Are More Open Economies More Sustainable? A Quantitative Assessment, 1980–2000

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Abstract

While many herald globalization—the increasing interconnectedness of national economies—to be associated with rising standards of living across the globe, many others fear its effects on economic sustainability. Anti globalization forces and environmentalists in particular view these developments as a threat to intergenerational equity and the health of the environment because of profligate consumption. This study is one of the first to estimate the effects of dependence on trade, Foreign Direct Investment, and an index of economic freedom on the World Bank's measure of sustainability (the genuine savings rate), which measures the rate at which the stocks of physical, human, and natural capital exceeds its depreciation. Contrary to pessimists, openness to the global economic system has positive effects on national rates of genuine savings, results that are robust to sample size, testing procedure, and several alternative specifications. The results support those who suggest that distorted economies tend to be inefficient converters of natural and human resources into wealth. If trade openness and increasing economic freedom are hallmarks of globalization, then worries about its effects on future well-being are misplaced.

The unprecedented rate of global interconnection is leading to dramatic changes in lifestyles and consumption patterns; the consequences of this for ecosystems is not yet clear (Millenium Ecosystem Assessment 2003: 98).

While many view growing economic interdependence as good for global prosperity, others fear its effects on economic sustainability, not least because of fears that over consumption will destroy the environment before prosperity for all can be achieved (MEA 2003; Mikesell 1992; Neumayer 2003; Pearce and Warford 1993; Sampson and Chambers 2002; WCED 1987). The pessimists expect globalization to increase the 'ecological shadow' over the South as a result of the consumption of the rich North, decreasing the earth's total carrying capacity (MacNeill, Winsemius, and Yakushiji 1991; Meadows, Meadows, and Randers 1993). The fierce competition resulting from free market globalization is expected to drive down environmental standards everywhere. This study will examine the effects of openness to trade and foreign direct investment (FDI) and an index of economic freedom on national rates of genuine savings (adjusted net savings), a broad indicator of economic sustainability with wide coverage spanning a period of roughly 20 years (Atkinson and Hamilton 2003; Hamilton 2001; World Bank 1997).[1] This is the first study to test the effects of globalization and economic freedom on an indicator of economic sustainability developed by the World Bank's department of environment, which captures the rate at which investment in manufactured, human, and natural capital exceeds its depreciation (World Bank 2002).

The question is not just academic. Policymakers at many levels seek to harmonize urgent societal requirements, such as growth of income, employment, and general well-being while

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[1] The term 'genuine savings' was coined by Kirk Hamilton and subsequently appears as 'net adjusted savings' in the World Development Indicators. Genuine savings is net savings minus resource depletion (fuel, minerals, ores, metals, and forests), minus costs of CO_2 pollution, plus investment in human capital. While traditional national accounting treats government spending on education as consumption, the adjusted savings treats it as investment. If resources are being used unsustainably, together with higher pollution, and lower investment in people, then a society is ostensibly on an unsustainable path of development (Dasgupta 2001; Hamilton and Clemens 1999). We examine the measure and concept in greater detail below.

ensuring intra- and inter-generational equity. It is increasingly recognized that ecosystems provide services for human well-being far beyond just the most immediate economic wants. These services are not reflected in the prices for those goods narrowly derived from a particular resource (Dasgupta 2001; MEA 2003). For example, trees are not just wood for furniture, but the loss of forests affects the quality of water, soil, and hence of food, not to mention the associated costs incurred from the loss of biodiversity. The green accounting program within economics seeks to value economic activity so that trade offs to pure accumulation of physical capital can be better accounted by taking into consideration true costs of economic activity. For example, wealth that comes at the expense of environmental harm may reduce future well-being. There is also a case to be made that achieving pure economic benefits without regards for sustainability could result in ill-being even for the present generation, and many suggest that economic development should proceed in a way that buffers ecosystems from anthropogenic harm (Arrow et al. 1996; MEA 2003). Therefore, the maintenance of all forms of capital that is valuable for production and consumption into the future with minimal depreciation of the natural environment and human capital is a desirable goal, a notion widely accepted by the pioneers in the profession who seek to measure sustainability objectively so as to translate knowledge into policy (Pearce and Warford 1993). As many note, economic sustainability may be achieved when capital, including natural capital and clean air, should be non-declining (Dasgupta 2001; Goodwin 2003; Pearce and Atkinson 1993; WCED 1987).

Today, the World Bank and other organizations devoted to development acknowledge 'good' and 'bad' growth (Thomas et al. 2000). The World Bank's genuine savings rate, or genuine investment, is a result of this new thinking and is one measure that tracks the trajectory of sustainability/unsustainability of countries based on a widely held precept that sustainable

development is the ability to maintain (increase) manufactured, human, and natural capital (Atkinson et al. 1999; Goodwin 2003; Hamilton and Clemens 1999; Mikesell 1992). Because the assumption of this approach is that substitutability between these forms of capital are high, this measure is admittedly one that captures 'weak sustainability' (Costanza and Jørgensen 2002; Neumayer 2004; Pearce and Atkinson 1993).[2] Atkinson and Hamilton (2003: 1804), nevertheless, conclude a recent paper by suggesting that 'it would be interesting in future work to examine the determinants of the genuine savings rate.' How then does increasing globalization determine our chances for achieving weak sustainability? The paper is organized as follows; first I examine arguments about globalization and economic sustainability, examine the relevance of genuine savings as an important empirical indicator measuring the concept of sustainability, present results, and conclude.

Globalization and Sustainability

This study approaches the question of globalization and sustainability from a national perspective by measuring the degree to which states are exposed to, or are connected with, the global economic system. It is standard practice to measure globalization as 'interconnectedness' through trade and foreign investment penetration (Birdsall and Lawrence 1999; Nye and Donahue 2000). According to Mikesell (1992: 141) sustainable development economists have largely ignored the macro concerns of conventional development economists, and their analyses have been 'historical and anecdotal.' He goes on to add that 'a comprehensive treatise on sustainable development should integrate the macroeconomics of conventional development with the special concern of natural resource sustainability and environmental protection' (Mikesell

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[2] As opposed to weak sustainability, strong sustainability is the view that all natural capital should be kept intact and that substitutability between forms of capital is not possible. Strong sustainability arguments in the globalization debate, however, are less prevalent given the preoccupation of both the right and left with job creation and concerns over relative economic well-being. In fact, strong environmentalism, largely prevalent in the North, views sustainable development to be a contradiction in terms.

1992: 141). Since most studies either dwell only on the welfare effects of trade, and others merely try to assess trade's effects on the environment, Coxhead and Jayasuriya (2003: 29) contend,

> A complete assessment of the welfare effects of trade must strive to include the consequences of its impact on the environment along with its effects on utility derived from the consumption of marketed goods and services.

This study attempts to address the concerns of conventional development economists who see trade and investment as sources of good, since they promote growth and development, and environmental economists who argue that such processes do not adequately consider the true costs incurred from environmental harm and resource depletion.

While any form of human activity damages the environment to some extent and reduces sustainability, the concept of the 'ecological shadow' is a useful lense through which to view globalization's impact on sustainable development. Since globalization is viewed as a process of economic activity that draws all countries into one production and consumption logic applicable across the globe, it is useful to ask to what degree being dependent on trade and FDI influences a country's ability to maintain its stocks of capital, or in other words, transform natural resource use into total wealth.[3] As some claim, globalization will increase the ecological shadow over the South because poorer countries will be exploited because of the profligacy of Northern consumption. The question is whether being tied to the global system enhances, or retards, the ability of countries to increase their chances of being sustainable. For example, are the effects of

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[3] Many also use the concept of the 'ecological footprint.' This concept relates to the amount of environmental resources, defined as the available area of land (habitat) required for sustaining the current levels of consumption as well as for absorbing the refuse and pollution resulting from consumption (Wackernagel et al. 1999). This concept gives little room for the substitution of environmental resources with physical capital, nor can it adequately account for trade as a substitute for scarcity—Singaporeans have more (and better) water resources at their disposal than large resource wealthy states such as Nigeria, the DRC, or Angola because human and physical capital substitutes scarcity.

any intensity in consumption that is driven by globalization seemingly affecting those states tied more closely to the global capitalist system?

Some highly popularized, anecdotal and journalistic arguments suggest that globalization leads to 'global pillage' (Brecher and Costello 1994). Anti-globalization activists successfully scuttled the Multilateral Agreement on Investment (MAI) on the basis that it would allow corporations to destroy the global commons at will. Giant corporations are accused of 'stealing' the patrimony of the poor and the unborn for conspicuous consumption by the rich (Hardt and Negri 2000; Korten 2001; Martin and Schumann 1997). Others argue that greater interdependence between rich and poor states and the liberation of markets from the clutches of profligate states will enhance wealth, increase efficiency, and break down barriers against international environmental cooperation (Baghwati 2000; Frankel 2003). As liberals point out, autarkic policies and government-dominated production have caused environmental havoc in places such as the former USSR because of unsustainable management of resources, inefficiency, and inadequate channels for civil society to affect policies. Markets will enhance the influence of consumers over production decisions, driving more environment-friendly developments. According to these scholars, it is subsidization of inefficient production, not free trade, which hampers sustainable development (Birdsall and Wheeler 2001; Yu 1994). Activists who scuttled the MAI apparently 'fight the wrong enemy' (Graham 2000).

