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by

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ABSTRACT

Various CO_2 permit schemes have been proposed as equitable, efficient, and politically acceptable means to effectively address the threat of global climate change. The present analysis suggests the direction, level, and terms of trade in North-South permit trading. Domestic permit market failure and international development aid experience are drawn upon for insight into a global permit system. The conclusion emphasizes inconsistencies in permit theory and the unfair and inefficient consequences of international application. Promoting the profitability of abatement in the developed world and a restructuring of development aid in the developing world is suggested in lieu of a single market approach.

INTRODUCTION

The Framework Convention on Climate Change (1992) arose out of both cooperation and conflict. Be it North vs. South, rich vs. poor, development vs. environment, or fairness vs. efficiency, more often than not, negotiators working towards a common goal found no common ground. The final Convention signed at the Earth Summit in Rio de Janeiro succeeded in universal acceptability, but at the expense of specificity, effectiveness, and equity.

Given the global nature of the cause and effects of climate change, an effective treaty requires widespread international cooperation. Cooperation, in turn, involves addressing both international equity and economic efficiency considerations. Chapman and Drennen (1990) define effectiveness as the impact on deferring a doubling of carbon dioxide (CO_2) concentration, and equity as the ratio of per capita consumption of fossil energy by developing countries to that by industrialized countries.

The Framework Convention suggests a freeze in industrial country emissions of CO_2, with a disregard for developing nation population and aggregate energy growth. Given the above definitions of equity and effectiveness, such a freeze would result in a CO_2 doubling in approximately 65 years and a small equity ratio improvement from 10:100 to 16:100 in 50 years (Drennen,1992a). In contrast, a CO_2 doubling is projected in 71 years under a business-as-usual reference case. It seems clear the the Framework Convention is not effective.

Consequently, the theory of tradable pollution permits has been proposed by many, both North and South[1], as a step towards a more effective, equitable and efficient means to greenhouse gas abatement. Initial attention has focused primarily on carbon dioxide (CO_2) due to its majority share of past and predicted radiative forcing, and the relative ease of national emissions computation. Most recently, a United Nations sponsored group of lawyers, economists, and energy specialists have thoroughly analyzed a system of tradable carbon entitlements (UNCTAD, 1992). The proposal was brought to Rio and has stimulated widespread support for market-incentive based climate change policy.

The present paper examines the theory of tradable permits in the context of North-South trading. Both the theoretical and application strength in the international setting is evaluated based on domestic permit experience, the history of world trade, and past export-led development efforts in the Third World. The conclusion criticizes tradable permits, supports the general direction of the Framework Convention, and suggests a more feasible, equitable, efficient, effective, and precedented step towards global climate protection.

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[1] North and South are used throughout to generalize the middle to high income, industrialized nations of North America, Europe, former Soviet Union, Japan, Australia, and New Zealand, and the low income, developing nations of Africa, Latin America, and non-Soviet Asia, respectively.

THEORETICAL PROPOSALS

The attraction of tradable permit schemes of pollution control is the theoretical attainment of both efficiency and fairness goals. Efficiency is viewed at the global market level as minimizing total abatement costs. The minimization path requires distributing the costs of CO_2 abatement to the lowest cost abaters. By assigning tradable permits, rather than inflexible uniform standards, national emissions decisions become internalized into rational cost minimization behavior. Nations adjust to their level of abatement by weighing the market cost of a permit against their unique marginal abatement costs (MACs). Revenue from permit sales provides an incentive to overcontrol and develop better abatement techniques. Through trading in a perfectly competitive market, CO_2 is abated at the lowest possible cost.

Fairness is generally viewed as distributing the burden of CO_2 abatement equitably. The few have realized a disproportionate benefit from the fires of industrialization, and now the many must face the consequences. Equity demands that the nations mainly responsible for any current commitment to global climate change, namely the industrialized world, should be allocated the majority of abatement burden. A two region political agenda arises : (1) reduce CO_2 emissions in the North without adversely affecting the industrial status quo, and (2) promote sustainable development in the South to increase standards of living while limiting rapid emissions growth. Tradable permits attempt to meet this challenge

through allocating equitable emissions rights and providing a market mechanism for North to South wealth and technology transfer.

