure of a country's unemployment as a percentage of their total workforce employment.

MIL_EXPS - Is a measure of a country's military expenditures as a percentage of their country's GDP.

PCSERGDP - Is a measure of service economic activity as a percentage of a country's GDP.

EXP_B - Is a measure of the value of a country's exports in billions of U.S. Dollars.

URB_L - Is land use for urban or city use, taken as a percent of total land area.

POPDS - Is the average number of people living per square kilometer in a country.

LIFE - (expectancy at birth) is the median number of years lived by people born in a cohort.

NURBD - Is the average number of people per square kilometer living in a country's non-urban areas.

ENGYPC - Is a country's energy consumption in kilograms of oil per capita.

E_TRT_P - Is the total number of environmental treaties a country has ratified.

EV_ISS - Is the total number of a country's environmental issues as listed in the CIA's *The World Factbook 2001*.

EXTP - A variable measuring if the other country in the waste exchange is an ordinary export-trading partner.

(Yes, export trading partners is the comparison category)

EXTPDUM2 - No, not export trading partners.

IMTP - A variable measuring if the other country in the waste exchange is an ordinary import-trading partner.

(Yes, import trading partners is the comparison category)

IMTPDUM2 - No, not import trading partners.

Table 59 and variable definitions continue on next page.

TABLE 59 (Part c): Waste Source Characteristics, Origination Country Characteristics and Development Level Movement - Multivariate regression results for Shipment Frequency Origination Variables for Y coded and Other Independent Variables, with Development Level Movement (ECONSCL) as the Dependent Variable (continued).

EXEG - A variable measuring if a country is a net energy exporter.

(Yes, a net energy exporter is the comparison category)

EXEGDUM2 - No, not a net energy exporter.

IMEG - A variable measuring if a country is a net energy importer.

(Yes, a net energy importer is the comparison category)

IMEGDUM2 - No, not a net energy importer.

EXCM - A variable measuring the type of exports for countries.

(Raw materials primary exports is the comparison category)

EXCMDUM2 - Manufactured products primary exports.

EXCMDUM3 - Mixed raw materials and manufactured products primary exports.

IMCM - A variable measuring the type of imports for countries

(No cases for raw material primary imports)

(Manufactured products primary imports is the comparison category)

IMCMDUM3 - Mixed raw materials and manufactured products primary imports.

End of Table 59.

TABLE 60 (Part a): Waste Chemical/Industrial Characteristics, Origination Country Characteristics and Development Level Movement - Multivariate regression results for Shipment Frequency Origination Variables for H coded and Other Independent Variables, with Development Level Movement (ECONSCL) as the Dependent Variable.

Independent Variables	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	\$7.129	0.630		11.323	0.000
HAZHDUM1	-\$0.392	0.237	-0.010	-1.657	0.098
HAZHDUM3	-\$0.041	0.045	-0.007	-0.908	0.364
HAZHDUM4	-\$0.042	0.080	-0.003	-0.520	0.603
HAZHDUM5	-\$0.126	0.038	-0.029	-3.361	0.001
HAZHDUM6	\$0.003	0.040	0.001	0.076	0.939
HAZHDUM7	-\$0.104	0.035	-0.028	-2.959	0.003
HAZHDUM8	-\$0.121	0.083	-0.009	-1.455	0.146
HAZHDUM9	-\$0.089	0.037	-0.022	-2.400	0.016
HAZHDUM10	-\$0.083	0.036	-0.024	-2.297	0.022
PROXDUM2	\$0.242	0.030	0.067	7.949	0.000
PROXDUM3	\$0.700	0.061	0.093	11.548	0.000
DSRCDUM2	-\$0.151	0.022	-0.051	-6.930	0.000
DSRCDUM3	-\$1.449	0.178	-0.053	-8.160	0.000
DSRCDUM4	-\$0.755	0.126	-0.035	-5.996	0.000
TRANDUM2	-\$0.139	0.042	-0.023	-3.318	0.001
TRANDUM3	-\$0.109	0.082	-0.008	-1.319	0.187
DEVLEV	-\$0.730	0.053	-0.168	-13.800	0.000
GINI	-\$0.016	0.004	-0.061	-4.314	0.000
EXCONC	-\$2.755	0.199	-0.136	-13.838	0.000
EXTDEBT	\$0.014	0.002	0.073	7.122	0.000
UNEMP	\$0.075	0.005	0.180	15.327	0.000
MIL_EXPS	\$0.015	0.017	0.011	0.924	0.356
PCSERGDP	-\$0.068	0.004	-0.369	-19.063	0.000
EXP_B	\$0.000	0.000	-0.051	-2.449	0.014
URB_L	\$0.004	0.003	0.026	1.395	0.163
POPDS	\$0.000	0.000	-0.018	-1.554	0.120
LIFE	\$0.022	0.008	0.039	2.825	0.005
NURBPD	\$0.003	0.001	0.055	3.203	0.001
ENGYPC	\$0.000	0.000	-0.034	-1.492	0.136
E_TRT_P	\$0.029	0.007	0.064	3.947	0.000
ENV_ISS	\$0.057	0.016	0.043	3.612	0.000
EXTPDUM2	-\$0.113	0.059	-0.027	-1.899	0.058
IMTPDUM2	-\$0.170	0.059	-0.041	-2.882	0.004
EXEGDUM2	-\$1.871	0.070	-0.385	-26.871	0.000
IMEGDUM2	-\$0.465	0.040	-0.132	-11.645	0.000
EXCMDUM2	\$0.292	0.051	0.044	5.706	0.000
EXCMDUM3	\$1.434	0.181	0.075	7.928	0.000
IMCMDUM3	-\$0.858	0.046	-0.289	-18.481	0.000

Adjusted R² = 0.874

Table 60 and variable definitions continue on next page.

TABLE 60 (Part b): Waste Chemical/Industrial Characteristics, Origination Country Characteristics and Development Level Movement - Multivariate regression results for Shipment Frequency Origination Variables for H coded and Other Independent Variables, with Development Level Movement (ECONSCL) as the Dependent Variable (continued).

Variable definitions (in order of appearance):

HAZH - Category variable for innate and descriptive characteristics of waste.

(Flammable liquids is the comparison category)

HAZHDUM1 - Explosive substance.

HAZHDUM3 - Flammable solids.

HAZHDUM4 - Oxidizing Subst.s or organic peroxides.

HAZHDUM5 - Poisonous or infectious substances.

HAZHDUM6 - Corrosive substances.

HAZHDUM7 - Toxic gases, toxic subst.s or ecotoxic substances.

HAZHDUM8 - Mixed substances.

HAZHDUM9 - Mixed shipments.

HAZHDUM10 - Unknown UN codes or Unknown H codes.

PROX - Category variable for proximity of shipment sending and receiving countries.

(Origination and destination countries are adjacent to each other is the comparison category)

PROXDUM2 - Origination and destination countries are not adjacent, but are in-region with each other.

PROXDUM3 - Origination and destination countries are out-of-region to each other.

DSRC - Category variable for disposal versus recycling of waste.

(Disposed waste is the comparison category)

DSRCDUM2 - Recycled waste.

DSRCDUM3 - Mixed disposed & recycled waste.

DSRCDUM4 - Disposal or Recycled Unknown.

TRAN - Category variable for number of countries shipment crossed in transit.

(Shipment traveled direct from one country to another is the comparison category)

TRANDUM2 - Shipment crossed one country in transit.

TRANDUM3 - Shipment crossed two, or more countries in transit.

DEVELEV - is a variable measuring economic development level in GDP & PPP per capita for year 2000.

GINI - Measure of internal income distribution of countries.

ECOMC - An index for measuring the degree a country's exports are concentrated in number.

EXTDEBT - Is a measure of a country's external debt given as a percentage of GDP.

UNEMP - Is a measure of a country's unemployment as a percentage of their total workforce employment.

MIL_EXPS - Is a measure of a country's military expenditures as a percentage of their country's GDP.

PCSERGDP - Is a measure of service economic activity as a percentage of a country's GDP.

EXP_B - Is a measure of the value of a country's exports in billions of U.S. Dollars.

URB_L - Is land use for urban or city use, taken as a percent of total land area.

POPDS - Is the average number of people living per square kilometer in a country.

LIFE - (expectancy at birth) is the median number of years lived by people born in a cohort.

NURBD - Is the average number of people per square kilometer living in a country's non-urban areas.

ENGYPC - Is a country's energy consumption in kilograms of oil per capita.

E_TRT_P - Is the total number of environmental treaties a country has ratified.

EV_ISS - Is the total number of a country's environmental issues as listed in the CIA's *The World Factbook* 2001.

EXTP - A variable measuring if the other country in the waste exchange is an ordinary export-trading partner.

(Yes, export trading partners is the comparison category)

EXTPDUM2 - No, not export trading partners.

Table 60 and variable definitions continue on next page.

TABLE 60 (Part c): Waste Chemical/Industrial Characteristics, Origination Country Characteristics and Development Level Movement - Multivariate regression results for Shipment Frequency Origination Variables for H coded and Other Independent Variables, with Development Level Movement (ECONSCL) as the Dependent Variable (continued).

IMTP - A variable measuring if the other country in the waste exchange is an ordinary import-trading partner.

(Yes, import trading partners is the comparison category)

IMTPDUM2 - No, not import trading partners.

EXEG - A variable measuring if a country is a net energy exporter.

(Yes, a net energy exporter is the comparison category)

EXEGDUM2 - No, not a net energy exporter.