Whether or not market mechanisms are likelier than others to induce required change for harmonizing economic interests with those of the planet are at the heart of the globalization debate.[4] The debate mirrors older theoretical splits in the social sciences and development

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[4] There are several environmental discourses. The 'survivalist' discourse is particularly prominent, represented by neo-Malthusians, whose chief concern is with population pressure and anthropogenic effects on the planet's natural resource base. For detailed analysis, see Dryzek (1997). For general debates on the subject, see Conca and Dabelko (1998).

studies, which pitted dependency/world systems theorists against liberals and modernization theorists concerning the fundamental nature of whether or not closer contact between rich and poor results in exploitative outcomes, such as the export of pollution and environmental degradation.[5] Sociological theories in particular are split between those who argue that as societies modernize, they adapt their ways to reflect greater concern for the environment. Thus, modernization enhances prospects of sustainable development. World-systems theory, on the other hand, views closer contact between rich and poor as a barrier against endogenously determined paths of progress. Greater integration of developing states in market relations diminishes their agency to act independently because they become locked into dependent relations with the rich, who benefit at their expense. Countries more dependent on the world system through trade and investment are expected not to be able to follow sustainable paths of development (Grimes and Kentor 2003; Roberts and Grimes 1997; Roberts and Hite 2000; York, Rosa, and Dietz 2003; Zammit 2003). Likewise, even neo-realist theories in International Political Economy suggest that the world system is structured in such away that the rich and powerful benefit disproportionately at the expense of the weak because the strategic interests of the powerful determine outcomes in the system (Gilpin 2000).

The effects of globalization on environmental sustainability are theoretically and empirically ambiguous in several ways (Dean 2001; Frankel 2003). First, poverty supposedly pollutes. Poor people degrade the environment through such practices as slash-and-burn agriculture, employ outmoded and inefficient production systems, remain poor by being dependent on natural resource exports, burn biomass that drives the green house effect, and they are highly dependent on burning fossil fuels for energy, particularly coal. The Brundtland

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[5] For review of long-standing theoretical debates and empirical evidence in political science and sociology concerning the effects of MNCs on development, see de Soysa (2003).

Report, which popularized the term 'sustainable development', regards economic growth and development that is mindful of environmental degradation as desirable, possible, and as the only way to ensure future well-being (WCED 1987). Moreover, one of the driving forces of research on the trade-environment relationship is the so called 'Environmental Kuznets Curve'(EKC), following on from economist Simon Kuznets' proposition on income growth and inequality. Accordingly, environmental quality is expected to worsen with increasing income and then improve after a certain threshold, computed by some to be around $5000 to $8000 per capita depending on which pollutant one looks at (Grossman and Krueger 1995).

The support for the EKC is highly mixed, although many observe that environmental regulation does in fact increase markedly with rising income (Copeland and Taylor 2003). Thus, trade and FDI should be good for sustainability because they promote growth (Birdsall and Lawrence 1999; Collier and Gunning 1999; Dollar and Kraay 2000; Frankel and Romer 1999; Srinivasan and Baghwati 1999). FDI is thought to supply poor countries with markets, transfer technology and capital, and above all, provide employment. The evidence seems to suggest a robust relationship between FDI, growth, and poverty reduction (Borenzstein, de Gregorio, and Lee 1998; Cooper 2001; de Mello 1999; de Soysa and Oneal 1999; Klein, Aaron, and Hadjmichael n.d.). Does this wealth come, however, at the expense of 'mother nature' and future well-being given the uncertainties surrounding the EKC? Moreover, does the fact that environmental conditions improve in rich countries mean that the problems are displaced on the poor through trade and FDI?

Many contest the notion that poverty pollutes more than wealth on grounds that the rich consume more and perhaps waste more. In other words, the luxurious 'greed' of the rich cannot be compared with the survival 'needs' of the poor. These analysts suggest that increased trade

will accentuate the profligacy of the already rich. The rich will expand their consumption possibilities at the expense of the poor by displacing the environmental costs on them (Fernando 2003). This proposition relates to what many term the 'pollution haven hypothesis,' whereby polluting industries move from more stringent regulatory environment to lax ones. The evidence for such a phenomenon is weak (Birdsall and Wheeler 2001; Copeland and Taylor 2003). Many pessimists argue, however, that increasing income alone will not automatically take care of environmental problems among the poor, since the level of income of many poor countries is so low that increased consumption in rich areas will place such a heavy burden on an already overloaded planet that the productive system may collapse long before prosperity is achieved (Daily and Ehrlich 1996; Daly 1993; Ekins, Folke, and Costanza 1994). In other words, increased economic activity across the globe can magnify the effects of human activity on the ecosystems. According to some,

> The pursuit of high and rising consumption in the North and of development in the South have together led to the increasing exploitation of natural resources in unsustainable ways, often by TNC investment in resource-extractive industries in developing countries (Zammit 2003: 137).

Secondly, the optimists reply that trade and FDI allow efficient allocation of resources across the world. According to the theory of comparative advantage, trade allows countries to specialize in those activities it has an advantage in so that countries with an abundance of one resource can trade with those that are abundant in another, thereby achieving maximum output for a given input—in other words movement towards sustainability because waste is minimized (Brack 1995). The pessimists counter that increased consumption leads to cost cutting that comes at the expense of sustainability. As some claim,

> Policies focusing on liberalization, deregulation and export orientation respond to the logic of short-term profit maximization and international competition that intensifies the need for cost-

cutting. The result is the rapacious exploitation and wasteful use of
natural resources (Zammit 2003: 137).

Further, some pessimists reply that comparative advantage may work against efficiency viewed in terms of the dependent nature of most poor countries on the export of primary commodities. Increased trade may snare the poor countries in a 'specialization trap' that locks them into servicing a world market growing ever more hungry for extractive resources (Røpke 1994). Others have argued that political structures within countries favor capital at the expense of resource protection and thereby subsidize foreign investors at the expense of sustainability (López 2003). These arguments are similar to the traditional dependency perspective visible in the non-economic social sciences that views the 'world capitalist system' as functioning at the behest of a core group of wealthy countries, resulting in the exploitation of the poor countries that seem to exist to service the needs of the rich (Bornschier and Chase-Dunn 1985; Cardoso and Faletto 1979; Galtung 1971; Hoogvelt 2001). Thus, even if one ignores the issue of the wealth-creating effects of trade and FDI, it is certainly not clear whether higher consumption resulting from income growth can be achieved without compromising future well-being and avoiding ecological collapse—if not for the rich, at least for the poor. According to one report,

FDI-led growth in particular would fuel economic development at
a scale and pace that overwhelms host country regulatory capacity,
resulting in inefficient and irreversible environmental destruction
and even potentially a decline in overall welfare' (Mabey and
McNally 1998: 29).

Thirdly, optimists claim that openness to trade is associated with getting prices right and ending distortions, which enhance sustainability. Governments in particular are likely to get prices wrong and subsidize economic activity for political reasons, thereby increasing waste. Here liberals and environmentalists *potentially* have common cause. For example, reducing subsidies to agriculture in the rich countries would serve both liberal trading policies as well as

the environment, helping poor farmers in the Third World in the process (Brack 1995). Environmentalists, however, often argue that the market will punish environmentally safe production. Since openness will drive down prices, increased competition will drive standards lower, prohibiting the internalization of true environmental costs. It is uncertain what sort of environmental burdens the poor countries will suffer given increased demand for agricultural goods. Moreover, some pessimists claim that increased competition to attract investment will lead countries to subsidize FDI, not to conservation (Mabey and McNally 1998).

Fourthly, open trading regimes are also more amenable to spreading newer, better technologies faster than more closed regimes. Since environmentally friendly production is likely to be lucrative as people value the environment more, such production technologies will be adopted faster where the market determines the prices. The adoption of such technologies across integrated space may lead to the 'leveling up' when laggards are forced by the market to standardize. The German decision to make catalytic convertors mandatory in new cars, for example, was largely due to the fact that their car manufacturers were already tooled to produce cars for the US market, where catalytic convertors had been mandatory since the 1970s. This effect is called the trading-up of environmental standards (Vogel 1995). The pessimists argue, however, that trade agreements that bind countries to standardized laws and regulations will reduce the ability for governments and societies to make decisions for themselves. They often cite the GATT's ruling on the Tuna-Dolphin case, where the GATT ruled against the US's ban on imports of Tuna caught with dolphin-unsafe nets. Moreover, pessimists on FDI claim that poor countries eager to attract FDI will lower regulatory standards, which will allow companies in the resource sector to invest even less than what they do currently on environmentally safe extraction (Mabey and McNally 1998).

Finally, while both camps recognize that protecting the global commons requires real international cooperation, with some even calling for a World Environment Organization to rival the WTO, free traders view the interdependence among countries as a potent driver of environmental cooperation (Haas, Keohane, and Levy 1993). Countries more open to trade are more likely to have signed and ratified important multilateral environmental agreements (Neumayer 2002). In this light, states that trade more with each other potentially have common cause and incentive to cooperate, an age old precept articulated most thoroughly by such philosophers as Immanuel Kant, Montesquieu, and the Manchester school (Russett and Oneal 2000). This wider perspective in international relations is challenged by neo-Marxists, who view international interdependence as dependent relationships resulting in the exploitation of the weak by the strong. Such exploitation does not result in mutual cooperation but in the breakdown of societies domestically and rising resistance that potentially inhibits real cooperation. These critics suggest that free trade is not fair and equitable, but results in uneven development and a divided planet within which cooperation required for environmental protection may not be forthcoming.[6] Their exhortations are generally to find alternative paths to capitalism for achieving sustainable development (Fernando 2003).