In theory, the achievement of efficiency and fairness are separable. No matter how permits are distributed, a perfectly competitive and rational market will distribute the abatement burden to the least cost abater until all MCs are equalized. Thus most attention has turned to questions of equity in distributing permits. Numerous allocation schemes exist (see Rose,1992), most with the same central components : a surplus of permits in the South, a deficit of permits in the North.

As a basis for further analysis it is useful to quantify the extremes of permit schemes and their compromises. Table 1 lists the typical reference data by national income category. The total number of permits might initially be set at 5.8 billion based on 1990 tons of world industrial carbon emissions. At one extreme, this total could be distributed based on shares of 1990 emissions. All nations would then be required to either reduce emissions to 1990 levels, buy permits from another country, or a combination of both. In the tradition of permit theory, trading would be based strictly on differences in MACs since no permit surpluses exist. While such a distribution would be extremely beneficial to the status quo, fairness objectives fail. The North is essentially rewarded for past CO_2 emissions and the South's future development options are stifled, particularly if Southern permits are sold.

To promote distributional fairness, it is necessary to depart from the traditional emissions reference base. Often an egalitarian per capita approach is suggested at the other extreme, assigning

Table 1. Reference Data by Income Group (1990)

(Source : World Bank, 1992)

Country Group	Population (millions)	GNP (bill. of $)	GNP per Capita (dollars)	Energy Consumption(b) (kg oil equiv.)(c)	Industrial Carbon Emissions(a) (mill. tons C)
World	5,284	22,173	4,200	8,280,028	5,822
Low-Income	3,058	1,070	350	1,036,662	952
Middle-Income	1,088	2,409	2,220	1,476,416	1,061
High-Income	816	15,998	19,590	4,208,928	2,702
Other Economies(d)	321	2,696	8,400	1,549,788	1,089

Notes :

Low-Income : $610 or less

Middle-Inc : $611-$7619

High-Inc : $7620 or more

(a) 1989 Data

(b) Commercial forms of primary energy - petroleum and natural gas liquids, natural gas, solid fuels, and primary electricity (nuclear, geo, and hydro)

(c) Per capita weighted average * population

(d) Cuba, Korea(PDR), Former Soviet Union

permits according to a nation's share of world population during a base year. Thus every person, rich or poor, has an equal right to emit CO_2. Table 2 demonstrates the magnitude of permit surpluses that are created in the low and middle income groups, and the permit deficits created in the high income and former Soviet Union. Assuming a $40 market permit price (a ballpark figure given pricing assumptions such as found in UNCTAD, 1992), the maximum transfer from North to South is over $1 trillion. Agarwal and Narain (1991) propose a twist to the egalitarian approach by assigning per capita rights to the world's sinks of the various GHGs. Only two developed countries (Albania and Portugal) fall within their sinkable limits for CO_2. Permits can then be traded for natural "sink space" available in the South with the excess users in the North. This image of egalitarian shares of the earth's cleansing capacity depicts the South rising to their sustainable level of emissions, and the North falling to theirs.

In all likelihood, an emissions sovereignty base wouldn't be accepted by the South, and an egalitarian base, rewarding past population growth and promoting huge transfers, wouldn't be accepted by the North. To rectify the two extremes, Grubb and Sebenius (1992) suggest a weighting scheme which has gained widespread support. The population and emissions bases are given separate weights in determining periodic permit allocations. Base year emissions would be weighted more heavily at first and slide to zero over time, eventually reaching a per capita allocation. Table 3 represents an initial allocation with a 90% current emissions

Table 2. Permit Distribution - Egalitarian

Country Group	Current Emissions 1990 Base (mill. tons C)	Per Capita (mill. permits)(a)	Surplus/ (Deficit) (mill. permits)	Net Transfer at $40/permit (mill. $)(b)
World	5,822	5,822	0	
Low-Income	952	3,369	2,417	$96,694
Middle-Income	1,061	1,199	138	$5,511
High-Income	2,702	899	(1,803)	-$72,117
Other Economies	1,089	354	(735)	-$29,413