IMEG - A variable measuring if a country is a net energy importer.

(Yes, a net energy importer is the comparison category)

IMEGDUM2 - No, not a net energy importer.

EXCM - A variable measuring the type of exports for countries.

(Raw materials primary exports is the comparison category)

EXCMDUM2 - Manufactured products primary exports.

EXCMDUM3 - Mixed raw materials and manufactured products primary exports.

IMCM - A variable measuring the type of imports for countries

(No cases for raw material primary imports)

(Manufactured products primary imports is the comparison category)

IMCMDUM3 - Mixed raw materials and manufactured products primary imports.

End of Table 60.

APPENDIX B

BASEL CONVENTION DEFINITIONS GERMANE TO THIS STUDY

Basel Convention Definitions and Codes (From Articles, Annexes and Sections of the Basel Convention)

Waste – Substances or objects, which are disposed of, or intended to be disposed of, are required to be disposed of by the provisions of national law.

Transboundary Movement – Any movement of hazardous wastes or other wastes from an area under the national jurisdiction of one state to or through an area under the national jurisdiction of another state or to or through an area not under the national jurisdiction of any state, provided at least two states are involved in the movement.

State of Export – A Party from which a transboundary movement of hazardous wastes or other wastes is planned to be initiated or is initiated.

State of Import – A Party to which a transboundary movement of hazardous wastes or other wastes is planned or takes place for the purpose of disposal therein or for the purpose of loading prior to disposal in an area not under the national jurisdiction of any State.

State of transit – Any State, other than the State of export or import, through which a movement of hazardous wastes or other wastes is planned or takes place.

Illegal traffic – Any transboundary movement of hazardous wastes or other waste as specified in Article 9 (transboundary waste movement not according to convention terms).

Article 1 1(b) – Waste that are not covered under paragraph (a) but are defined as, or are considered to be, hazardous waste by the domestic legislation of the Party of export, import or transit. **I code this origin category of waste as 1.**

BASEL CONVENTION CATEGORIES OF WASTES TO BE CONTROLLED - ANNEX I (Y-Codes)

Waste Streams (Y1 – Y18) - I code this origin category of waste as 2.

- Y1** Clinical wastes from medical care in hospitals, medical centers and clinics
- Y2** Wastes from the production and preparation of pharmaceutical products
- Y3** Waste pharmaceuticals, drugs and medicines
- Y4** Wastes from the production, formulation and use of biocides and phytopharmaceuticals
- Y5** Wastes from the manufacture, formulation and use of wood preserving chemicals

- Y6** Wastes from the production, formulation and use of organic solvents
- Y7** Wastes from heat treatment and tempering operations containing cyanides
- Y8** Waste mineral oils unfit for their originally intended use
- Y9** Waste oils/water, hydrocarbons/water mixtures, emulsions
- Y10** Waste substances and articles containing or contaminated with polychlorinated biphenyls (PCBs) and/or polychlorinated terphenyls (PCTs) and/or polychlorinated biphenyls (PBBs)
- Y11** Waste tarry residues arising from refining, distillation and any pyrolytic treatment
- Y12** Wastes from production, formulation and use of inks, dyes, pigments, paints, lacquers, varnish
- Y13** Wastes from production, formulation and use of resins, latex, plasticizers, glues/adhesives
- Y14** Waste chemical substances arising from research and development or teaching activities which are not identified and/or are new and whose effects on man and/or the environment are not known
- Y15** Wastes of an explosive nature not subject to other legislation
- Y16** Wastes from production, formulation and use of photographic chemicals and processing materials
- Y17** Wastes resulting from surface treatment of metals and plastics
- Y18** Residues arising from industrial waste disposal operations

Wastes having as constituents (Y19 – Y45): - I code this origin category of waste as 3.

- Y19** Metal carbonyls
- Y20** Beryllium; beryllium compounds
- Y21** Hexavalent chromium compounds
- Y22** Copper compounds
- Y23** Zinc compounds
- Y24** Arsenic; arsenic compounds
- Y25** Selenium; selenium compounds
- Y26** Cadmium; cadmium compounds
- Y27** Antimony; antimony compounds
- Y28** Tellurium; tellurium compounds
- Y29** Mercury; mercury compounds
- Y30** Thallium; thallium compounds
- Y31** Lead; lead compounds
- Y32** Inorganic fluorine compounds excluding calcium fluoride
- Y33** Inorganic cyanides
- Y34** Acidic solutions or acids in solid form
- Y35** Basic solutions or bases in solid form
- Y36** Asbestos (dust and fibres)
- Y37** Organic phosphorus compounds
- Y38** Organic cyanides
- Y39** Phenols; phenol compound including chlorophenols
- Y40** Ethers

- Y41** Halogenated organic solvents
- Y42** Organic solvents excluding halogenated solvents
- Y43** Any congener of polychlorinated dibenzo-furan
- Y44** Any congener of polychlorinated dibenzo-p-dioxin
- Y45** Organohalogen compounds other than substances referred to in this Annex (e.g. Y39, Y41, Y42, Y43, Y44)

BASEL CONVENTION CATEGORIES OF WASTES REQUIRING SPECIAL CONSIDERATION, ANNEX II (Y46 – Y47) -

I code this origin category of waste as 4.

- Y46** Wastes collected from households
- Y47** Residues arising from the incineration of household wastes

In summary of my Y-category coding:

Art 1(1) b coded waste is coded 1,
 Y waste category I (Y1_ Y18) is coded 2,
 Y waste category II (Y19 - Y45) is coded 3,
 Y waste category III (Y46 - Y47) is coded 4,
 Mixed Y categories is coded 88, and
 No Y-codes or no Art 1(1) b codes reported is coded 99.
 This waste hazard variable is labeled HAZY.

BASEL CONVENTION LIST OF HAZARDOUS CHARACTERISTICS - ANNEX III (UN Class and H-codes)

UN Class 1 Code H1 – I code this category 1.

Characteristics - Explosive An explosive substance or waste is a solid or liquid substance or waste (or mixture of substances or wastes) which is in itself capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings.

UN Class 3 Code H3 - I coded this category 3.

Characteristics - Flammable liquids with the word "flammable" have the same meaning as "inflammable". Flammable liquids are liquids, or mixtures of liquids, or liquids containing solids in solution or suspension (for example, paints, varnishes, lacquers, etc., but not including substances or wastes otherwise classified on account of their dangerous characteristics) which give off a flammable vapour at temperatures of not more than 60.5 deg. C, closedcup test, or not more than 65.6 deg C, opencup test. (Since the results of opencup tests and of closedcup tests are not strictly comparable and even individual results by the same test are often variable, regulations varying from the above figures to make allowance for such differences would be within the spirit of this definition.) UN

Class 4.1 Code H4.1 - I coded this category 4.

Characteristics - Flammable solids, or waste solids, other than those classed as explosives, which under conditions encountered in transport are readily combustible, or

may cause or contribute to fire through friction.

UN Class 4.2 Code H4.2 - I coded this category 4.

Characteristics - Substances or wastes liable to spontaneous combustion Substances or wastes which are liable to spontaneous heating under normal conditions encountered in transport, or to heating up on contact with air, and being then liable to catch fire.

UN Class 4.3 Code H4.3 - I coded this category 4.

Characteristics - Substances or wastes which, in contact with water emit flammable gases Substances or wastes which, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities.

UN Class 5.1 Code H5.1 - I coded this category 5.

Characteristics - Oxidizing Substances or wastes which, while in themselves not necessarily combustible, may, generally by yielding oxygen cause, or contribute to, the combustion of other materials.

UN Class 5.2 Code - I code this category to 5.

Characteristics - Organic Peroxides Organic substances or wastes which contain the bivalentostructure are thermally unstable substances which may undergo exothermic selfaccelerating decomposition.

UN Class 6.1 Code H6.2 - I code this category 6.

Characteristics - Poisonous (Acute) Substances or wastes liable either to cause death or serious injury or to harm human health if swallowed or inhaled or by skin contact.

UN Class 6.2 Code H6.2 - I code this category 6.

Characteristics - Infectious substances are substances or wastes containing viable micro organisms or their toxins, which are known or suspected to cause disease in animals or humans.

UN Class 8 Code H8 - I code this category 8.

Characteristics - Corrosives Substances or wastes which, by chemical action, will cause severe damage when in contact with living tissue, or, in the case of leakage, will materially damage, or even destroy, other goods or the means of transport; they may also cause other hazards.

UN Class 9 Code H10 - I code this category 9.

Characteristics - Liberation of toxic gases in contact with air or water Substances or wastes which, by interaction with air or water, are liable to give off toxic gases in dangerous quantities.

UN Class 9 Code H11 - I code this category 9.

Characteristics - Toxic (Delayed or chronic) Substances or wastes which, if they are inhaled or ingested or if they penetrate the skin, may involve delayed or chronic effects, including carcinogenicity.

UN Class 9 Code H12 - I code this category 9.

Characteristics - Ecotoxic Substances or wastes which if released present or may present immediate or delayed adverse impacts to the environment by means of bioaccumulation and/or toxic effects upon biotic systems.

UN Class 9 Code H13 - I code this category 9.

Characteristics - Capable, by any means, after disposal, of yielding another material, e.g., leachate, which possesses any of the characteristics listed above.