Much of the early literature on liberalization and the environment focused on structural adjustment and the World Bank's lending priorities (Rich 1995). The Bank was accused generally of using structural adjustment for increasing privatization of the commons in poor countries, constraining governments from regulating their own environmental needs. The result of structural adjustment programs on the environment and sustainability is inconclusive (Reed 1996), even though environmental impact assessments are now a crucial part of World Bank lending (Cruz, Munasinghe, and Warford 1996). Much of the problem relates to insufficient data

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[6] For an excellent treatment of the differing perspectives, see Gilpin (2000).

and the relatively short time period since the adoption of structural adjustment programs and the studies conducted (Gueorguieva and Bolt 2003). Apparently, it is difficult to judge how short term degradation resulting from projects implementation could mitigate longer-term environmental harm and vice versa. Moreover, evidence from sector- and region-specific projects may be too narrow to judge the general effects of longer-term sustainability. Further, focusing on Bank's projects suffer from selection bias given than one would not be able to assess clearly what the environmental impact might have been if the Bank had not lent at all, not to mention the difficulty of differentiating net gains based on trade offs between economic gains versus environmental losses (Mikesell 1992).

Clearly, more longer-term effects of sustainability and environmental impact can only be judged by looking at national performance over time by evaluating sustainability based on patterns of savings of physical, human, and natural capital, and the degree of trade-off between economic activity and environmental damage (Mikesell 1992). In other words, any economic activity that benefits humans may come at the expense of the environment. The question is under what conditions is the benefit maximized with minimal loss to the environment and when is it the opposite? This study focuses on sustainability rather than pollution, which is more widely analyzed based on somewhat narrower focus on specific pollutants, such as CO_2, SO_2, NOx etc. This study asks to what extent globalization promotes, or prevents, the degradation of 'capital' including manufactured, human, and natural capital, and thereby aids or hinders economic sustainability. If globalization represents an extractive, exploitative, top-down project, then its effect on the physical, human, and natural capital stocks of countries over time should provide some answers.

Measuring Sustainability

There are several operational definitions of sustainable development and methods for calculating measures and indexes of sustainability (Neumayer 2004). This study's definition is very close to the sprit of the original definition supplied by the Brundtland Commission, which is 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (WCED 1987). In other words, the steady depletion, or degradation of physical, natural, or human capital without offsetting gains to society may be deemed unsustainable. Contrarily, higher genuine savings signifies gains in the production of physical capital with relatively lower depletion of the resource base, higher investment in human capital and lower damage to the environment. As some claim quite simply, savings of all forms of capital then is the essence of sustainability (Atkinson et al. 1999), or in the words of others, an indication of 'living within limits' (Hardin 1993). Production that minimizes losses presently may also be viewed as movement towards maximizing restoration and regeneration possibilities of ecosystems. According to the Millenium Ecosystem Assessment,

> A society's natural capital—its living and nonliving resources—is a key determinant of its well-being. The full wealth of a nation can be evaluated *only with due consideration to all forms of capital: manufactured, human, social, and natural* (MEA 2003: 28).

A sustainable development path that is mindful of the entire ecosystem should be reflected in the savings of all forms of capital over time.

Until quite recently, economists viewed the growth of gross domestic product (GDP) as a measure of development. Gross domestic product and the investment required for the growth of output were thought of as involving merely physical capital. The degradation of natural capital in the process of economic activity was unaccounted in GDP statistics. Green accounting processes began as an important corrective for making GDP reflect the degradation of the natural

environment as a result of economic production. As a result, the World Bank embarked on estimating the 'Wealth of Nations' to include manufactured, human, and natural capital of countries as a first step towards monitoring the progress of nations in terms of sustainability (World Bank 1997). The changes in the redefined estimates of wealth, therefore, indicate the sustainability/unsustainability of a development trajectory of any given country over time. Importantly, however, these data also show that the most important component of a nation's capital stock is human capital (unfortunately, social capital is left out of the calculations because of the complex issues surrounding its measurability).

My own calculations based on these data reveal that nature has been kind to most poor countries comparatively.[7]

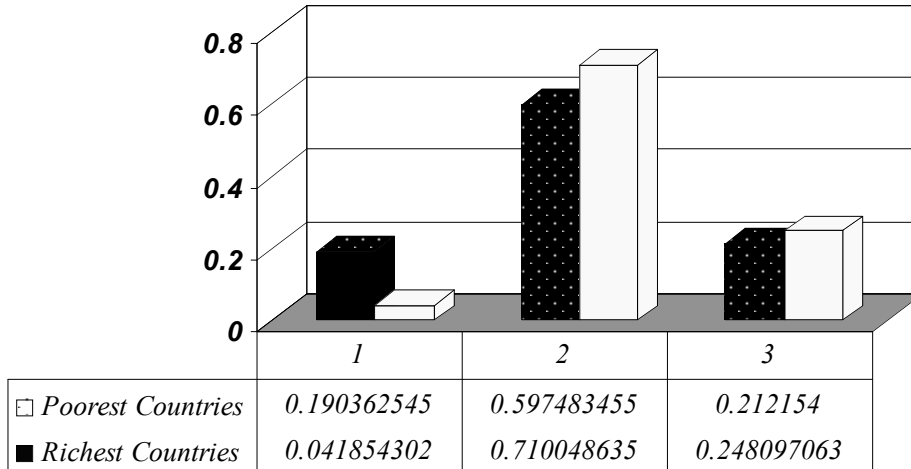-------------------------------Figure I about here ----------------------------------

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[7] These data are constructed for roughly 100 countries for the year 1994 are the first disaggregated measure of the actual wealth of nations. The data are values for total natural assets composed of cropland, land, pasture, timber, non-timber assets, protected areas, and all subsoil assets (minerals). Human assets are computed as the value of labor based on education and health, and produced assets are basically man-made objects such as buildings, roads, ports etc. The construction of the data are detailed in several studies (Hamilton and Clemens 1999; Kunte et al. 1998) and on the World Bank's department of environment website:
http://lnweb18.worldbank.org/ESSD/envext.nsf/41ByDocName/Environment

Figure I.

Average Share of Natural, Human, and Produced in Total Capital Assets Among the Richest and Poorest Countries

	1	2	3
⊡ *Poorest Countries*	*0.190362545*	*0.597483455*	*0.212154*
■ *Richest Countries*	*0.041854302*	*0.710048635*	*0.248097063*

1 = natural capital assets; 2 = human capital assets; 3 = produced assets

As figure I demonstrates, the poorest countries' have roughly 5 times more natural capital as assets in their total wealth compared with what the richest countries possess. Being wealthy is a function of the productivity of labor—healthy, wealthy and wise! As countries grow rich their dependence on natural wealth becomes minimal. The best way to avoid abusing nature and ensure its services into the future, thus, is to develop human resources and increase physical and human capital (Dixon and Hamilton 1996).

Indeed, the smallest wealth-gap between rich and poor compared in per capita terms is natural wealth. Figure II shows the share of the poorest countries' natural, produced, and human assets per capita as a percentage of the richest countries' total per capita.

----------------------------Figure II about here ------------------------------

Figure II.

Poor Countries' Average Per Capita Share of Natural, Produced, and Human Capital Relative to the Richest Countries' Share
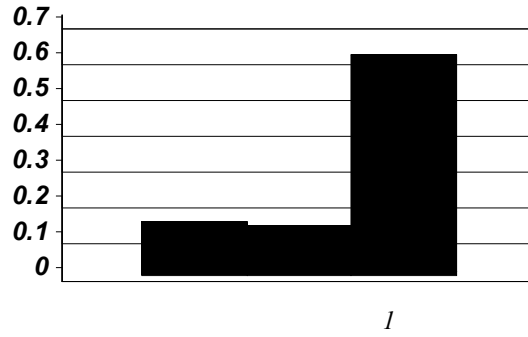
	1
■ Human Capital	0.137283397
□ Produced Assets	0.12581573
■ Natural Capital	0.60110705

Thirty-eight of the poorest countries have 60% of the total natural capital of the richest (nine countries). This is a remarkable portion of the rich countries' total assets that the poorest enjoy, even though on average the poorest countries have roughly 2% of the per capita income of the richest countries.[8] Moreover, the poorest compare dismally in terms of human (14%) and produced assets (13%). The comparison shows clearly that what poor countries lack relative to the rich is not natural capital, but human and produced assets (Dixon and Hamilton 1996). It follows naturally than that increasing human and produced assets reduces the dependency of people on the planet while increasing wealth. As Dasgupta (2001: 87) has written,

> Genuine investment [savings] is the social worth of net changes in an economy's capital assets. It is a comprehensive notion, including as it does the social worth of net changes in manufactured and human capital, public knowledge, and natural capital. Thus, ensuring that social well-being is sustainable involves taking care that the economy's assets are managed well.