Table 3. Permit Distribution - Weighted Scheme

Country Group	Current Emissions 1990 Base (mill. tons C)	Population (millions)	Weights : Population=0.1 Emissions=0.9 (million permits)	Surplus/ (Deficit) (million permits)
World	5,822	5,284	5,822	0
Low-Income	952	3,058	1,194	242
Middle-Income	1,061	1,088	1,075	14
High-Income	2,702	816	2,522	(180)
Other Economies	1,089	321	1,015	(74)

Notes:
(a) 1 permit = 1 ton of carbon
(b) Assumes all available permit surpluses are purchased

weight and a 10% population weight. Low income nations still retain their permit surpluses but at a much lower level.

DISTRIBUTION OF MARGINAL ABATEMENT COSTS

The theory of tradable permits, as it was developed for domestic externalities, depends heavily on differences in MACs. Abatement costs for traditionally controlled emissions such as particulate matter, SO_2 (sulfur dioxide), NO_x (nitrous oxides), and VOCs (volatile organic compounds), have involved expensive techniques such as fuel switching, flue gas scrubbing, or plant closures. Initial attempts of estimating CO_2 MACs have been heavily influenced by these past methodologies and include costs of changing from fossil to non-fossil fuels, afforestation, CO_2 scrubbing, and limiting economic growth. Nordhaus (1991) reports the costs of CO_2 scrubbing in the range of $55 to $120 per ton of C, and of substituting methane for oil and gas in electrical generation from $300 to $700 per ton of C. Rose and Stevens (1992) find a general consensus of relatively higher mitigation costs in the industrialized nations. For instance, they estimate MAC's for the U.S., Canada, and Western Europe between $29 and $34 for a 10% CO_2 reduction, while the same estimates lie at about $7 for Indonesia and Brazil.

These estimates aim to reduce emissions without reducing total energy consumption, and presumably, maintain economic output. What they fail to incorporate are energy efficiency

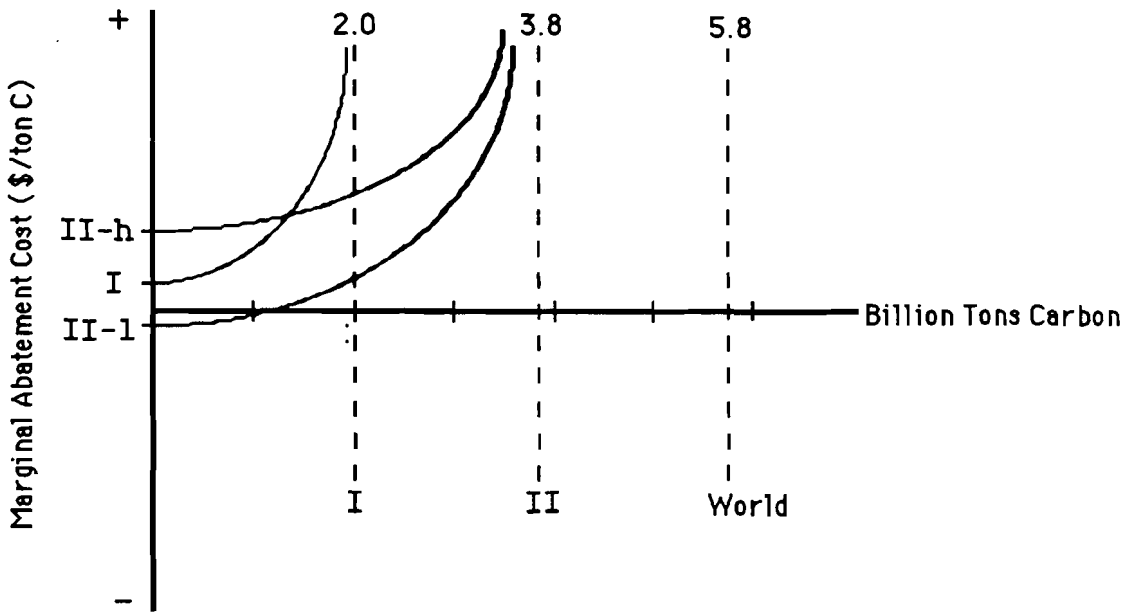
techniques which reduce energy consumption without affecting, or at times improving, economic output. Energy consumption is itself an expense. Before a rational nation would ever undertake huge expenses such as CO_2 scrubbing, it would most likely utilize measures to get the same or more output from less energy input.