In summary of my UN Class and H category coding:

UN Class 1 Code H1 – I code this category 1,

UN Class 3 Code H3 - I coded this category 3,

UN Class 4.1 Code H4.1 - I coded this category 4,

UN Class 4.2 Code H4.2 - I coded this category 4,

UN Class 4.3 Code H4.3 - I coded this category 4,

UN Class 5.1 Code H5.1 - I coded this category 5,

UN Class 5.2 Code H5.2 - I code this category to 5,

UN Class 6.1 Code H6.2 - I code this category 6,

UN Class 6.2 Code H6.2 - I code this category 6,

UN Class 8 Code H8 - I code this category 8,

UN Class 9 Code H10 - I code this category 9,

UN Class 9 Code H11 - I code this category 9,

UN Class 9 Code H12 - I code this category 9,

UN Class 9 Code H13 - I code this category 9,

A substance composed of 1 and more other (collapsed) UN class codes I code 10,

Shipments with multiple substances that are a mixture of (collapsed) UN class codes I coded 88, and

Shipments with unknown (collapsed) UN class codes I code 99,

This descriptive waste hazard category variable is labeled DSRC.

A summary of the codes for the Proximity Category variables I created from Basel Convention Tables 3 and 4, Import and Export Nation Hazardous and Other Waste Reports Data is as follows:

Shipments to countries out-of-region from country of origin I code as 1;

Shipments to countries not adjacent, but within the region from origin I code as 2; and

Shipments to countries adjacent from origin I code as 3.

This proximity category variable is labeled PROX.

**BASEL CONVENTION ANNEX IV - DISPOSAL OPERATIONS (D-codes) -
I code the D-coded Disposal Waste Categories as 1.**

D1 Deposit into or onto land, (e.g., landfill, etc.)

D2 Land treatment, (e.g., biodegradation of liquid or sludgy discards in soils, etc.)

- D3** Deep injection, (e.g., injection of pumpable discards into wells, salt domes or naturally occurring repositories, etc.)
- D4** Surface impoundment, (e.g., placement of liquid or sludge discards into pits, ponds or lagoons, etc.)
- D5** Specially engineered landfill, (e.g., placement into lined discrete cells which are capped and isolated from one another and the environment, etc.)
- D6** Release into a water body except seas/oceans
- D7** Release into seas/oceans including seabed insertion
- D8** Biological treatment not specified elsewhere in this Annex which results in final compounds or mixtures which are discarded by means of any of the operations in Section A
- D9** Physico chemical treatment not specified elsewhere in this Annex which results in final compounds or mixtures which are discarded by means of any of the operations in Section A, (e.g., evaporation, drying, calcination, neutralisation, precipitation, etc.)
- D10** Incineration on land
- D11** Incineration at sea
- D12** Permanent storage (e.g., emplacement of containers in a mine, etc.)
- D13** Blending or mixing prior to submission to any of the operations in Section A
- D14** Repackaging prior to submission to any of the operations in Section A
- D15** Storage pending any of the operations in Section A

BASEL CONVENTION SECTION B - RESOURCE RECOVERY, RECYCLING, RECLAMATION, DIRECT REUSE OR ALTERNATIVE USES (R-codes) - I code the R-coded Recycling Waste Categories as 2.

- R1** Use as a fuel (other than in direct incineration) or other means to generate energy
- R2** Solvent reclamation/regeneration
- R3** Recycling/reclamation of organic substances which are not used as solvents
- R4** Recycling/reclamation of metals and metal compounds

R5 Recycling/reclamation of other inorganic materials

R6 Regeneration of acids or bases

R7 Recovery of components used for pollution abatement

R8 Recovery of components from catalysts

R9 Used oil rerefining or other reuses of previously used oil

R10 Land treatment resulting in benefit to agriculture or ecological improvement

R11 Uses of residual materials obtained from any of the operations numbered R1-R10

R12 Exchange of wastes for submission to any of the operations numbered R1-R11

R13 Accumulation of material intended for any operation in Section

In summary of my D-code Disposal Category and R-coded Recycling Category Waste:

I code the D-coded Disposal Waste Categories as 1,
I code the R-coded Recycling Waste Categories as 2,
Mixed waste D and R coded waste is labeled 88, and
Unknown disposed/recycled waste is coded 99.
This disposal/recycling variable is labeled DSRC.

In summary of my Countries Crossed in Transit Category codes:

I code shipments that cross one country in transit as 1,
I code shipments that cross no countries in transit as 2, and
I code shipments that cross two or more countries in transit as 3.
This category variable for countries crossed in transit is labeled TRAN.

APPENDIX C

VARIABLE DEFINITIONS

Country Case Data File

Variables Created from Basel Convention Information

CNTRY1 - is a country code identification number unique for the 99 countries in the sample.

DESFFLT - is a SPSS filter variable that filters the data file for destination countries.

ORGFLT - is a SPSS filter variable that filters the data file for origination countries.

DESMNTT - is a variable measuring the waste amounts in metric tons to the third decimal place received by destination countries.

DESRQT - is a variable for the number of shipments destination countries received.

ORMNTT - is a variable measuring the waste amounts in metric tons to the third decimal place sent by origination countries.

ORIFRQ - is a variable for the number of shipments origination countries sent.

SHIPMENT FREQUENCY DATA FILES

Variables Created from Basel Convention Information

NEWID - is the shipment case identification number. Each of the 4,090 shipments in this data file has a unique assigned identification case number.

SHPAMT - is shipment size in metric tons to the third decimal place.

ECONSCL - is the economic level movement scale created using GDP data from CIA *The World Factbook 2000*.

HAZY - is a variable created from the Basel Convention Article 1 1(b) and Y source codes and source descriptive text. This variable measures relative waste hazard according to source descriptive information.

HAZYCAT1 - is a Hazy dummy variable for Article 1 1(b) source (Non-Basel, but domestically regulated Y type) waste.

HAZYCAT2 - is a Hazy dummy variable for Y1 - Y18 source (waste streams) waste.

HAZYCAT3 - is a Hazy dummy variable for Y19 - Y45 source (waste having as constituents) waste.

HAZYCAT4 - is a Hazy dummy variable for Y46 - Y47 source (special consideration) waste.

HAZYCAT5 - is a Hazy dummy variable for mixed categories source (Y type) waste.

HAZYCAT6 - is a Hazy dummy variable for unknown or unreported (Y type) waste.

PROX - is a variable measuring proximity of countries of shipment origination and countries of destination. Proximity has three measures: adjacent, in region (but not adjacent), and out-of-region.

PROXDUM1 - is a dummy variable for PROX for adjacent countries.

PROXDUM2 - is a dummy variable for PROX for counties in region (but not adjacent).

PROXDUM3 - is a dummy variable for PROX for countries out-of-region.

DSRC - is a variable for waste disposal or waste recycling. Information for creating this variable was taken from the Basel Convention's D & R codes.

DSRCDUM1 - is a DSRC dummy variable for disposed waste

DSRCDUM2 - is a DSRC dummy variable for recycled waste.

DSRCDUM3 - is a DSRC dummy variable for mixed disposed and recycled mixed (D & R coded) waste.

DSRCDUM4 - is a DSRC dummy variable where disposal or recycling intentions (D & R codes) are unknown.

TRAN - is a variable that measures the number of countries crossed in transition from country of origination and destination. This variable has three measures: direct from one country to another, one country crossed in transition and two or more countries crossed in transition.

TRANDUM1 - is a dummy variable for TRAN where no country crossed in transition.

TRANDUM2 - is a dummy variable for TRAN where one country was crossed in transition.

TRANDUM3 is a dummy variable for TRAN where two or more countries were crossed in transition.

HAZH is a variable for the relative hazard level of waste created from the Basel Convention's descriptions and innate characteristics of waste as given in UN codes, the Basel Convention H codes and descriptive text.

HAZHDUM1 - is a Hazh dummy variable where the UN Code is 1 for explosive substances.

HAZHDUM2 - is a Hazh dummy variable where the UN Code is 3 for flammable liquids.

HAZHDUM3 - is a Hazh dummy variable where the UN Code is 4 for flammable solids or substances capable of creating flammable substances.

HAZHDUM4 - is a Hazh dummy variable where the UN Code is 5 for oxidizing substances or organic peroxides.

HAZHDUM5 - is a Hazh dummy variable where the UN Code is 6 for poisonous or infectious substances.

HAZHDUM6 - is a Hazh dummy variable where the UN Code is 8 for corrosive substances.

HAZHDUM7 - is a Hazh dummy variable where the UN Code is 9 toxic gases, toxic substances or ecotoxic substances.

HAZHDUM8 - is a Hazh dummy variable of shipments of a substance containing one or more of the above.

HAZHDUM9 - is a Hazh dummy variable where the shipment is a mixture of UN or H coded packages.

HAZHDUM10 is a Hazh dummy variable of shipments where the UN or H code is unknown.

COUNTRY CASE AND SHIPMENT FREQUENCY DATA FILES

Economic Variables

DEVLEV - is a variable measuring a country's economic level of development using gross domestic product (GDP) at Purchasing Power Parity (PPP) at official exchange rates (OER) in U.S. dollars per capita. This variable was created from information provided by the World Bank's *World Development Indicators* (WDI 2000).

GINI - is a variable measuring the internal wealth distribution of countries. This variable was created from the Gini Index provided by the World Bank's *World Development Indicators* (WDI 2000).

EXCONC - is a variable measuring the export concentration of countries created using information from United Nations Conference on Trade and Development (UNCTAD) *2002 UNCTAD Handbook of Statistics*.

IMCONC - is a variable measuring the import concentration of countries created using information from United Nations Conference on Trade and Development (UNCTAD) *2002 UNCTAD Handbook of Statistics*.