The genuine savings rate, or genuine investment rate, thus is one effort to estimate the sustainability path of nations based on how 'well' they manage physical and human capital. How 'well' then is highly dependent on the environmental costs based on damage to atmosphere (CO_2) and damage and depletion of natural resources (forest, mineral, and energy assets). While resource-wealthy countries, such as oil producers, would naturally have higher depletion, policies governing the decisions to spend on education and other means of productivity increases in society may offset the given depletion. Such countries, however, rarely make these forms of investment, which means that future well-being is jeopardized by an unsustainable path of resource extraction (Atkinson and Hamilton 2003; Hamilton 2001). While some argue over the exact method of calculating resource depletion and some problematic assumptions surrounding the concept and its measurement, this study accepts the adequacy of the World Bank's method

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[8] This figure is based on the average per capita income of PPP $450 for the World Bank's low income category and PPP $28,000 average for the OECD.

for current purposes. Naturally, nothing stops anyone from continually testing our theories against better data as they become available. The multidimensionality of the measure of sustainability that the genuine savings rate presents, however, makes it an attractive choice for addressing the larger issue of how globalization may influence weak sustainability of nations over time. The basic equation for calculating the genuine savings rate is:

Genuine Savings =   increase in produced assets - decrease in natural capital - cost of atmospheric pollution + increase in human capital / Gross National Income (GNI)

Added advantages of this measure of sustainability is that it is widely available in time-series format, is consistent with most orthodox views that see economic activity requiring tradeoffs, and is a measure policymakers readily understand (Atkinson and Hamilton 2003).

Statistical Methods & Data

This study employs a time-series, cross section (TSCS) design to gauge the relationship between trade openness and dependence on FDI and economic freedom on the genuine savings rate (adjusted net savings) and the individual components of the genuine savings rate. The data are for 137 countries spanning roughly 20 years. The dataset is unbalanced and contains over 2000 data points (an average of 14.5 country-years).[9] There are no clear models to guide the determinants of genuine savings. I control for the following factors because of their connection to the main globalization variables and direct effects on the dependent variable. In general, the models account for important factors predicting the gross savings rate, so as to control as fully as possible, but parsimoniously, for determinants of physical capital savings. Our measure of dependence on trade is total trade to GDP (imports+exports/GDP). These data are from the

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[9] The dataset will be made available upon publication.

World Bank (World Bank 2002).[10] The FDI measure is stock to GDP obtained from the United Nations, which is the most comprehensive data on the activities of MNCs in poor countries (UNCTAD 2003).[11] The stock of FDI is accumulated investment over time, which captures the structural power of MNCs of a host economy to a greater degree than do FDI flows alone (Bornschier and Chase-Dunn 1985; de Soysa and Oneal 1999; Grimes and Kentor 2003). The trade and FDI variables are logged to reduce skewness.

The Fraser Institute's index of economic freedom is made up of roughly 35 components of objective indicators capturing the extent of economic openness within countries (Gwartney and Lawson 2003). The index measures freedom of economic activity according to the following five main criteria in quintiles since 1980 (see appendix for full list of components and sub-components of the index):

    a. size of government based on spending and the level of state
    ownership of enterprises
    b. strength of legal system and sanctity of private property rights
    c. access to sound money
    d. freedom to exchange with foreigners
    e. the extent of regulation of economic activity

The missing years for this variable are interpolated. Since the score on economic freedom by and large changes only very slowly between the five years periods measured, the interpolated values between the five-year periods should not be problematic.

While openness to trade and FDI figure quite prominently in assessing economic freedom, they are but a small part of the overall measure. The bivariate correlation between economic freedom and trade and FDI, nonetheless, are r=0.35 and r=0.37 respectively. Clearly, the broader indicator of economic freedom captures aspects of economic openness beyond what

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[10] All data are taken from the WDI (2002) unless noted otherwise.
[11] The foreign investment stock data are available from www.unctad.org.

trade and FDI alone are able to capture. Since economic freedom is heavily influenced by wealth and since trade and FDI dependence is smaller among the wealthy, the bivariate correlation is bound to be misleading. However, using the economic freedom measure as an added factor in the globalization process has practical and normative value. On the practical side, trade and foreign investment's effects may be over predicting the savings component of the genuine savings measure to such an extent that it swamps any effects on the human capital and environmental components. Normatively, much argumentation about globalization's effects on sustainability reflects fears about growing economic freedom at the expense of government's ability to regulate the market for the sake of intergenerational equity. While sustainability should be gauged by looking at the components of genuine savings in toto because of the tradeoffs inherent in the concept, I nevertheless also gauge the effects of our globalization variables in separate tests on each of the components. These results, however, will be treated tentatively since each component should ideally be modeled separately. For example, factors effecting education expenditure could be totally different from those explaining CO_2 and vice versa, so that using the same set of controls are unsatisfactory. However, since all of the dimensions capture some aspect of the 'race to the bottom arguments', it is worthwhile also to present these results in addition. The basic control variables are discussed below.

The models control for level of per capita income since richer countries have higher savings rates and supposedly exhibit better environmental standards on several dimension (Baghwati 1999; Frankel 2003; Loayza, Schmidt-Hebbel, and Serven 2000; Ogaki, Ostry, and Reinhart 1995; Shafik 1994). Accounting for physical capital savings as stringently as possible allows one to separate globalization's effects on the purely economic factors from the human and

environmental factors.[12] Gross National Income per capita in PPP dollars is taken from the WDI. In addition to income, I account for the structure of production by including the percentage of GDP devoted to agriculture following others (Grimes and Kentor 2003). Trade dependence, the savings rate, and environmental stress are affected by demographic factors (Alesina and Spolaore 1997; MEA 2003).[13] Thus, both population size (total population), population density (people per square kilometer), and the share of urban population in total population are included in the models. Urbanization has important implications for levels of pollution and physical capital savings because it is argued that consumption rises with rising urbanization (Shafik 1994). These variables are all logged to minimize the effect of extreme values, and the data are obtained from the WDI.

I control for the year-to-year change in income levels, since it is often thought that higher rates of growth require more intensive use of environmental resources, but it is also found to be robustly associated with the physical capital savings rate. On the other hand, higher growth may enable increases in other forms of capital, such as physical and human capital that reduces the direct dependence of people on natural resources (Coxhead and Jayasuriya 2003; Loayza et al. 1998). There is mixed evidence on the effects of growth rates on pollution and environmental quality.

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[12] I have largely relied on the World Bank's research program on savings across the world to pick several variables found to be associated with public and private savings rates (Loayza et al. 1998). The basic model employs per capita wealth, growth rate, and urbanization, variables that have data points for at least 137 countries. For robustness, we also test investment rate, broad money supply (m2/GDP), and age dependency ratio. Using these variables lowers the sample of countries considerably. The World Bank's research on savings can be accessed at: http://www.worldbank.org/research/projects/savings/savinwld.htm.

[13] Neo- Malthusian views and anti globalization views generally coincide on issues of sustainable development. There is lively debate in the literature between the neo-Malthusians and the cornucopians, or those who think substitution of natural resources with human ingenuity is possible. For the classic debate, see (Myers and Simon 1994). Most texts on environmental security and economic sustainability sample this debate (Conca and Dabelko 1998).

Democracy, it is often argued, is good for environmental sustainability because it empowers people and provides channels through which governments can be influenced by civil society, net of the effect of level of income (Dryzek 1997; Frankel 2003; Midlarsky 2001). Democracy also enhances international environmental cooperation (Neumayer 2002). The rise of green movements, non-governmental organizations, and other activist movements within democracies is seen as proof of this. Democracy also relates to trade openness, with many arguing that democracy increases openness (Milner 1999). Moreover, democracy also affects the savings rate as politics drive tax policies and affect the issue of corruption and rent-seeking behavior. I use the standard polity IV (version 2) data (Gurr and Jaggers 1995). I subtract autocratic values from the democratic values and add 11 to create a scale from 1 to 21. By assigning the value 1 if democracy ranges from 16–21, and 0 if the values are between 1 and 15, I construct a dummy variable for regime type. This variable correlates perfectly with others who have used the Polity data in a similar manner (Fearon and Laitin 2003).

The models include the degree to which countries are dependent on natural resource exports because resource depletion will be higher among these countries. As the early studies of the genuine savings data indicate, energy rich states in particular tend to have low genuine savings given the high extraction levels of a single resource, coupled with lower than normal investment in human capital, dimensions of the familiar 'resource curse' hypothesis highlighted in the literature (Atkinson and Hamilton 2003; Gylfason 2000; Hamilton 2001). I control for resource dependence in two ways. First, I test a discrete variable that takes the value 1 if exports of petroleum are greater than 50% of GDP. This measure is obtained from an independent source (Easterly and Sewadeh 2001). Secondly, I employ continuous measures for fuels and ores and mineral exports in total merchandise exports. These variables are obtained from the WDI data.

Finally, I enter terms for social capital and political stability, which presumably influence savings rates and the degree to which extractive activity, corruption, and accumulation of physical capital proceeds. I compute a count of peace years since 1946 utilizing the PRIO-Uppsala civil war data (Gleditsch et al. 2002) and the method outlined in (Beck, Katz, and Tucker 1998). A civil war is defined as internal wars that have reached at least the threshold of 1000 battle deaths. The incidence of civil war is also added to the models to account for ongoing civil war, so as to capture any immediate effects above those of accumulated years of peace.