Rubin et al. (1992) suggest that "a variety of energy efficiency and other measures that are now available could reduce U.S. emissions of greenhouse gases by roughly 10 to 40% of current levels at relatively low cost, perhaps at a net cost savings." The majority of these cuts come from CO_2. Innovations in lighting, heating, and refrigeration pay for themselves in energy savings. Likewise, higher fuel efficiency standards and power plant improvements can occur at zero and negative net costs. Similarly, Flavin and Lenssen (1990) conclude that by implementing cost-effective technologies the U.S. could "cut its projected annual carbon emissions by more than 20 percent by the year 2010, and in so doing save about $35 billion annually."

Figure 1 demonstrates the importance of a departure from traditional "cost with no benefits" estimates. When group II's MACs are assumed negative at first, the likely outcome is similar to curve II-l; a dramatic shift from the traditional cost estimates such as curve II-h. In this low MAC scenario, Northern MAC's remain less than Southern MAC's throughout the abatement spectrum. In addition, the amount of reductions that can occur are constrained by current carbon emissions for each nation group. Thus even when MAC's for group II are estimated to be higher than for group I, a point occurs when MAC curves must cross due to the constraining

asymptote of smaller current emissions in the less developed nations.

Figure 1. Marginal Abatement Cost Assumptions



I = Low/Mid-Income
II = High-Income/Former USSR
II-h = High MAC Estimate
II-1 = Low MAC Estimate

Furthermore, energy conservation promotes opportunities, not opportunity costs, for new markets, jobs, profits, and greater energy independence. Development of "clean" technologies, renewable energy, recycling processes, and sustainable resource stocks are the trends of the future and promise to increase employment opportunities (see Renner, 1991). For much of the industrialized world, initial CO_2 minimization means profit maximization.

President Bush's "No Regrets Policy" in the final climate negotiations is based on these premises of alternative benefits to CO_2 reduction. The U.S. held that their CO_2 emissions would be cut by 7-11% of projected emissions for the year 2000 due to other policies which made political and economic sense aside from addressing the uncertainties of climate change (Drennen, 1992b). Such policies include the 1990 Clean Air Act Amendments and a future National Energy Strategy.

If MACs in the North lie beneath MACs in the South throughout or over a significant portion of abatement, or if nations are reducing CO_2 for non-climate change reasons, serious doubts are thrown on popular notions of the direction of trade in CO_2 permits. Theory dictates that low cost abaters are sellers of permits. Therefore, the majority emitters of CO_2 would reduce wasteful emissions for a profit, or at least with relatively low costs, *and* profit from the sale of permits to the developing world. Of course, this makes no sense in terms of fairness, politics, or if the Third World held permit surpluses; yet theory fully supports this notion. In all likelihood, a permit system based on such a distribution of MACs would result in no trade, cost-effective abatement in the North, and zero assistance to the South. In terms of global market efficiency, CO_2 reduction should occur in the North anyway, where MACs are lowest. In terms of fairness objectives, sustainable development assistance for the Third World is left to a Northern favored market mechanism, in which little or no wealth and technology transfer are likely to occur.

THE FALLACY OF THEORY

To further evaluate claims to efficiency and fairness, it is necessary to take two steps back and quantify the level and terms of trade in a CO_2 permit system if North to South wealth transfer would indeed occur. After all, the case of U.S. energy inefficiencies doesn't necessarily apply across the board. In fact, current economies such as Japan and Germany may have already exhausted much of their "free" abatement opportunities in response to the oil shocks of the 1970's. For instance, Japan's Ministry of International Trade and Industry assumed vast powers to allocate fuel and power, promoting stringent factory conservation measures, while passing higher costs on to the consumer. Development and installation of energy-efficient industrial processes followed suit, and highly energy-intensive industries were relocated abroad (Delfs, 1992).