EXTDEBT - is a variable measuring the external debt of countries measured in percentages of GDP. Information for creating this variable was taken from the CIA's *The World Factbook 2001, 2002, 2005*.

UNEMP is a variable measuring the unemployment of countries as a percentage of total workforce. Information for creating this variable was taken from the CIA's *The World Factbook 2001*.

MIL_EXPS - is a variable measuring the military expenditures of countries as a percentage of GDP. Information for creating this variable was taken from the CIA's *The World Factbook 2001*.

MIL_IM - is a variable measuring the military imports of countries in millions of U.S. dollars. Information for creating this variable was taken from the online version of Encyclopædia Britannica's *Nation's Rank, Arms Imports for the year 1999*.

PCAGGDP - is a variable measuring the portion agriculture comprises the economy of countries, taken as a percentage of the country's GDP. Information for creating this variable was taken from the CIA's *The World Factbook 2001*.

PCINDGDP - is a variable measuring the portion industry comprises the economy of countries, taken as a percentage of the country's GDP. Information for creating this variable was taken from the CIA's *The World Factbook 2001*.

PCSERGDP - is a variable measuring the portion service comprises the economy of countries, taken as a percentage of the country's GDP. Information for creating this variable was taken from the CIA's *The World Factbook 2001*.

EXP_B - is a variable measuring the value of exports of countries in billions U.S. dollars. Information for creating this variable was taken from the CIA's *The World Factbook 2001*.

IMP_B - is a variable measuring the value of imports of countries in billions U.S. dollars. Information for creating this variable was taken from the CIA's *The World Factbook 2001*.

Factbook 2001.

Geography and Land Use Variables

AREA - is a variable measuring the land area of a country. This is a measure of the total area within a country's borders, minus the land taken up by lakes, rivers, bays and other lands under water. Information for creating this variable was taken from the CIA's *The World Factbook 2001*.

ARAB_L - is a variable measuring the arable land or the portion of land cultivated for crops that are replanted after each harvest like wheat, maize, and rice. This definition and the information for creating this variable were taken from the CIA's *The World Factbook 2001*.

PERMCRP is a variable measuring permanent cropland or the portion of land cultivated for crops that are not replanted after each harvest such as citrus, coffee, and rubber. This definition and the information for creating this variable were taken from the CIA's *The World Factbook 2001*.

PERMPST is a variable measuring permanent pastureland or the portion of land permanently used for herbaceous forage crops. This definition and the information for creating this variable were taken from the CIA's *The World Factbook 2001*.

FOREST - is a variable measuring the forest and woodlands, or the portion of the land under dense or open stands of trees. This definition and the information for creating this variable were taken from the CIA's *The World Factbook 2001*.

OTH_L - is the variable measuring the land not defined as used in the above four, such as urban areas, roads, deserts, etc. This definition and the information for creating this variable were taken from the CIA's *The World Factbook 2001*.

URB_L - is a variable measuring the portion of land in urban areas. The information for creating this variable was taken from the SEDAC (2000) *Gridded Populations of the World*.

LOWUSL - is a variable measuring the portion of land of extremely low use that theoretically might be available for waste disposal to a greater degree than more used land. This low use land is calculated by subtracting URB_L from OTH_L.

Demographic Variables

POP - is a variable measuring the total number of people living in a country. Information for creating this variable was taken from the CIA's *The World Factbook 2001*.

POPDS - is a variable measuring the number of people per square kilometer in a country. This variable was calculated using the population and the land area of countries as provided by the CIA's *The World Factbook 2001*.

INFMR - is a variable measuring the infant mortality rate (IMR) of countries as the annual infant deaths per thousand of population. The information for creating this variable was taken from the CIA's *The World Factbook 2001*.

LIFE - is a variable measuring life expectancy at birth is the median number of years to be lived (year half still living) by a group of people born in the same year if the death rate remains the same. The information for creating this variable was taken

from the CIA's *The World Factbook 2001*.

TFR - is a variable measuring the total fertility rate (TFR) of countries taken as the average number of children that would be born per woman if all women lived to the end of their childbearing years and bore children according to a given fertility rate at each age. The information for creating this variable was taken from the CIA's *The World Factbook 2001*.

NURBPP_D - is a variable measuring the population density of non-urban areas of countries. This variable was calculated by dividing the non-urban population by the non-urban land area, and is given in people per square kilometer. Information for creating this variable is from the CIA, "The World Factbook" (2001), the SEDAC (2000), and the United Nations' *Demographic Yearbook* (2000, 2001, 2002, 2003).

Energy Variables

ELCPC - is a variable measuring the kilowatt-hours of electric power consumption per capita for a country. The information for creating this variable was taken from the World Bank's "World Development Indicators (WDI)" (2000, 2001, 2002, 2003).

ENGYPC - is a variable measuring the kg of oil equivalent per capita for a country. The information for creating this variable was taken from the World Bank's "World Development Indicators (WDI)" (2000, 2001, 2002, 2003).

ELECCON - is a variable measuring the total electric power consumption of a country calculated by multiplying the country's kilowatt-hour per capita electric power by the country's population. Information for creating this variable was taken from the World Bank's *World Development Indicators (WDI)* (2000, 2001, 2002, 2003) and the World Bank, *2002 World Bank Atlas*.

ENGYCON - is a variable measuring a country's total energy use in kg of oil equivalent calculated by multiplying a country's kg of oil equivalent per capita use by the country's population. Information for creating this variable was taken from the World Bank's *World Development Indicators (WDI)* (2000, 2001, 2002, 2003) and the World Bank, *2002 World Bank Atlas*.

Environmental Variables

ECOFTP - known as the Eco Footprint of Nations is a variable measuring the total global ecological impact of a country in total hectares of worldwide land used to support the population of that country. Information used to create this variable was taken for the year 2000 from *Ecological Footprint of Countries 2004*.

ECOFTPPC - is a variable measuring the Eco Footprint of countries per capita calculated by dividing the Eco Footprint of a country by its population. Information used to create this variable was taken for the year 2000 from *Ecological Footprint of Countries 2004* and *The World Factbook 2001*.

ENV_ISS - is a variable measuring the number of environmental issues a country has. This variable was calculated by counting the number of environmental issues cited for a country in the CIA's *The World Factbook 2001*.

E_TRT_P - is a variable measuring the number of environmental treaties a country is a party to, having both agreed to treaty terms and ratified the treaty. Information for creating this variable is taken from the CIA's *The World Factbook 2001*.

E_TT_PNR - is a variable measuring the number of treaties a country is a party to plus the number of to which the country has agreed to the treaty terms, but are yet to be ratified. Information for creating this variable is taken from the CIA's *The World Factbook 2001*.

Shipment Frequency Data Files

Economic Trade Country Characteristics

EXTP - is a variable measuring if the other country in the waste exchange is an ordinary export-trading partner. Information for creating this variable is taken from the CIA's *The World Factbook 2001*.

EXTPDUM1 - is an EXTP dummy variable (Yes, Export Trade Partner).

EXTPDUM2 - is an EXTP dummy variable (No, not Export Trade Partner).

IMTP - is a variable measuring if the other country in the waste exchange is an ordinary import-trading partner. Information for creating this variable is taken from the CIA's *The World Factbook 2001*.

IMTPDUM1 - is an IMTP dummy variable (Yes, Import Trading Partner).

IMTPDUM2 - is an IMTP dummy variable (No, not Import Trading Partner).

EXEG - a variable measuring if electricity or oil is among a country's primary exports. Information for creating this variable is taken from the CIA's *The World Factbook 2001*.

EXEGDUM1 - is a dummy variable for EXEG (Yes, Electricity or oil are among Primary Exports).
Factbook 2001.

EXEGDUM2 - is a dummy variable for EXEG (No, Electricity or oil are not among Primary Exports).

IMEG - a variable measuring if electricity or oil is among a country's primary imports. Information for creating this variable is taken from the CIA's *The World Factbook 2001*.

IMEGDUM1 - is a dummy variable for IMEG (Yes, Electricity or oil are among Primary Imports).

IMEGDUM2 - is a dummy variable for IMEG (No, Electricity or oil are not among Primary Imports).

EXCM - a variable measuring if raw materials, manufactured goods or a mix of both are among a country's primary export commodities. Information for creating this variable is taken from the CIA's *The World Factbook 2001*.

EXCMDUM1 - is a dummy variable for EXCM (Yes, raw materials among Primary Export Commodities).

EXCMDUM2 - is a dummy variable for EXCM (Yes, manufactured goods among Primary Export Commodities).

EXCMDUM3 - is a dummy variable for EXCM (Yes, a mixture of both raw materials and manufactured goods are among Primary Export Commodities).

IMCM - a variable measuring if raw materials, manufactured goods or a mix of both are among a country's primary import commodities. Information for creating this variable is taken from the CIA's *The World Factbook 2001*.

IMCMDUM1 - is a dummy variable for IMCM (Yes, raw materials among Primary Import Commodities).

IMCMDUM2 - is a dummy variable for IMCM (Yes, manufactured goods among Primary Import Commodities).

IMCMDUM3 - is a dummy variable for IMCM (Yes, a mixture of both raw materials and manufactured goods are among Primary Import Commodities).

APPENDIX D

DATA FILES DESCRIPTIONS

Descriptions of Basel Convention Data Sources and Working Data Files

1. Samples of Basel Convention Data Tables

Table 3. Export of Hazardous Waste and other Waste in 2000 (as provided by parties).