The analysis of time-series cross-section (TSCS) data generally poses several problems in the estimating process. TSCS data have complicated temporal and spatial structures that simple OLS cannot adequately account for. TSCS models often allow for temporally and serially correlated errors as well as for heteroscedasticity. The well-known Parks method based on GLS, which is close to the OLS method, is discredited for underestimating the true variability of the parameter estimates, which some report to be as high as 200% (Beck and Katz 1995). Beck and Katz (1995) propose 'panel corrected standard errors' (PCSE) as an alternative procedure. I follow this procedure, assuming an AR1 process to deal with autocorrelation. The Rho coefficient computed in the AR1 process accounts for serially correlated errors in the model (Stata 2003). For evaluating the robustness of the findings, I also estimate random effects GLS and population averaged models, or the GEE method, which is yet another testing procedure when the underlying correlation structures in the data are unknown (Zorn 2001). All the independent variables are lagged one year to minimize simultaneity, although for our main variables of interest it will be hard to maintain that increased genuine savings increases trade and FDI dependence, or economic freedom.

Results

Table 1 presents the results of trade and FDI's effects on the genuine savings rate utilizing three estimation procedures, the random effects GLS, GEE, and the PCSE methods. As seen there, in columns 1 and 2, both trade and FDI dependence are positively associated with the genuine savings rate. The results are statistically significant at the 5% level for trade and FDI using the ordinary random effects GLS method. These results are confirmed in columns 3 & 4 when GEE is used. In columns 5 & 6, however, when the PCSE method is employed, trade's effects are significantly diminished, while FDI's effects are confirmed once again. Indeed, the PCSE method is somewhat more conservative than the other two. In columns 7 & 8, the PCSE models are rerun without just two countries, which had extremely high negative values on the genuine savings rate. Angola and Sudan showed several years of negative values (more than -100) and had averages of –45 and –37 respectively, when the global average over the entire 20-year period is 6.3 percent. Without these two countries in the model, Trade and FDI's effects on the genuine savings rate are unambiguously positive with statistical significance far smaller than the 1% level.[14] Having run a number of different specifications and combinations of the control variables, at no time did the main variables of interest ever come close to being negative, nor statistically insignificant.

Notice that all the three methods used for the analysis of the data produce somewhat similar results on our variables of interest although the controls differ to varying degrees. Per capita income is strongly positively associated with genuine savings across the testing procedures. Richer societies are more efficient at accumulating human, natural, and physical capital savings. Surprisingly, more densely populated societies are associated with higher genuine savings rates, contrary to the pervasive neo-Malthusian discussions on sustainable

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[14] We run all subsequent models without these two countries.

development. In other words, population pressure within a territorial unit does not inhibit genuine savings, but it promotes it, net of the other control variables in the model, such as income. Population size, on the other hand, is negative, but the results are far from statistical significance. Higher percentages of urban population, net of the influence of the other control variables, seem to be highly detrimental to the genuine savings rate, but as seen farther below (table 2, column 4) urbanization's effect is possibly a result of overall poverty rather than an effect of Malthusian population pressure, since population size and density are already in the model.

Democracy's effect on genuine savings is positive and statistically significant only in the last two columns when PCSE method is used without Angola and Sudan. Our results suggest that democracy's actual performance does not necessarily match the degree of emphasis on this variable in the academic and popular discussions on economic sustainability. However, its positive effect, even if weak, is encouraging. Moreover, given our crude dichotomization of the Polity measure, future research should focus on disaggregating types of democracies, as differing democratic institutions produce varying policy outcomes (de Soysa 2003; Lijphart 1994; Powell 2000). The economic growth rate is not statistically significant. Given that higher income levels are good for genuine savings, growth's long-term, accumulated effect should be positive. A higher percentage of an economy devoted to agriculture is negative for accumulating genuine savings, net of the effect of per capita income and the other controls. This result supports those who argue that the modernization of economies promotes sustainability.

Dependence on oil extraction has a strong negative effect on the genuine savings rate as others have also reported (Hamilton 2001). This result is statistically highly significant and substantively very large. Being an oil dependent country lowers the genuine savings rate by an

average of roughly 20% over the 20-year period. This figure is comparatively large given that the average genuine savings rate for all countries over this period is positive 6.3 percent. The effect of an on going war and accumulated years of peace seem to exhibit relatively low influence on the genuine savings rate across the testing procedures, although the estimated effects have the right sign on both variables—the incidence of war is bad while accumulated years of peace seems to be good for sustainability. This result is net of income. Given war's detrimental effects on income, the overall effect on gains to genuine savings from peace is potentially large. This subject alone warrants further reflection and more analysis. Finally, the trend over time seems to be weakly negative when all of the controls used above are in the model. This result is most likely due to the inclusion of a host of unsustainable economies from the FSU regions in the dataset during the latter years (the 1990s).

In table 2, the dichotomous measure of oil export dependence is substituted by two continuous measures of fuel exports and ores and metals exports as a percentage of merchandise exports. The substitution results in the loss of approximately 13 countries and roughly 150 data points. While the fuel export dependence variables are correlated at r=0.77 with each other, the fuel measures are weakly correlated with exports of metals and ores. As seen in column 1 and 2, trade's and FDI's effects on the genuine savings rate remain positive and statistically highly significant. The results of the natural resource variables are both consistent with the findings of others, and the control variables remain pretty much the same except that now, the results on democracy are statistically far from significant. Contrarily, the effects of civil war and accumulated years of peace are now both consistently statistically significant with the expected sign. In column 3, both FDI and trade are entered in the equation and both variables remain positive with trade retaining its statistical significance and FDI becoming statistically

insignificant. It is evident that both measures, which are correlated at r=0.49, mask each others

effects on the genuine savings rate. In column 4, income is dropped from the model. As seen

there, without per capita income in the model, the coefficient of the share of the urban population

is reduced from roughly 6 to 2, or by two-thirds. This result may suggest that raising income can

help reduce the burdens of urbanization.[15]

In table 3, the previous models are run against each of the components of the genuine

savings rate—net savings, expenditure on education, CO_2 damage, and resource depletion

(forestry, mineral, and energy assets). As seen there, trade has positive and statistically

significant effects on net savings and on education expenditure. Its effects on the rest of the

components are statistically not different from zero. Despite statistically significant effects of

FDI on the genuine savings rate, its effects on the individual components are all statistically not

significant. These results highlight the importance of looking at the entire component of savings

as a measure of sustainability given arguments about substitutability among the different forms

of capital and the trade offs inherent in the concept of sustainability. As mentioned above, it is

difficult to give much credence to this set of results given that ideally each component should

have been modeled separately. However, given the insignificant relationships, it is hard to

support pessimistic views on trade and FDI's effects on either CO2 damage or resource

depletion. I now turn to a broader measure of economic openness that is relatively weakly

correlated with trade and FDI dependence—the index of economic freedom.

In table 4, I report the results of running the models with the measure of economic

freedom. The models are run the exact same way as above—first against the genuine savings rate

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[15] The interactive effect between a discrete variable taking on the value 1 if income is a standard deviation above the mean (PPP $ 6100 + 6700 =12800) yielded a coefficient of 6.0, whereas a similar interaction between a discrete variable taking on the value 1 if income is below the mean yielded a coefficient of –3.2, which suggests that urbanization without development is harmful for sustainability by a substantively large margin.

and then individually against each component. As seen in column 1, economic freedom is positively correlated with the genuine savings rate. A 1-point increase in the index of economic freedom increases the genuine savings rate by 2%, a substantively significant increase given that the average is only 6.3 over the 20-year period. Results for the rest of the control variables are rather similar to those reported in table 2 above, despite the fact that the number of countries decreases by roughly 30, which suggests that the results are quite robust to sample size. Economic freedom's effects on the subcomponents of the dependent variable are also interesting. Its effect on net savings is positive and statistically significant. While economic freedom has no effect on education spending, economic freedom's effects on sustainability seem to work through its negative association with CO_2 damage and resource depletion as well. These results are statistically highly significant. Interestingly, democracy has little effect on the components of genuine savings except for net savings with which it is negatively and statistically significantly associated. Because of the question of substitutability discussed above, I prefer to interpret the results based on the genuine savings rate and not on the components alone, as each component potentially requires its own model for proper analysis. Again, being resource wealthy in terms of fuel and mineral wealth seems to be highly detrimental to the accumulation of genuine savings, as others have also reported.

The results taken together seem to be robust to sample size, specification, and testing procedure. To check robustness even further, I conducted fixed effects estimates, which allows the within unit transformation of the data so as to estimate how well your covariates of interest behave when accounting for time-invariant, country specific factors, such as culture. The assumptions behind fixed effects estimation are less problematic when country heterogeneity may affect the estimates of the results, particularly if models are imperfectly parameterized. The

result on trade, FDI, and economic freedom remained unaffected, and the Hausman specification test called for the rejection of the hypothesis that the coefficients were systematically different.