Furthermore, it can't be ruled out that Northern nations would act irrationally and buy permits from the South despite negative or low MACs. Significant implementation barriers and costs currently exist towards energy efficiency strategies and may continue to persist (see Rubin et al., 1992). Such "hidden" costs also raise Northern MACs. Lastly, steeper cuts in CO_2 emissions, beyond low cost options, may require relatively more expensive abatement in the North given CO_2 dependent lifestyles.

Buyer Marginal Cost Pricing

In theory, permit prices are set by the anonymous forces of the market which push to equalize MACs between players. Given popular permit distribution scenarios in which the South holds a surplus and the North faces a deficit, such a marginal cost pricing system fails. A CO_2 limit in the North constrains current emissions as they must weigh the cost of abatement against the cost of a permit, essentially setting the ceiling on a permit price. To an underdeveloped nation, however, with a surplus of permits, their CO_2 entitlement is a non-binding constraint having a marginal value of zero. A poor nation certainly can't afford to exercise the pollution rights granted by surplus permits, and in fact, may be depending on surplus permit sales for development assistance. The only option available is to sell at whatever price it can receive.

Southern permits would be sold to the North because they have no Southern use, a clear departure from buyer/seller marginal cost pricing. Market power tips in favor of the buyer, but exercising such power depends on another critical assumption of competitive theory: the anonymity and neutrality of a world CO_2 permit market.

Domestic Market Failure

To gain insight into the workings of a North-South CO_2 permit market it is necessary to evaluate past domestic experience with tradable pollution permits. Applications have occurred in regulating conventional air pollutants, lead in gasoline, ozone-depleting

chemicals, water pollution, and acid rain (see Tietenberg, 1992). The U.S. experience with tradable permit schemes typically grounds the support for international application. Given recent analysis, grounds for criticism seem more appropriate.

The U.S. experience was formalized with the 1977 amendments to the Clean Air Act (CAA) of 1970. The amendments created partial permit schemes by incorporating emission reduction credits (ERCs) in systems of emissions bubbles, offsets, netting, and credit banking. Market size limitations, system design flaws, and unfaithful markets have limited the trading and subsequently, restricted the potential cost savings. In the past five years, the historical praise of permits turned into an evaluation of "what went wrong" as only fractions of theoretical efficiency gains were realized.

Theory assumes anonymity and price taking behavior for all market players. Yet Atkinson and Tietenberg (1991) quantify a critical flaw in U.S. permit market design : trades were bilateral and sequential. When permit trades develop through a sale by sale, source to source, negotiated process, the efficiencies from perfect competition are diminished considerably. The opportunity to exercise market power prevails as the neutrality of price taking behavior is lost and permit prices fall victim to the distortion of price asking behavior. No market price is created, and trading becomes a belabored, uncertain process.

This uncertainty combined with high transaction costs placed further limits on the amount of transfer that occurred in the U.S. permit market. Raufer and Feldman (1987) surveyed a number of U.S.

electric utilities to determine the internal symptoms of domestic permit market failure. More than 95% of the transactions occurred within firms. Sufficient amounts of ERCs were generated through overcontrol and plant retirements, however, very few were banked or externally traded due to lack of faith in the market. The basic fear was that overcontrol wouldn't get credit or would be made mandatory. In fact, instances existed where banked credits were confiscated by regulators. Hoarding ERCs was simply rational, risk averse behavior. As a result, far less advances in emissions controls were created from the so-called market incentive system.

The survey also revealed the tremendous transaction costs involved in external trades, diminishing payback on overcontrol considerably. For example, Pacific Gas & Electric sponsored a study to locate emissions offsets in the San Francisco Bay area which lasted 10 months, cost $56,000, and found only 1 out of 200 sources willing to sell. The utility eventually spent $70,000 on an offset, slightly more than the searching costs alone. This union of buyer and seller occurred within the same state, with the same language, the same currency, the same government, the same culture, and the same market power. The complications in a North-South national trade could far exceed this domestic example.

Domestic Experience to International Application

There is no evidence to suggest that an international permit market could avoid the above flaws in domestic application. The history of world trade is based on bilateral and sequential trading.

Import/export contracts are negotiated on a price bidding system, fully susceptible to market power influence. Oil and grain markets may be the only sound exceptions that exist, and even so, prices are dictated by actions taken in wealthy nations.