Country of Export	Y-code	Waste streams	Annex VIII	UN class	Code	Characteristics	Amount exported (in mt)	Country of Transit	Country of destination	D code	R code
AR	Y10	PCB liquid and contaminated	A1180		H11	toxic (delayed or chronic)	251.500	UR,BR	FR	D10	
AR	Y10	PCB liquid and contaminated	A1180		H11	toxic (delayed or chronic)	297.000	UR,BR	ES	D10	
AR	Y26	Scrap Nickel-Cadmium Battery			H6.1,H11	toxic (acute and delayed or	54.000	UR,BR	FR		R4
AU	Y31	Lead dross	A1020	6.1,9	H6.1,H11, H12	Poisonous (acute), Toxic (delayed or chronic), Ecotoxic	7,239.000	SG	BE		R4
AU	Y26	Nickel-cadmium batteries	A1170	6.1,9	H6.1,H11, H12	Poisonous (acute), Toxic (delayed or chronic), Ecotoxic	61.052	DE	SE		R4
AU	Y26	Nickel-cadmium batteries	A1170	6.1,9	H6.1,H11, H12	Poisonous (acute), Toxic (delayed or chronic), Ecotoxic	47.909	ZA, BE	FR		R4
AU	Y23	Lead sulphate leach concentrate	A1070	9	H12	Poisonous (acute), Toxic (delayed or chronic), Ecotoxic	6,719.000	ZA	BE		R4

Table 4. Import of Hazardous Waste and Other Waste in 2000 (as provided by parties).

Country of Import	Y-code	Waste streams	Annex VIII	UN class	Code	Characteristics	Amount Imported (in mt)	Country of Transit	Country of Origin	D code	R code
AU	Y31	Zinc ashes and residues	A1080	6.1,9	H6.1,H11, H12	Poisonous (acute), Toxic (delayed or chronic), Ecotoxic	99.151		NZ		R4
AU	Y46	Waste collected from households					150.000		FR	D1	R9
AU	Y23	Paragoethite residues	A1070	6.1,9	H6.1,H11, 12	Poisonous (acute), Toxic (delayed or chronic), Ecotoxic	53.000		ZA		R4
AT	Y4	wastes from p.f.u.. of pesticides	A4140	6.1	H6.1	pesticides	614.930		IT	D10	
AT	Y6	used solvents	A3160	3	H3	non halogenated solvents	2,885.700		DE		R1
AT	Y6	wastes from p.f.u. of solvents	A3160	3	H3	distillation residues	1,746.130		IT	D10	
AT	Y8	oil containing wastes	A4060	4.1	H4.1	waste from craft shops	65.370	SI	HR	D10	

2. Detailed Description of Basel Convention Data Files

Data for this study are from the Basel Convention website (Secretariat of the Basel Convention 2006a, 2006b). The particular data used from the website is from: Table 3 Export of Hazardous Wastes and Other Wastes in 2000 (Basel Convention Table 3), and Table 4 Import of Hazardous Wastes and Other Wastes in 2000 (Basel Convention Table 4). These two tables contain data for hazardous and other waste movement. Basel Convention Table 3 reports shipments of waste by exporting countries and Basel Convention Table 4 reports shipments of waste by importing countries. Of the 139 countries that had ratified the terms of the 1989 Basel Convention by the year 2000, 99 countries responded to a questionnaire regarding Article 13 and Article 16 for transboundary waste movement during the year 2000, responding by March 21, 2003. The four countries of Comoros, Mexico, Switzerland, and Venezuela responded after the Basel Convention's cut off date of November 30, 2002 for the year 2000. The data for the year 1999 was used for these four countries. The latter two convention articles mandated that all production and transboundary movement by member countries would be documented and reported to the convention.

Of the 99 treaty member countries that responded to the Basel Convention questionnaire regarding year 2000 transboundary waste, 52 parties reported data on the import of hazardous waste. Of these 99 treaty member countries, 96 parties reported data on the export of hazardous waste. For the sake of clarity and in order to avoid a great deal of confusion throughout the remainder of this paper, import countries will be labeled and referenced as destination countries and export countries will be labeled and referenced as origination countries.

The data in each of the tables in Basel Convention Table 3 and Basel Convention Table 4 is aggregated into twelve columns. The content of the first column on the left is the country of origin (or destination country in the import country reported file) as identified by the UN two Digit code. Moving from left to right, the second column in each of the two tables give Y-codes (Y1 - Y47) designating generating sources. The third column in each of the tables contains waste stream (origin) text descriptor columns. The fourth column in each of the tables gives Convention Annex VII codes characterizing type of hazard. The fifth column in each of the tables contains United Nations classifications (UN class). The sixth column in each of the tables gives H codes (Annex III to the Convention). The seventh column in each of the tables lists hazardous characteristics in a text form describing waste characteristics. The eighth column in each of the tables reports the amount exported/imported in metric tons to the third decimal place. The ninth column in each table lists countries crossed in transit, as identified by the UN two-digit code. The tenth column in each table gives country of destination (or country of origination in the import country reported file) as identified by the UN two digit country code. The eleventh column in each table lists D-codes designating disposal descriptors and the twelfth column in each of the two tables contains R-code designating recycling descriptors.

The data contained in Basel Convention Table 3 and Basel Convention Table 4 are rich sources for information on the global movement of hazardous waste and is used in this research to operationalize variables for the statistical analysis of the data. Additional information concerning the data in these columns is provided by the Basel

Convention and is included in Appendix B (Secretariat of the Basel Convention. 2006c).

Basel Convention Table 3 reports a total of 2,485 shipments sent from origination countries for a total of 4,911,793 metric tons shipped (Secretariat of the Basel Convention 2006a). Basel Convention Table 4 reports a total of 3,612 shipments received by destination countries for a total of 6,959,555 metric tons accepted (Secretariat of the Basel Convention 2006b). It appears that the waste receiving (importing) countries were much more diligent in reporting waste received than the sending (exporting) countries were.

The Basel Convention in "Summary Table 1: Transboundary Movements of Hazardous and Other Wastes in 2000." gives the total exported wastes reported for the year 2000 as 5,173,383 metric tons and the total imports reported wastes for the year of 2000 as 7,060,998.000 (Secretariat of the Basel Convention 2006e). This is a difference of 261,590 metric tons more than my totals for export reported wastes and 101,443.500 metric tons more than my totals for the import reported wastes. Since I used two different data entry people working independently to move the data from the Basel Convention PDF tables into Excel and the figures of these two data entry people agreed, I wrote and asked the Basel Convention officials for an explanation for these differences. The response from the Basel Convention for the discrepancies in our totals was not totally satisfactory. Much of this discrepancy may be explained by rounding.

Other missing data for which an explanation was inquired of the Basel Convention Officials were: six shipment cases where no amounts were reported for the size of the shipments (four export and two import shipments), two shipment cases where the country codes did not match any UN country codes (one export and one import shipment), five shipment cases where either no country of origination or no country of destination are given (three export and two export shipments), ten shipment cases where a D or R letter code is given without the number codes, and four shipment cases for which the D and R codes are not defined in the Basel Convention Glossary. Not receiving any response to inquiries concerning these, descriptions for how this missing data are handled are given with the creation of the corresponding data analysis variables in Chapter IV.

Each of the shipments reported in Basel Convention Table 3 and Basel Convention Table 4 were examined in order to identify unique shipments and to eliminate duplicate shipments, using factors such as countries of origin and destination and other characteristics included in the 12 columns of each table including shipment amounts. A total of 4,090 shipments in each of the two tables were identified as unique, having a total amount of waste shipped and received of 7,533,464 metric tons. These unique shipments are used to make three data spreadsheet files containing information for my analysis of transboundary waste.

As I outlined in Chapter I, "Introduction", this research has three objectives. The first objective is to determine country characteristics related to amounts of waste shipped. The second objective is to determine country characteristics related to economic level movements of shipments. The third objective is to determine if waste with higher hazard levels moves to lower economic developed countries more often than to higher economic level developed countries. In order to achieve these objectives, three working data files are constructed, a data file with countries as the unit of analysis and two data files with shipment frequencies as the unit of analysis. Sections 3, 4, 5 & 6 of Appendix D explain how these three data files are constructed, providing examples of each data file.

3. Sample of the Country Case Data File

TABLE B: Country Case Data File

Case Identifiers or Country Name (cntrys1)	Destination Country Filter (desfltr)	Destination Country Amount (desmntt)	Origination Country Filter (orgfltr)	Origination Country Amount (orgmntt)	Destination Country Frequency (desfrqt)	Origination Country Frequency (orgfrqt)	Economic Development Level (devlev)	Distribution of Wealth Coefficient (gini)	Export Concentration (exconc)
Andorra			1	18.000		1	4		0.1749
Argentina			1	1,251.110		6	3	52.2	0.1371
Australia	1	305.041	1	14,067.026	4	12	4	35.2	0.1240
Austria	1	25,659.738	1	113,367.619	38	72	4	30.0	0.0685
Bahamas			1	0.000		17	4		0.2168
Bahrain			1	1,222.604		30	3		0.5307
Barbados			1	9.000		4	4		0.2253
Belarus	1	290,365.912	1	5,842.638	9	4	2	30.4	0.1672
Belgium	1	479,664.751	1	684,524.313	342	162	4	25.0	0.0971
Bosnia & Hercegovina			1	297.859		29	2	26.2	
Botswana			1	12.000		1	3	63.0	0.8090
Brazil	1	998.000	1	1,084.559	4	4	3	59.3	0.0888
Bulgaria	1	4,153.360	1	28.553	3	2	2	31.9	0.1249
Canada	1	561,579.185	1	297,000.966	1,344	295	4	33.1	0.1327
Chile			1	143.808		4	3	57.1	0.2920
China			1	96,879.000		9	2	44.7	0.0732
Colombia			1	127.630		2	2	57.6	0.2943
Costa Rica			1	24.900		3	3	46.5	0.2962
Croatia			1	9,435.246		10	3	29.0	0.1398
Cuba			1	1,348.680		3	2		0.4289
Cyprus			1	479.190		1	4		0.2980
Czech Repu	1	20,543.610	1	2,879.741	10	11	3	25.4	0.0826
Denmark	1	105,750.097	1	189,526.788	85	80	4	24.7	0.0826

By using the sample Basel Convention Table 3 and Basel Convention Table 4 given in Section 1 of this appendix and using the above sample of the Country Case Data File as references, the reader may follow the text in the following section 4 in order to specifically determine how the working Country Case Data File was constructed.