In order to check whether it was the degree of corruption, or governance, rather than trade, FDI, or economic freedom that mattered, I tested the models using the International Country Risk Guide's (ICRG) data on 'corruption', which is a widely accepted measure of good governance (Ades and Di Tella 1999; Kaufmann, Kraay, and Zoido-Lobaton 1999; Treisman 2000).[16] The results of the globalization variables were unchanged when corruption was included. This variable turned out to be positive but statistically not different from zero. Since some demonstrate that trade's effect on growth works through investment (Levine and Renelt 1992), I included total investment to GDP in the models. As the savings literature reports, I too found a positive and statistically significant effect between investment and the genuine savings rate, but the results on trade, FDI, and economic freedom were upheld. Likewise, including M2/GDP (broad money supply) and the age dependency ratio had little effect on the positive and significant effects of the globalization variables. The results on these two variables, which allowed a total of 93 countries to be tested, show similar results to those reported by studies on the determinants of savings in general (Loayza et al, 1998). The globalization variables remained unchanged despite several alternative specifications, including a lagged dependent variable model (all results with the STATA do file will be made available upon publication).

If the spread of globalization and economic liberalism increase interconnectivity among states, then these trends increase the chances that states would be less profligate. Despite several

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[16] The ICRG data on corruption gauge the degree to which the rule of law prevails. We average the quarterly scores for each year between 1984 and 2000. The data are available for 110 countries in our sample and was obtained from the Political Risk Services (PRS) group, which supplies the data commercially for a fee (www.prs.com). While the drawbacks and advantages of these data are discussed by others, it should be noted that there is no transparency concerning their sources and method. On the other hand, since private companies are willing to pay for these expensive data, they are market tested.

different controls and other highly significant variables, all three globalization variables are positive, substantively large, and statistically significant. Our results taken together support those who argue that globalization potentially improves conditions for economic sustainability. If increasing globalization is good for creating wealth, our analyses do not suggest that it will come at the expense of increasing poverty for future generations. What seems to be harmful for sustainability seems to be autarchy. Contrary to Malthusian concerns dominant in the literature, this study finds that population density, increases sustainability, defined as savings in physical, natural, and human capital, possibly because density may encourage efficiency as critics of neo-malthusianism argue.

Conclusion

This study examined the effects of globalization on the World Bank's 'genuine savings rate,' which gauges the extent to which man-made, human, and natural capital exceed their rate of depreciation over time. The logic of the measure is that sustainable development requires the savings of all forms of capital that we value, but one which captures the trade offs inherent in the accumulation of physical wealth vis-à-vis human and natural assets. Since even building a school requires the trade-off of land, trees, other resources etc, analyses of sustainable development have often failed to capture such dimensions in their operationalization. While policymakers in poor countries are deeply aware that pollution is bad, they may in fact be helpless to act given other pressing concerns. Thus, the question becomes under what conditions countries transform global resources, including clean air, into income more efficiently, thereby reducing their dependence on planetary resources over time without losses in consumption. This study gauged the effects of trade and FDI dependence and degree of economic freedom on the genuine savings

rate over the period of twenty years. The question is how globalization influences a country's ability to maintain a path of economic sustainability. The results are easy to summarize.

The analyses show that trade and FDI dependence increase the genuine savings rate. There does not seem to be reason to fear what some dependency and world system theorists have argued in terms of an exploitative capitalist world system. These arguments have also been echoed by many anti-globalization voices that see poor countries 'racing to the bottom.' Mixed in with anti-capitalist arguments are Malthusian concerns about globalization's effects on the carrying capacity of societies and the ecological shadow cast by rising consumption. This study finds no such effect of globalization variables on the genuine savings rate. Countries more dependent on the world capitalist system and those that are economically freer tend to have a higher genuine savings rate, making them more sustainable. Clearly, more research needs to be done on the determinants of the genuine savings rate beyond globalization concerns, so that econometric models might be refined over time. When stronger findings from other variables can be incorporated into models, we will be able to test further the potential spuriousness of the association between trade, FDI, economic freedom and sustainability reported here.

The results taken together suggest that economic globalization leads to better management of the wealth of nations, a good prospect for the present generation and for those to whom we bequeath the planet. On the other hand, resource-wealthy countries seem to waste resources given that they fail to translate their extraction of nature's wealth into sustainability via adequate investment in human capital, presumably because of the well-documented feature of both economic and political 'Dutch disease' that often results in distorted markets, corruption, mal-governance, and social breakdown. The gradual adoption of open economic policies in resource-wealthy regions such as Africa is good news for sustainability.

Table 1.

Random effects GLS, GEE, and PCSE regression estimates of Trade and FDI dependence on genuine savings rate, 1980-2000

	REGLS	REGLS	GEE	GEE	PCSE	PCSE	PCSE	PCSE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Trade/GDP (log)	1.9** (2.1)		2.4** (2.2)		1.7 (1.5)		2.4*** (2.7)	
FDI stock /GDP (log)		.90** (2.6)		.95** (2.3)		.97** (2.5)		.88*** (2.7)
Income per capita (log)	5.8*** (5.2)	5.5*** (4.9)	4.9*** (4.6)	4.3*** (3.3)	5.0*** (4.9)	4.9*** (4.6)	4.8*** (4.9)	5.1*** (5.0)
Pop. Density (log)	1.6*** (3.2)	1.7*** (3.4)	1.6*** (2.9)	1.8*** (3.4)	1.7*** (4.3)	1.8*** (4.6)	1.3*** (4.0)	1.5*** (4.9)
Population (log)	-.22 (-.46)	-.54 (-1.1)	-.15 (-.31)	-.54 (-1.2)	-.20 (-.48)	-.42 (-1.4)	.09 (.26)	-.27 (-.90)
Pop. Urban (log)	-7.6*** (-4.3)	-8.2*** (-4.6)	-7.2*** (-4.2)	-7.6*** (-3.9)	-7.0*** (-5.3)	-7.7*** (-5.3)	-7.5*** (-7.4)	-7.9*** (-7.7)
Democracy (dummy)	1.1 (1.4)	1.1 (1.3)	1.2 (1.6)	1.0 (1.2)	1.4 (1.6)	1.2 (1.4)	1.3** (2.2)	1.0* (1.7)
Econ. Growth$_{pc}$	-.006 (-.23)	.02 (.77)	.0002 (.01)	.06 (.76)	-.01 (-.19)	.0002 (.01)	-.001 (-.02)	-.002 (-.07)
Agriculture/ GDP %	-.10* (-1.8)	-.13** (-2.3)	-.12* (-1.7)	-.17* (-1.9)	-.10 (-1.6)	-.11* (-1.7)	-.08* (-1.7)	-.08 (-1.5)
Oil >50% of GDP	-22.7*** (-7.9)	-21.9*** (-7.8)	-23.2*** (-5.0)	-23.0*** (-5.2)	-23.5*** (-7.8)	-22.3*** (-6.2)	-19.6*** (-8.7)	-19.7*** (-8.4)
Civil War (dummy)	-.35 (-.40)	-1.5 (-1.6)	-1.2 (-.52)	.93 (.51)	-1.6 (-1.2)	.49 (.30)	-1.8** (-2.4)	-1.3* (-1.8)
Years Peace since 1946	-.003 (-.11)	-.0005 (-.02)	.02 (.65)	.03 (.95)	.04* (1.9)	.04* (1.7)	.03* (1.7)	.03 (1.5)
Year					-.17 (-1.6)	-.20* (-1.8)	-.14 (-1.5)	-.18* (-1.8)
Wald chi^2	**225.3**	**216.8**	**243.2**	**333.6**	**246.9**	**246.9**	**373.3**	**318.6**
P	**.00001**	**.00001**	**.00001**	**.00001**	**.00001**	**.00001**	**.00001**	**.00001**
Obs	**2153**	**2138**	**2153**	**2138**	**2153**	**2138**	**2130**	**2114**
Groups	**137**	**137**	**137**	**137**	**137**	**137**	**135**	**135**
Rho	**.69**	**.66**			**.75**	**.75**	**.74**	**.75**

z scores in brackets. Significance denoted as *=p<.1, **=p<.05, and ***=p<.01 respectively.
An AR1 correlation structure assumed in all tests.
Robust standard errors computed with GEE estimations.
Year dummies computed in all tests except for PCSE tests, where years enter the equation in linear form.
The statistical package STATA 8 was used in all computations.
All independent variables are lagged 1 year.

Table 2.