An international CO_2 permit market seems particularly susceptible to the distortions of uncertainty and high transaction costs, although for different reasons. National CO_2 emissions from fossil fuel use can be roughly estimated on a "what goes in, must come out" basis, but emissions from land use changes are only best guesses. Such uncertainty weighs heavily on crediting maintenance for national carbon sinks.

Article 4 of the Framework Convention requires national inventories of sources and sinks for CO_2 and other GHGs. Fulfilling this requirement would help alleviate some uncertainty, however, political bickering seems more likely. The IPCC quantifies carbon sources of 7.0 +/- 0.5 GtC/yr and sinks of 5.4 +/- 1.0 GtC/yr, indicating a missing sink of 1.6 +/- 1.4 GtC/yr (Drennen, 1992b). The battle for rights to such a sizable sink can only delay inventory requirements and add to the frustrations of market uncertainty.

Fluctuations in exchange and interest rates, evolving scientific knowledge, North-South information barriers, and implications of market power, all enforce international uncertainty. The information, infrastructure, and financial transaction requirements to compete in world trade further impede a North-South trade zone. In addition, the costs of enforcing abatement are magnified given the weak international nature of record keeping and legally binding enforcement mechanisms. The element of trade adds

sufficient enforcement costs that may far outweigh costs of uniform standards. In fact, the economic conditions for minimizing abatement costs and minimizing enforcement costs may differ (see Malik, 1992).

Still, advocates of tradable permits feel valuable lessons have been learned from the past and look to the 1990 CAA amendments as precedents for the future. The amendments outline the creation of a national permit market for controlling sulfur dioxide (SO_2) emissions, the principal component of acid deposition. In addition, they encourage the privatization of a spot and futures market to handle transactions. The Chicago Board of Trade is in the process of establishing a SO_2 permit trading floor (see Walters, 1992), and soon the potential of theoretical efficiencies may finally be realized. However, the first trade between Wisconsin Power and Light and the Tennessee Valley Authority resumed the past bilateral process.

The UNCTAD (1992) report proposes the eventual creation of a similar international CO_2 permit spot and futures market. It must be emphasized that North-South world trading is extremely more complex than the relative uniformity of a domestic market. An international spot and futures market would have to bridge canyons between the diversity of currencies, market access, and trading power between nations. In modern domestic markets everyone is more or less an equal player. In a North-South world market, inequality is the rule, not the exception. For an international CO_2 permit market to overcome the stigma of past domestic market

failure would be a tremendous task. To reverse the nature of world trade would be an economic, cultural, and political miracle.

TRADABLE PERMITS IN THE GLOBAL STATUS QUO

Arguments for the location of market power and the means to exercise it have been outlined. It is now necessary to raise these criticisms against tradable permits in the context of the history of North-South, rich-poor, post-colonial relations. A clearer economic interpretation of a worldwide CO_2 permit system will then become evident.

North-South Trade in Perspective

Trade has often been viewed as a means by which developing nations move out of poverty and on to the road to prosperity. In theory, establishing export industries in the Third World brings in foreign currency to buy products and services necessary for a modern, industrial culture. The Newly Industrialized Countries (NICs) of the Pacific Rim, have taken this theory to heart through massive export growth. In fact, South Korea, Taiwan, Singapore, and Hong Kong "have forged the fastest industrial revolutions the world has ever seen" (Asia's Emerging Economies, 1991). GNP growth rates doubled and tripled that of OECD nations throughout the 1980's. The NICs have been successful through developing a level of economic integrity with a commitment to education, infrastructure, domestic

investment, and control over their own destinies. However, export-led growth does not always have this result.

Take the case of sub-Saharan Africa. Export-led development initiated by First World corporations and multilateral institutions has not been successful. Fantu Cheru (1989) describes a continent controlled by the forces of a Northern market and a people in which "development has always meant the progressive modernization of their poverty." Rather than build capital from development aid, Africa became a net exporter of capital in the 1980's. OPEC oil shocks, shortfalls in export earnings, and declining Official Development Assistance, kept debt growing at 25% per year throughout the 1970's and early 80's. In 1986, Africa received $18 billion in aid, yet paid out $15 billion in debt service. During the same year, the International Monetary Fund (IMF) took out $1 billion more than it put in (Cheru, 1989).