4. Detailed Description of Country Case Data File

The first of these three waste movement data files, created using the year 2000 Basel Convention data, is created by totaling the amounts of the 4,090 unique shipments for countries of origination and countries of destination, creating a spreadsheet where either countries of origination or countries of destination can be used for the unit of analysis. The spreadsheet for this file has the names of countries of origin and countries of destination in one column, the amounts shipped by the country in a second column, and the amounts received by the country in a third column. This file is created and fashioned so that either the country of origination or the country of destination can be used (filtered) for the unit of analysis and is labeled "Country Case data file" (CCDF).

Most of the variables used in all three of the data files created for the analysis of the transboundary waste data retrieved from the Basel Convention Nation Reports, the Country Case data file, which is discussed in this section, and the Destination Frequency and Origination Frequency data files, which are discussed in the following sections, measure the same characteristics of countries or measure the same waste characteristics as reported by the Basel Convention (Secretariat of the Basel Convention. 2006a, 2006b).

Therefore, in most occurrences they have identical names in all three files. In the situation where the Basel Convention waste characteristics are for identical shipments occurring in the Destination Shipment Frequency and the Origination Shipment Frequency data files, they naturally have identical values, because these values (ordinarily) do not change between departure and arrival.

However, the values of the variables derived and created from the Basel Convention provided waste characteristics for the Country Case data file differ from those in the two shipment frequency data files, due to the country being the unit of analysis in the former and shipment frequency being the unit of analysis in the latter. Additionally, although identical in name and measuring the same concept, the values for the country characteristic variables created for each of the three data files are different in that the values of the variables occurring in these three files correspond appropriately in each file to the country characteristics of the destination or origination country to which they apply.

Variables and variable creations for the first file for transboundary waste research analysis as described in this section of Appendix D will be created for the Country Case data file. As stated previously, this file has countries as a unit of analysis, either countries of waste origination or countries of waste destination. The initial six variables for this file are created from information from the Basel Convention Table 3 and Basel Convention Table 4 in the following manner. The first column in this data file spreadsheet is reserved for case identifiers and is labeled CNTRYS1. It includes the names of the origination countries taken from Table 3, and the names of the countries of destination taken from Table 4, 99 in all.

Using the 4,090 unique global shipments totaling 7,533,464 metric tons identified from Basel Convention Table 3 and Table 4 and discussed in Chapter III, “Methodology”, other variables in the country case data file are created as follows. The first variable in the spreadsheet has a value of 1 where the country in CNTRYS1, the case identifier column, is the country of destination. This variable is labeled DESFFLT. A second variable in this spreadsheet is created by totaling the amounts of the shipments to each country as a destination. This variable is labeled DESMNTT. The totals in DESMNTT are given in metric tons to the third decimal place.

Similar to the method used to fashion DESFFLT, the second variable in the Country Case data file, a third variable is created for the file also having value of 1, only with this third variable the value is 1, where the country in CNTRYS1 is the country of origination. This third variable will be labeled ORGFLTR. When exported to SPSS, DESFFLT will allow the file to be filtered for country of destination and ORGFLTR will allow the file to be filtered for country of origin. A fourth variable in this spreadsheet is created by totaling the amounts of the shipments from each country as an origination. This variable is labeled ORGMNTT. The totals in ORGMNTT are given in metric tons to the third decimal place.

Fifth and sixth variables are also created using the same 4,090 unique global shipments totaling 7,533,464 metric tons identified from Basel Convention Tables 3 and Basel Convention Table 4. The fifth variable (column) is created by totaling the number of shipments to each destination country and is labeled DESFRQT. The sixth and last variable to be created for the Country Case data file and fashioned from Basel Convention information is created by totaling the number of shipments from each

origination country. This seventh variable is labeled ORIFRQ.

Other variables for characteristics of countries are created for this Country Case data file, using information primarily taken from the CIA Year 2000 Factbook (2001). However, additional information on the characteristics of countries from various sources is also used in this data file. This additional information is taken from the United Nations, World Bank, from other global information publications and from websites. These sources will be cited as their variables for country characteristics are operationalized and explained in Chapter IV “Variables and Variable Creation”

5. Samples of the Destination Shipment Frequency and the Origination Shipment Frequency Data Files

TABLE C: Destination Shipment Frequency Data File

Shipment Identification No. (newid)	Shipment Amount (shpamt)	Y-Category Waste Hazard (hazy)	Distination & Origination Proximity (prox)	Disposed Vs Recycled Waste (dsrsc)	No. Counties Crossed in Transit (tran)	UN Class Codes & Waste Hazard (hazh)	Economic Level Movement Scale (econsc1)
1	99.151	3	2	2	2	88	1
2	150.000	4	1	88	2		0
3	53.000	3	1	2	2	88	2
4	614.930	2	3	1	2	6	0
5	2,885.700	2	3	2	2	3	0
6	1,746.130	2	3	1	2	3	0
7	65.370	2	2	1	1	4	3
8	409.980	2	3	2	2	4	0
9	935.525	2	3	2	2	13	0
10	553.280	2	3	1	2	13	0

Tables D: Origination Shipment Frequency Data File

Shipment Identification No. (newid)	Shipment Amount (shpamt)	Y-Category Waste Hazard (hazy)	Distination & Origination Proximity (prox)	Disposed Vs Recycled Waste (dsrsc)	No. Counties Crossed in Transit (tran)	UN Class Codes & Waste Hazard (hazh)	Economic Level Movement Scale (econsc1)
1	99.151	3	2	2	2	88	1
2	150.000	4	1	88	2		0
3	53.000	3	1	2	2	88	2
4	614.930	2	3	1	2	6	0
5	2,885.700	2	3	2	2	3	0
6	1,746.130	2	3	1	2	3	0
7	65.370	2	2	1	1	4	3
8	409.980	2	3	2	2	4	0
9	935.525	2	3	2	2	13	0
10	553.280	2	3	1	2	13	0

By using the sample Basel Convention Table 3 and Basel Convention Table 4 given in section 1 of this appendix and using the above samples of the Destination Shipment Frequency Data File and Origination Shipment Frequency Data File as references, the reader may follow the text in the following section 6 in order to specifically determine how the two working shipment frequency data files were constructed.

6. Detailed Description of the Creation of the Destination and Origination Shipment Frequency Data Files

The second and third of the three waste movement data files, created from information taken from the Basel Convention 2000 data, is formed by using the 4,090 unique cases identified earlier from Basel Convention Table 3 and Basel Convention Table 4 (Secretariat of the Basel Convention 2006a, 2006b). The second file has the country of origination of shipment in the first data column as its first variable and is labeled "Origination Shipment Frequency data file" (OSFDF). The third file has the country of destination of shipment in the first data column as its first variable and is labeled "Destination Shipment Frequency data file" (DSFDF). The unit of analysis for each of these two data files will be shipment frequencies. In both the Origination Shipment Frequency and the Destination Shipment Frequency data files, information provided in the twelve columns of Basel Convention Table 3 and Basel Convention Table 4 is used to create variables such as: amounts shipped, degrees of hazard, proximity, number of countries crossed, and disposal versus recycling waste methods.

Three ways of classifying waste into major categories are used by the Basel Convention for reporting year 2000 waste in their Table 3 & Table 4 (Secretariat of the Basel Convention 2006a, 2006b). I will explain each of these as follows. The first of the three methods of waste classification used in Columns 2 and Column 3 of the tables is classification according to sources and according to descriptions of content of these sources. For example, in Column 2, the Y-code of "Y2" may be given, while in the same row in Column 3 a text description of: "Waste from the production and preparation of pharmaceutical products" may be given. These two columns contain coupled information on the waste and comprise a source classification system for the waste shipments. Information from these two columns on waste, classified according to this source system, is used to make the first waste-type categorical variable.

The second method used in reporting waste in Column 5 and Column 6, is spelled out in the text in Column 7. This method is classification according to apparent description and innate characteristics. For example, in Column 5, a U.N. Class "3" (meaning flammable liquids) may occur, linked to the Basel Convention code "H3" (also meaning flammable liquids) in Column 6, and further linked in Column 7 to text saying: "Solvent containing". This classification system will be used to make a second categorical variable measuring types of waste.