Effects of Trade & FDI dependence on genuine savings rate controlling for fuel exports and metals and ores exports, 1980–2000

	PCSE	PCSE	PCSE	PCSE
	(1)	(2)	(3)	(4)w/o income/pc
Trade/GDP (log)	2.7*** (2.9)		2.3** (2.4)	
FDI stock /GDP (log)		.61** (2.2)	.43 (1.4)	
Income per capita (log)	4.3*** (4.5)	4.4*** (4.4)	4.4*** (4.5)	
Pop. Density (log)	1.3*** (3.9)	1.6*** (5.4)	1.3*** (3.9)	2.2*** (7.1)
Population (log)	.57 (1.6)	.14 (.53)	.58* (1.7)	.11 (.42)
Pop. Urban (log)	-6.0*** (-5.2)	-5.9*** (-5.0)	-6.1*** (-5.1)	-2.0** (-2.0)
Democracy (dummy)	.08 (.12)	-.07 (-.11)	.08 (.12)	.87 (1.4)
Econ. Growth$_{pc}$	.02 (.61)	.02 (.50)	.02 (.60)	.04 (1.2)
Agric./GDP	-.06 (-1.3)	-.07 (-1.5)	-.06 (-1.2)	-.16*** (-3.6)
% Fuel Exports	-.20*** (-8.5)	-.20*** (-7.7)	-.21*** (-7.8)	-.20*** (-7.5)
%Ores & Metals Exp.	-.07** (-2.4)	-.06** (-2.0)	-.07** (-2.3)	-.07** (-2.3)
Civil War (dummy)	-1.5* (-1.9)	-1.6** (-2.0)	-1.6** (-2.0)	-1.3 (-1.6)
Years Peace since 1946	.04** (2.2)	.04** (2.0)	.03* (1.7)	.09*** (4.7)
Year	-.17* (-1.9)	-.18* (-1.9)	-.19** (-2.0)	-.05 (-.61)
Wald chi^2	**416.1**	**364.9**	**378.5**	**267.2**
P	**.00001**	**.00001**	**.00001**	**.00001**
Obs	**1998**	**1976**	**1976**	**2029**
Groups	**124**	**124**	**124**	**128**
Rho	**.73**	**.74**	**.74**	**.76**

z scores in brackets.
*=p<.1, **=p<.05, and ***=p<.01
An AR1 correlation structure assumed in all tests.
All independent variables are lagged 1 year.
The statistical package STATA 8 was used for all computation.

Table 3.

Effects of Trade and FDI dependence on individual components of the genuine savings rate, 1980–2000

	Net National Savings/GNI	Education Expenditure/GNI	CO$_2$ Damage/GNI	Resource depletion/GNI
Trade /GDP	3.4*** (4.3)	.20** (2.2)	.04 (.93)	.17 (.79)
FDI stock/GDP	.28 (1.1)	-.01 (-.42)	-.01 (-.42)	-.08 (-.97)

Control variables same as in Table 2 (not shown).

z scores in brackets.
*=p<.1, **=p<.05, and ***=p<.01
An AR1 correlation structure assumed in all tests.
All independent variables are lagged 1 year.

Table 4.

Effects of economic freedom on the genuine savings rate and its components, 1980–2000

	PCSE		PCSE	PCSE	PCSE	PCSE
	Genuine Savings/ GNI	Genuine Savings/ GNI	Net Savings /GNI	Education Spending/ GNI	CO_2 Damage/ GNI	Resource depletion/ GNI
Economic Freedom	2.0*** (4.0)	1.7*** (3.0)	.92** (2.2)	.02 (.26)	-.18*** (-6.1)	-.29** (-2.6)
Trade/GDP (log)		2.3*** (2.6)				
FDI stock/ GDP (log)		.40 (1.2)				
Income per capita (log)	3.2*** (2.8)	3.8*** (3.3)	1.9** (2.0)	.34*** (3.7)	.002 (.05)	-.38* (-1.8)
Pop. Density (log)	1.1*** (4.0)	.83*** (2.7)	1.5*** (7.8)	-.27*** (-7.3)	.04*** (2.9)	.01 (.18)
Population (log)	.23 (1.2)	.80** (2.5)	.67*** (2.7)	-.17*** (-6.8)	.06** (3.1)	.05 (.93)
Pop. Urban (log)	-2.9*** (-2.3)	-3.5*** (-2.8)	-1.6 (-1.5)	-.38** (-2.4)	.18*** (2.6)	.32 (1.0)
Democracy (dummy)	-.71 (-1.1)	-.49 (-.73)	-1.3** (-2.1)	.03 (.43)	-.01 (-.43)	.04 (.32)
Econ. Growth$_{pc}$	-.02 (-.77)	-.02 (-.82)	-.001 (-.03)	-.002 (-1.1)	-.0002 (-.27)	.006 (1.1)
Agric./GDP	-.02 (-.37)	.01 (.22)	-.06 (-1.3)	-.03*** (-6.1)	-.006*** (-2.7)	-.02* (-1.9)
% Fuel Exports	-.18*** (-6.4)	-.18*** (-6.3)	.08*** (3.2)	-.004 (-1.6)	.002** (2.2)	.08*** (6.7)
%Ores & Metals Exp.	-.07** (-2.6)	-.08*** (-2.7)	-.04 (-1.5)	-.003 (-1.6)	.0004 (.43)	.01 (1.5)
Civil War (dummy)	-1.1 (-1.5)	-1.7* (-1.7)	-1.1 (-1.6)	.03 (.42)	.03 (.70)	.36** (2.0)
Years Peace since 1946	.003 (.18)	-.007 (-.41)	-.008 (-.56)	.005** (2.2)	-.001 (-1.3)	-.00003 (-.01)
Year	-.22** (-2.5)	-.26*** (-2.9)	-.15** (-2.2)	-.01 (-.83)	.02*** (5.1)	.01 (.29)
Wald chi^2	**356.7**	**349.4**	**277.0**	**335.0**	**95.4**	**83.5**
P	**.00001**	**.00001**	**.00001**	**.00001**	**.00001**	**.00001**
Obs	**1796**	**1783**	**1796**	**1796**	**1796**	**1796**
Groups	**108**	**108**	**108**	**108**	**108**	**108**
Rho	**.76**	**.76**	**.74**	**.87**	**.87**	**.79**

z scores in brackets.
*=p<.1, **=p<.05, and ***=p<.01
An AR1 correlation structure assumed in all tests.
All independent variables are lagged 1 year.
The statistical package STATA 8 was used for computing these results.

Appendix

Summary Statistics

Variable	Obs	Mean	St. dev	Min	Max
Genuine savings rate	2665	6.3	15.3	-171.5	57.1
Net national savings/gni	2665	8.7	12.1	-167.5	81.4
Education Expenditure/gni	2665	4.0	1.7	0	10.8
CO_2 damage/gni	2665	.59	.70	-.21	7.9
Resource depletion/gni	2665	1.9	3.6	-4.6	29.2
Log trade/gdp	2532	4.2	.59	1.8	6.1
Log fdi stock/gdp	2523	2.2	1.4	-6.2	6.1
Econ. Freedom Index	2132	5.5	1.3	1	9
Income/pc (gni)	3077	6136	6738	310	45470
Log income/pc	2483	8.1	1.1	5.7	10.6
Log Pop. Density	2518	4.0	1.5	.41	8.8
Log total population	2540	15.7	1.9	10.6	20.9
Log Urban pop. %	2540	3.8	.63	1.4	4.6
Democracy	2552	.49	.50	0	1
Econ. Growth/pc	2522	1.2	5.4	-39.7	35.4
Log agriculture/GDP	2372	19.2	15.1	.1	72.0
Metals & ore / Merchandise exports	2445	8.0	16.2	.00002	96.4
Fuels/merchandise exports	2339	15.7	27.1	0	100
Peace years since 1946	2506	20.3	17.1	0	54
Civil War	2506	.07	.26	0	1

Definitions of components of the Adjusted Net Savings (Genuine Savings)
Adjusted net savings, or genuine savings, are equal to net national savings plus education expenditure and minus energy depletion, mineral depletion, net forest depletion, and carbon dioxide damage

Net national savings are equal to gross national savings less the value of consumption of fixed capital

Carbon dioxide damage is estimated to be $20 per ton of carbon (the unit damage in 1995 U.S. dollars) times the number of tons of carbon emitted

Education expenditure refers to the current operating expenditures in education, including wages and salaries and excluding capital investments in buildings and equipment

Energy depletion is equal to the product of unit resource rents and the physical quantities of energy extracted. It covers crude oil, natural gas, and coal

Mineral depletion is equal to the product of unit resource rents and the physical quantities of minerals extracted. It refers to bauxite, copper, iron, lead, nickel, phosphate, tin, zinc, gold, and silver

Net forest depletion is calculated as the product of unit resource rents and the excess of roundwood harvest over natural growth.

The Areas and Components of the Economic Freedom in the World Index

1: **Size of Government: Expenditures, Taxes, and Enterprises**
A. General government consumption spending as a percentage of total consumption.
B. Transfers and subsidies as a percentage of GDP.
C. Government enterprises and investment as a percentage of GDP.
D. Top marginal tax rate (and income threshold to which it applies).
i. Top marginal income tax rate (and income threshold at which it applies)
ii. Top marginal income and payroll tax rate (and income threshold at which it applies)

2: **Legal Structure and Security of Property Rights**
Judicial independence: the judiciary is independent and not subject to interference
by the government or parties in disputes (GCR).
Impartial courts: A trusted legal framework exists for private businesses to
challenge the legality of government actions or regulation (GCR).
C. Protection of intellectual property (GCR).
D. Military interference in rule of law and the political process (ICRG).
E. Integrity of the legal system (ICRG).

3: **Access to Sound Money**
Average annual growth of the money supply in the last five years minus average
annual growth of real GDP in the last ten years
B. Standard inflation variability in the last five years.
C. Recent inflation rate.
D. Freedom to own foreign currency bank accounts domestically and abroad.

4: **Freedom to Exchange with Foreigners**
A. Taxes on international trade.
i. Revenue from taxes on international trade as a percentage of exports plus imports.
ii. Mean tariff rate.
iii. Standard deviation of tariff rates.
B.   Regulatory trade barriers.
i. Hidden import barriers: No barriers other than published tariffs and quotas (GCR).
ii. Costs of importing: the combined effect of import tariffs, licence fees, bank fees, and
the time required for administrative red-tape raises costs of importing equipment by
(10 = 10% or less; 0 = more than 50%) (GCR).