Cheru emphasizes that entire African economies are dependent "on the export of a few commodities to a limited number of markets." When world demand for these products declines, or the dollar appreciates, or international interest rates soar (i.e. 20% in 1981-82), African economies are destroyed. The export earnings that do accumulate are applied towards debt. In 1983, an average of 25% of export earnings were used to service debt. Tanzania, Sudan, and Zambia were applying over 100% of export earnings towards debt servicing (Cheru, 1989).

Sub-Saharan Africa is one case of a host of Third World regions in which export-led development has produced tremendous debt burdens and Northern market dependency. In fact, Africa's debt

burden pales in comparison to the majority of the developing world. The Third World as a whole owed $1.2 trillion in 1989 (nearly one half its cumulative GNP) and in 1988 sent $43 billion more to the industrialized world in debt service than they received in new capital (Tietenberg, 1990).

A permit market in which the South is the exporter and the North is the importer is essentially another export-led development strategy. Instead of exporting cheap natural resources or pollution intensive products, the South will export its right to develop. In addition, Kinuthia and Nyangena (1991) speculate the immediate impact of tradable permits may be to increase costs of African imports due to increased costs to producers in the purchase of permits. Given Africa's dependence on imports for manufactures, the shifting of Northern permit cost to the Southern capital importers can only further deteriorate terms of trade. Depending on the elasticity of import demand, the entire cost of a U.S. permit could be shifted through the price of a Kenyan import.

Supporters of permits claim they can be distributed such that the South has sufficient cushion to develop sustainably plus extra permits to sell and finance this development. If history truly does repeat itself, the majority of developing nations will find new dependence in the export of CO_2 permits, the developed world will control the terms of trade, and Northern demanded environmental goals will be upheld at the expense of Southern impoverishment.

Monopsony Power and Perfect Price Discrimination

In an effort to summarize the terms of trade in an international CO_2 permit market, it is useful to adopt two notions of economic theory departing from the social optimum of perfect competition.

First, given location of market power and the traditional mechanisms available to exercise such power, the few, rich, energy inefficient nations can collectively act as a monopsonist. Considerable trade unionization currently exists in the industrialized world as the dollar, deutsche-mark, and yen economic blocs emerge from the post-cold war. Developed nations may collectively act, while the multitude of disorganized, poor permit exporters accept any income transfer available. Similar to a factory in a one factory town, where suppliers of labor have no choice but to take the wage rate set, permit exporters have no choice but to accept any permit price offered.

Monopsony power carries with it a second type of market power : the ability to discriminate perfectly between permit sellers. In the bilateral trading process described above, buyers and sellers are not anonymous, and no market price exists. The North could pick and choose between developing nations and exploit its monopsony power to set prices it deemed appropriate. Trade would most likely exploit the weakest of the weak first, and then move up the scale sequentially until market barriers such as uncertainty and transaction costs prevailed.

Corruption

There is a need to address perhaps the greatest barrier to efficient and fair North to South transfer, namely the presence of widespread corruption in First/Third World relationships. Corruption certainly isn't unique to this setting, only more blatantly pervasive, definable, and debilitating.

To extend the example of sub-Saharan Africa, export earnings often vanish into the pockets of corruption. Nothing represents its presence more than the image of the African "Big Men" rulers and their kinship with the power and greed of Western exploitation. Blaine Harden (1990) describes the realities of the "kleptocratic" state in the case of Zaire and its self-proclaimed Big Man, Mobutu Sese Seko. Mobutu himself describes the system as follows : "In a word, everything is for sale, anything can be bought in our country. And in this flow, he who holds the slightest cover of public authority uses it illegally to acquire money, goods, prestige or to avoid obligations." Northern industry and government have built Mobutu's personal wealth to an estimate of over $5 billion. In return, Zaire's copper and cobalt are obtained at less than market prices (Chapman, 1992a). All the while, the people of Zaire are left with the eighth poorest nation in the world in which "poor nutrition and poor health care leave one-third of Zairian children dead before age five" (Harden, 1990).