The third and last classification system used by the Basel Convention to report waste is according to methods of recycling and disposal. This is the classification system used in reporting data in Basel Convention Tables 3 and Table 4, Column 11, and Column 12. However, if codes for recycling waste appear in Column 11 naturally no codes for waste disposal appear in Column 12. Here are examples: In Column 11, the Basel Convention D-code (disposal code) of "D10" (Incineration on land) may appear,

with nothing appearing in Column 12. In the next row down, nothing may appear in Column 11 and in adjacent Column 12, the Basel Convention R-code “R6” (Regeneration of acids and bases) may appear. Column 11 and Column 12, and the D and R codes in each, respectively, are used to create a four category variable containing a category for disposal waste, recycling waste, mixed waste and a category for shipments that are not labeled with either D or R codes. More specific information concerning all three of these coding and classification systems are spelled out as each related variable is created and operationalized.

The unit of analysis in both the Destination Shipment Frequency and the Origination Shipment Frequency data files are shipment frequencies. The variables in the two shipment frequency data files, those that are created for the Basel Convention data have the same number of cases, identical names, equal numbers of variables, and identical variable values.

The initial six variables for Destination Shipment Frequency and the Origination Shipment Frequency data files are created from information taken from the Basel Convention Table 3 and Basel Convention Table 4. The 4,090 unique global shipments totaling 7,533,464 metric tons identified from Basel Convention Table 3 and Table 4 are used to create the initial variables of these two shipment frequency data files, described as follows. The first column of the two spreadsheets for the Destination Shipment Frequency and the Origination Shipment Frequency data files is reserved as an identifier column and is created by assigning to each of the 4,090 shipments individual numbers 1 through 4,090. This shipment identifier column is labeled NEWID in both files. The amounts of waste in each of the above unique 4,090 shipments are used as a variable for sizes of waste shipments. The shipment size is given in metric tons to the third decimal place. This variable for amount of waste is labeled SHPAMT in both files.

Please note: Three hundred and fifty-five of these unique 4,090 shipments reported shipment sizes of .000 metric tons. The countries of origination and destination were examined for these 355 zero amount shipments were examined for a clue for an explanation for this amount. Upon examination, it was discovered that 319 of these shipments were from the U. S. to Canada, 15 were from Canada to the U.S., 18 were from The Bahamas to Canada, and the remaining three shipments were between European countries. A reasonable assumed explanation for most of these shipments that reported zero amounts is that the original shipments were reported in pounds and that the shipments were less than .001 metric tons (less than one kilogram or 2.2 pounds) in size, thus the shipment amounts were rounded to .000 metric tons in the Basel Convention Nation Report Tables. An inquiry was made to the Basel Convention for an explanation for these zero shipment sizes. The response was that many countries round off to zero shipment amounts that are between 0 and 0.5 metric tons.

The Basel Convention also provides extensive information on all of the various codes and texts describing waste characteristics that are used in the reporting of the shipments and amounts of the international transboundary waste movement. I use this same information in the construction of APPENDIX B “Basel Convention Definitions and Codes” in order to guide the reader in understanding the sometimes-complex nature of the same data and in understanding of my recoding of this data (Secretariat of the Basel Convention 2006a; 2006b; 2006c; 2006d).

Information indicating the level of waste hazard, according to waste sources and

wasted descriptions, is available from the second and third columns of the Basel Convention Table 3 and Table 4. In the second column, Annex I and Annex II of the Basel Convention, defines waste sources and descriptions into 47 Y-coded wastes, with these 47 Y-Coded wastes classified into three separate categories of: Category I Waste Steams (Y1 - 18), Category II Waste Having as Constituents (Y19 - Y45), and Category III Categories of Wastes Requiring Special Consideration.

The third column of the Basel Convention Table 3 and Table 4 gives a text description and various codes for types of waste in a particular shipment. One of these codes is Art 1(1) b. The Basel Convention identifies these codes as wastes that are not deemed hazardous enough by the convention articles to be reported, but are required by the reporting country's laws to be internally reported to their own environmental agency. If Y codes are reported in a cell of column two of these two tables, no Art 1(1) b codes are reported in the adjacent cell of Column 3 of these tables, and vice versa.

Taken from the Glossary of the Basel Convention (2000c), the descriptions for these 47 Y-coded wastes and the Art 1(1) b waste are available in Appendix B of this dissertation. Inspection of the Art 1 and Art 1(1) b wastes, the 47 Y-coded wastes, and their three classification categories shows that the level of waste hazard generally increases across the four waste categories, starting with the Art 1(1) b category, through the successive Y I - III categories.

A category variable for waste hazard is created using this information by defining each of the 4,090 shipments according to content as they fall into the previously described four categories, a fifth category of mixed Y I - YIII category waste, and a sixth category with neither Y-codes or Art 1(1) b codes reported. Art 1(1) b coded waste is coded 1, Y waste category I (Y1 - Y18) is coded 2, Y waste category II (Y19 - Y45) is coded 3, Y waste category III (Y46 - Y47) is coded 4, mixed Y categories is coded 88, and no Y-codes or no Art 1(1) b codes reported are coded 99. This waste hazard level variable for Y – category waste is labeled HAZY.

Please note: The Basel Convention defines the mixed Y category differently than I do in this paper. They place a waste shipment in the Mixed Y category if the shipment contains two or more different Y codes. I do the same. However, if the shipment is of mixed Y codes where packages are of the same category of Y codes, I categorize the shipment to the Y category in which they all fall. They do not. This results in my totals for the different categories being different than those of the Basel Convention.

A third shipment frequency variable, derived from information provided in Base Convention Table 3 and Table 4, concerns the distance between origination and destination countries. Origination and destination countries of each shipment are given in these two tables by a two-digit UN code, in Column 1 and Column 10 of the tables. Using the map provided for each country by *The World Factbook 2001*, it was determined if the origination and destination countries for each of our 4,090 shipments were adjacent, not adjacent but in-region, or out-of-region. Shipments to countries out-of-region from their origin were coded 1; shipment to countries not adjacent, but within the region from their origin were coded 2; and shipments to countries adjacent from their origin were coded 3. This proximity category variable is labeled PROX.

Please note how I determine the three proximity categories: In this study, in-region proximity is primarily geographic in determination. Attention was also given to such things as membership in trading blocks, also governmental, historical, and cultural

ties. Taking Europe for an example, the region of Europe would include mainland European countries as well as offshore island nations such as the United Kingdom. Despite distance in nautical miles, Iceland is considered adjacent to Denmark and in-region with other continental European countries, because of governmental ties to Denmark, and their having trading block membership with Europe and historical and cultural ties with the other European countries. In-region is also a relative concept in that two countries might be in region with each other, but not in-region with all countries that the other country is in-region with in proximity. An example of the latter is Russia and some of its former Western Asian Republics, like Uzbekistan and Turkmenistan. Russia is geographically located and has trade, historical, and cultural ties with Europe, so is in-region with European countries. It also has these same features in common as well as former governmental ties with its former two republics, so is also in-region with them. It is not geographically considered in-region nor does it have most of these kinds of ties with Middle Eastern countries such as Iran and Iraq, so it would not be in-region with these two countries. However, Uzbekistan and Turkmenistan do not have these features in common with Europe, but do have them in common with these two Middle Eastern countries, so they are considered in-region with these Middle Eastern countries, but are not in-region with European countries. Maps provided by the CIA's (2000) *The World Factbook 2000* were useful in determining geographic proximity.

A subject of debate by public policy makers and researchers is whether waste shipments that are stated as intended for recycling are more likely to go to lower economically developed countries than waste shipments that are stated as intended for disposal. The Basel Convention information from export and import nation reporting Table 3 and Table 4, Columns 11 and Columns 12, can be used to create a four-category variable measuring recycling and disposal of transboundary waste. Column 11 contains fifteen different D-codes labeling each shipment according to a method of disposal. Column 12 contains twelve different R-codes labeling each shipment according to a method of recycling. Combining the information in these two columns can create a four-category variable, with one category for disposed waste, a second category for recycled waste, a third category for mixed waste, and a fourth category for D and R codes that are unreported or are unknown. Disposed waste is coded 1, recycled waste is labeled 2, mixed waste is labeled 88, and unknown disposed/recycled waste is coded 99. This variable for disposed/recycled category waste is labeled DSRC.

Information from the Basel Convention Table 3 and Table 4 are used to create a fifth variable for measuring number of countries in which shipments crossed in transit. Columns 9 of these two tables list the two-digit UN codes for each of the countries that shipments crossed in transit. Classifying each shipment according to no countries crossed, one country crossed, and two or more countries crossed in transit creates a three-category variable. Shipments that cross one country in transit are coded 1, shipments that cross no countries in transit are coded 2, and shipments that cross two or more countries in transit are coded 3. The newly created category variable for number of countries crossed in transit is labeled TRAN.

In addition to the Y-coded waste sources and waste source descriptions previously discussed, information indicating level of waste hazard is available from Column 5, Column 6 and Column 7 of the Basel Convention Table 3 and Table 4 data. Column 5 contain UN class codes, Column 6 contain H-codes and Column 7 contain test

descriptions of the wastes. These codes are defined and discussed in Annex I and Annex II of the Basel Convention Articles (Secretariat of the Basel Convention 2006d). Basically, the information in these two columns and the two types of codes along with text descriptions in Column 7, provide information classifying the waste according to apparent description and innate characteristics. Using information from the above Annex I and Annex II, Appendix B provides definitions and a comparison of the UN class and Basel Convention H-codes.

In order to avoid any possible confusion concerning the codes used in this paper, the reader is encouraged to consult the extensive descriptions for all the Basel Convention codes, as well as my recoding of these codes and variables, which are shown at the end of this paper in Appendix B. The information in Basel Convention Annex I and Annex II contained in Appendix B shows that there are 14 UN class codes and 14 corresponding H-codes. Since the UN class codes correspond directly with each of the 14 H-codes, the use of only one set of these codes is all that is necessary to address the underlying waste hazard variable.

The fourteen UN class codes are collapsed into seven categories, by collapsing all categories containing fractions of the codes into whole numbers. For example, UN class codes 6.1 "Poisonous", and 6.2 "Infectious substances" are collapsed into code 6, which becomes "Poisonous or infectious substances", since the degree of hazard for these two UN Class subcategories are virtually the same. Basically in this case, I use the UN codes without the fractions added by the Basel Convention. In shipments without UN class codes, the corresponding Basel Convention D-codes, if available, are substituted. The seven resulting UN class codes are: 1, 3, 4, 5, 6, 8, and 9.

These seven new UN classes are used to make seven categories of a ten category waste classification variable. The other three categories are shipments containing a substance composed of 1 or more other (collapsed) UN class codes, coded 10, shipments with multiple substances that are a mixture of (collapsed) UN class codes coded 88, and shipments with unknown (collapsed) UN class codes coded 99. This UN class code category variable indicating hazard level is labeled HAZH.

As with the Country Case data file, the Origination Shipment Frequency and Destination Shipment Frequency data files use variables of characteristics of countries created primarily from data from the CIA Year 2000 Factbook (2001). However, additional information on characteristics of countries taken from United Nations, the World Bank, other global information publications, and websites is also used in creating variables for these latter two data files. These sources will be cited as each variable is created from information on the characteristics of countries and as each variable is operationalized..

APPENDIX E

BASEL CONVENTION MEMBERS YEAR 2000 WASTE REPORTING

TABLE E (Part 1): Parties to Basel Convention by year 2000*.

Participant	Date Accepted or Ratified		
	Month	Day	Year
Albania	06	29	1999
Algeria	09	15	1998
Andorra	07	23	1999
Antigua and Barbuda	04	05	1993
Argentina	06	27	1991
Armenia	10	01	1999
Australia	02	05	1992
Austria	01	12	1993
Bahamas	08	12	1992
Bahrain	10	15	1992
Bangladesh	04	01	1993
Barbados	08	24	1995
Belarus	12	10	1999
Belgium	11	01	1993
Belize	05	23	1997
Benin	12	04	1997
Bolivia	11	15	1996
Botswana	05	20	1998
Brazil	10	01	1992
Bulgaria	02	16	1996
Burkina Faso	11	04	1999
Burundi	01	06	1997
Canada	08	28	1992
Cape Verde	07	02	1999
Chile	08	11	1992
China	12	17	1991
Colombia	12	31	1996
Comoros	10	31	1994
Costa Rica	03	07	1995
Côte d'Ivoire	12	01	1994
Croatia	05	09	1994
Cuba	10	03	1994
Cyprus	09	17	1992
Czech Republic	09	30	1993
Democratic Republic of Congo	10	06	1994

*133 countries had ratified the treaty in time (1999) to receive the year 2000 data questionnaires.

** Countries that ratified treaty after 1999 were exempt from year 2000 reporting.

Table E continued on next page,

TABLE E (Part 2): Parties to Basel Convention by year 2000*.

Participant	Date Accepted or Ratified		
	Month	Day	Year
Denmark	02	06	1994
Dominica	05	05	1998
Dominican Republic	07	10	2000**
Ecuador	02	23	1993
Egypt	01	08	1993
El Salvador	12	13	1991
Estonia	07	21	1992
Ethiopia	04	12	2000**
Finland	11	19	1991
France	01	07	1991
Gambia	12	15	1997
Georgia	05	20	1999
Germany	04	21	1995
Greece	08	04	1994
Guatemala	05	15	1995
Guinea	04	26	1995
Honduras	12	27	1995
Hungary	05	21	1990
Iceland	06	28	1995
India	06	24	1992
Indonesia	09	20	1993
Iran (Islamic Republic of)	01	05	1993
Ireland	02	07	1994
Israel	12	04	1994
Italy	02	07	1994
Japan	09	17	1993
Jordan	06	22	1989
Kenya	06	01	2000**
Kiribati	09	07	2000**
Kuwait	10	11	1993
Kyrgyzstan	08	13	1996
Latvia	04	14	1992
Lebanon	12	21	1994
Lesotho	05	31	2000**
Liechtenstein	01	27	1992
Lithuania	04	22	1999

*133 countries had ratified the treaty in time (1999) to receive the year 200 data questionnaires.

** Countries that ratified treaty after 1999 were exempt from year 2000 reporting.

Table E continued on next page,

TABLE E (Part 3): Parties to Basel Convention by year 2000*.			
Participant	Date Accepted or Ratified		
	Month	Day	Year
Luxembourg	02	07	1994
Macedonia	07	16	1997
Madagascar	06	02	1999
Malawi	04	21	1994
Malaysia	10	08	1993
Maldives	04	28	1992
Mali	12	05	2000**
Malta	06	19	2000**
Mauritania	08	16	1996
Mauritius	11	24	1992
Mexico	02	22	1991
Micronesia (Federated States of)	09	06	1995
Monaco	08	31	1992
Mongolia	04	15	1997
Morocco	12	28	1995
Mozambique	03	13	1997
Namibia	05	15	1995
Nepal	10	15	1996
Netherlands	04	16	1993
New Zealand	12	20	1994
Nicaragua	06	03	1997
Niger	06	17	1998
Nigeria	03	13	1991
Norway	07	02	1990
Oman	02	08	1995
Pakistan	07	26	1994
Panama	02	22	1991
Papua New Guinea	09	01	1995
Paraguay	09	28	1995
Peru	11	23	1993
Philippines	10	21	1993
Poland	03	22	1992
Portugal	01	26	1994
Qatar	08	09	1995
Republic of Korea	02	28	1994

*133 countries had ratified the treaty in time (1999) to receive the year 200 data questionnaires.

** Countries that ratified treaty after 1999 were exempt from year 2000 reporting.

Table E continued on next page,

TABLE E (Part 4): Parties to Basel Convention by year 2000*.			
Participant	Date Accepted or Ratified		
	Month	Day	Year
Republic of Moldova	07	02	1998
Romania	02	27	1991
Russian Federation	01	31	1995
Saint Kitts and Nevis	09	07	1994
Saint Lucia	12	09	1993
Saint Vincent and the Grenadines	12	02	1996
Saudi Arabia	03	07	1990
Senegal	11	10	1992
Serbia	04	18	2000**
Seychelles	05	11	1993
Singapore	01	02	1996
Slovakia	05	28	1993
Slovenia	10	07	1993
South Africa	05	05	1994
Spain	02	07	1994
Sri Lanka	08	28	1992
Sweden	08	02	1991
Switzerland	01	31	1990
Syrian Arab Republic	01	22	1992
Thailand	11	24	1997
Trinidad and Tobago	02	18	1994
Tunisia	10	11	1995
Turkey	06	22	1994
Turkmenistan	09	25	1996
Uganda	03	11	1999
Ukraine	10	08	1999
United Arab Emirates	11	17	1992
Northern Ireland	02	07	1994
United Republic of Tanzania	04	07	1993
Uruguay	12	20	1991
Uzbekistan	02	07	1996
Venezuela	03	03	1998
Viet Nam	03	13	1995
Yemen	02	21	1996
Zambia	11	15	1994

*133 countries had ratified the treaty in time (1999) to receive the year 200 data questionnaires.

** Countries that ratified treaty after 1999 were exempt from year 2000 reporting.

End of Table E.

National reporting for Basel Convention (2000) Data

The following Table F shows Basel Convention members reporting data on their waste exports and imports that are included in Table 3, Export of Hazardous Waste and other Waste in 2000 and Table 4, Import of Hazardous Waste and Other Waste in 2000.

TABLE F: Countries Included in Basel Convention Nation Reports (2000).

Albania	Estonia	Papua New Guinea
Algeria	Finland	Paraguay
Andorra	France	Peru
Argentina	Gambia (The)	Poland
Armenia	Georgia	Portugal
Australia	Germany	Qatar
Austria	Hungary	Republic of Korea
Bahrain	Iceland	Republic of Moldova
Barbados	Indonesia	Romania
Belarus	Ireland	Russian Federation
Belgium	Israel	Saint Lucia
Bolivia	Italy	Senegal
Botswana	Japan	Serbia and Montenegro
Brazil	Jordan	Singapore
Bulgaria	Kiribati	Slovakia
Burkina Faso	Kyrgyzstan	Slovenia
Cambodia	Latvia	South Africa
Canada	Lithuania	Spain
Chile	Luxembourg	Sri Lanka
China	Malaysia	Sweden
Colombia	Mauritania	Switzerland
Comoros	Mauritius	Thailand
Costa Rica	Mexico	Tunisia
Croatia	Micronesia (Federated States of)	Turkey
Cuba	Monaco	Uganda
Cyprus	Mongolia	Ukraine
Czech Republic	Morocco	United Kingdom
Democratic Republic of Congo	Mozambique	United Republic of Tanzania
Denmark	Netherlands	Uruguay
Dominica	New Zealand	Uzbekistan
Ecuador	Norway	Venezuela
Egypt	Oman	Viet Nam
El Salvador	Panama	Zambia

The following nations reported their waste after the 2000 deadline, so their 1999 data is used in Table 3 and Table 4: Comoros, Mexico, Switzerland and Venezuela.