Many nations of Africa are ruled by similar Big Men, in which bribes, not market prices, run First to Third World ventures. In an international CO_2 permit market, Africa would likely have large

permit surpluses for sale, and to the "kleptocratic" system, the opportunity is welcomed. Nation to nation trade strictly flows funds into state hands, precisely where corrupt practices are most prevalent and debilitating. Past exploitation of the African populace could only continue through sales of such "Mobutu entitlements."

The example of Zaire, or sub-Saharan Africa in general, isn't used to plead for the extreme cases of corruption and self interest. It is employed rather as a reminder of the legacy of export-led development, Western implanted free-market idealism, and the realities of the international market place. CO_2 reductions and development aid transfer, left to the blind eyes of the marketplace, scantily resemble popular notions of fairness and efficiency.

FIRST WORLD WASTE AND THIRD WORLD POVERTY

Continued, unsustainable CO_2 emissions growth stems from two sources : the disproportionate, uneconomical, wasteful burning of fossil fuels in the North, and the unsustainable, resource degradation and future "dirty" development forced by poverty in the South. Disguising the causes under a single global market avoids the realities of the situation. Effectively addressing the causes, and thus tackling climate change, requires a direct commitment in abatement from the North and development cooperation with the South.

First, it has been argued above that both responsibility and lowest cost abatement lie within the borders of the industrialized

world. So why let an irrational, unpredictable, inequitable market allocate the burden of CO_2 abatement if global fairness and efficiency already dictate its location? The Framework Convention establishes a precedent in this direction. It requires adoption of national policies by developed country parties detailing plans to return CO_2 and other GHG emissions "individually or jointly" to 1990 levels (Drennen, 1992b). A departure from this step of commitment towards a market system would allow for tremendous ambiguities in abatement responsibility and ultimately shift the burden disproportionately to the weakest market players.

Secondly, it's more feasible and effective to restructure current development assistance efforts than to impose an unprecedented, unpredictable market mechanism for transfering development funds. Sustainable development requires Northern assistance. Yet tradable permits offer a process that buys Southern development rights. Rather than transfer aid to the "kleptocratic" state through selling CO_2 rights to the wealthy, inefficienct state, assistance would be utilized more effectively in the hands of the people to build their own economies, democracies, and competitiveness. Improving the macroeconomic statistics of a poor country is not enough. Aid must benefit the poor people of a poor country (Ekins, 1989). Poverty dramatically distorts the time preference of resource use, perhaps to the point where extinction is optimal (see Chapman, 1992b). Only by eradicating poverty, can the international community address the longer term protection of the global climate.

In addition, although politically unpopular, a push for equal representation for the Third World in multilateral institutions is a necessary step for international equality. This political process starts with revamping the Global Environmental Facility, the organization designated as the "interim" funding agency in the Framework Convention.

In terms of effectiveness, linking policies in population control, economic development, energy taxation, and forestation, could bring about atmospheric CO_2 stabilization. Chapman and Drennen (1990) investigated a treaty initiative which would reduce developing country population growth and increase income growth, while taxing energy and foresting 10 million acres annually. A doubling of CO_2 was avoided under such a scenario, while the tax revenue, mainly from the industrialized nations, was assumed available for renewable energy research and energy efficiency implementation in developing countries. Again, masking the solutions to waste and poverty under a single market avoids firm, effective decisions on energy, development, population, and forestry policy.

The legal and societal precedent of chlorofluorocarbon (CFC) treaties lays the groundwork for similar CO_2 treaties with time scales for compliance, efficient and fair levels of commitment, and international aid for development.

CONCLUSION

By separating the risks of environmental degradation into the dual causes of Northern wastefulness and Southern poverty, global CO_2 emissions can be viewed at two levels : "luxury" and "subsistence". Shue (1992) notes that the "central point about equity is that it is not equitable to ask some people to surrender necessities so that other people can retain luxuries." The central point about efficiency is that it is more efficient to reduce excess than to stifle growth. Tradable CO_2 permits seem likely to shuffle responsibility and avoid efficient abatement, and therefore effectiveness in reducing CO_2 emissions growth is unlikely.

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