C. Actual size of trade sector compared to expected size.
D. Difference between official exchange rate and black market rate.
E. International capital market controls
i. Access of citizens to foreign capital markets and foreign access to domestic capital markets. (GCR)
ii. Restrictions on the freedom of citizens to engage in capital market exchange with foreigners—index of capital controls among 13 IMF categories.

5: **Regulation of Credit, Labor, and Business**
A. Credit Market Regulations
i. Ownership of banks: percentage of deposits held in privately owned banks.
ii. Competition: domestic banks face competition from foreign banks (GCR).
iii. Extension of credit: percentage of credit extended to private sector.
iv. Avoidance of interest rate controls and regulations that lead to negative real interest rates.
v. Interest rate controls: interest rate controls on bank deposits and/or loans are freely determined by the market (GCR).
B. Labor Market Regulations
Impact of minimum wage: the minimum wage, set by law, has little impact on wages because it is too low or not obeyed (GCR).
Hiring and firing practices: hiring and firing practices of companies are determined by private contract (GCR).
iii. Share of labor force whose wages are set by centralized collective bargaining (GCR).
Unemployment Benefits: the unemployment benefits system preserves the incentive to work (GCR).
v. Use of conscripts to obtain military personnel
C. Business Regulations
i. Price controls: extent to which businesses are free to set their own prices.
ii. Administrative conditions and new businesses: administrative procedures are an important obstacle to starting a new business (GCR).
Time with government bureaucracy: senior management spends a substantial amount of time dealing with government bureaucracy (GCR).
iv. Starting a new business: starting a new business is generally easy (GCR).
Irregular payments: irregular, additional payments connected with import and export permits, business licenses, exchange controls, tax assessments, police protection, or loan applications are very rare (GCR).

GCR = Global Competitiveness Report
ICRG = International Country Risk Guide

References

Ades, Alberto, and Rafael Di Tella. 1999. Rents, Competition, and Corruption. *American Economic Review* 89 (4):982–993.

Alesina, Alberto, and Enrico Spolaore. 1997. On the Number and Size of Nations. *Quarterly Journal of Economics* 112 (4):1027–1056.

Arrow, Kenneth, Bert Bolin, Robert Costanza, Partha Dasgupta, Carl Folke, C. S. Holling, Bengt-Uwe Jansson, Simon Levin, Karl-Göran Mäler, Charles Perrings, and David Pimentel. 1996. Economic Growth, Carrying Capacity, and the Environment. *Ecological Applications* 6 (1):13–15.

Atkinson, Giles, Richard Dubourg, Kirk Hamilton, Mohan Munesinghe, David Pearce, and Carlos Young. 1999. *Measuring Sustainable Development: Macroeconomics and the Environment*. Cheltanham: Edward Elgar.

Atkinson, Giles, and Kirk Hamilton. 2003. Savings, Growth and the Resource Curse Hypothesis. *World Development* 31 (11):1793–1807.

Baghwati, Jagdish. 1999. Economic Freedom: Prosperity and Social Progress. Paper read at Conference on Economic Freedom and Development, 17-18 June, at Tokyo.

Baghwati, Jagdish. 2000. *The Wind of the Hundred Days: How Washington Mismanaged Globalization*. London: MIT Press.

Beck, Nathaniel, and Jonathan N. Katz. 1995. What To Do (and Not To Do) with Time-Series Cross-Section Data. *American Political Science Review* 89 (3):634-647.

Beck, Nathaniel, Jonathan N. Katz, and Richard Tucker. 1998. Taking Time Seriously: Time-Series-Cross-Section Analysis with a Binary Dependent Variable. *American Journal of Political Science* 42 (4):1260–1288.

Birdsall, Nancy, and Robert Z. Lawrence. 1999. Deep Integration and Trade Agreements: Good For Developing Countries? In *Global Public Goods: International Cooperation in the 21st Century*, edited by I. Kaul, I. Grunberg and M. Stern. Oxford: Oxford University Press.

Birdsall, Nancy, and David Wheeler. 2001. Trade Policy and Industrial Pollution in Latin America: Where are the Pollution Havens? In *International Trade and the Environment*, edited by J. M. Dean. Aldershot: Ashgate.

Borenzstein, Eduardo, José de Gregorio, and Jhong-Wha Lee. 1998. How Does Foreign Investment Affect Economic Growth? *Journal of International Economics* 45:115–135.

Bornschier, Volker, and Christopher Chase-Dunn. 1985. *Transnational Corporations and Underdevelopment*. New York: Praeger.

Brack, Duncan. 1995. Balancing Trade and the Environment. *International Affairs* 71 (3):497–514.

Brecher, Jeremy, and Tim Costello. 1994. *Global Village or Global Pillage: Economic Reconstruction from the Bottom Up*. Boston: South End Press.

Cardoso, Fernando H. , and Enzo Faletto. 1979. *Dependency and Development in Latin America*. Berkeley: The University of California Press.

Collier, Paul, and Jan Willem Gunning. 1999. Explaining African Economic Performance. *Journal of Economic Literature* XXXVII:64–111.

Conca, Ken, and Jeffrey D. Dabelko, eds. 1998. *Green Planet Blues: Environmental Politics from Stockholm to Kyoto*. 2nd Edition ed. Boulder, CO: Westview.

Cooper, Richard N. 2001. Growth and Inequality: The Role of Foreign Trade and Investment: Harvard University.

Copeland, Brian R., and Scott M. Taylor. 2003. Trade, Growth and the Environment. Cambridge, MA: National Bureau of Economic Research.

Costanza, Robert, and Sven Erik Jørgensen. 2002. *Understanding and Solving Environmental Problems in the 21st Century: Towards a New, Integrated Hard Problem Science*. Amsterdam: Elsevier.

Coxhead, Ian, and Sisira Jayasuriya. 2003. *The Open Economy and the Environment: Development, Trade and Environment in Asia*. Cheltenham: Edward Elgar.

Cruz, Wilfredo, Mohan Munasinghe, and Jeremy Warford. 1996. Greening Development: Environmental Implications of Economic Policies. *Environment* 38 (5):6–38.

Daily, Gretchen C., and Paul R. Ehrlich. 1996. Socioeconomic Equity, Sustainability, and Earth's Carrying Capacity. *Ecological Applications* 6 (4):991–1001.

Daly, Herman E. 1993. The Perils of Free Trade. *Scientific American* November:50–57.

Dasgupta, Partha. 2001. *Human Well-Being and the Natural Environment*. Oxford: Oxford University Press.

de Mello, Luiz R. Jr. 1999. Foreign Direct Investment-Led Growth: Evidence From Time Series and Panel Data. *Oxford Economic Papers* 51 (1):133–151.

de Soysa, Indra. 2003. *Foreign Direct Investment, Democracy, and Development: Assessing Contours, Correlates and Concomitants of Globalization*. London: Routledge.

de Soysa, Indra, and John R. Oneal. 1999. Boon or Bane? Reassessing the Productivity of Foreign Direct Investment. *American Sociological Review* 64 (October):766–782.

Dean, Judith M., ed. 2001. *International Trade and the Environment*. Aldershot: Ashgate.

Dixon, John A., and Kirk Hamilton. 1996. Expanding the Measure of Wealth. *Finance & Development* December:15–18.

Dollar, David, and Aart Kraay. 2000. Trade, Growth, and Poverty. Washington D.C.: World Bank, Development Research Group.

Dryzek, John S. 1997. *Environmental Discourses: The Politics of the Earth*. Oxford: Oxford University Press.

Easterly, William, and Mirvat Sewadeh. *Global Development Network Growth Database* [http://www.worldbank.org/research/growth/GDNdata.htm]. World Bank, 2001 [cited.

Ekins, Paul, Carl Folke, and Robert Costanza. 1994. Trade, Environment and Development: The Issues in Perspective. *Ecological Economics* 9 (1):1–12.

Fearon, James D., and David D. Laitin. 2003. Ethnicity, Insurgency, and Civil War. *American Political Science Review* 97 (1):1–16.

Fernando, Jude L. 2003. The Power of Unsustainable Development. *Annals of American Academy of Political and Social Science*:6–34.

Frankel, Jeffrey A. 2003. The Environment and Globalization. Cambridge, MA: NBER.

Frankel, Jeffrey A., and David Romer. 1999. Does Trade Cause Growth? *American Economic Review* 89 (3):379–399.

Galtung, Johann. 1971. A Structural Theory of Imperialism. *Journal of Peace Research 8, 2*:81–117.

Gilpin, Robert. 2000. *The Challenge of Global Capitalism: The World Economy in the 21st Century*. Princeton, NJ: Princeton University Press.

Gleditsch, Nils Petter, Peter Wallensteen, Mikael Eriksson, Margareta Sollenberg, and Havard Strand. 2002. Armed Conflict 1946–2001: A New Dataset. *Journal of Peace Research* 39 (5):615–637.

Goodwin, Neva R. 2003. Five Kinds of Capital: Useful Concepts for Sustainable Development. Medford, MA: Global Development and Environment Institute, Tufts University.

Graham, Edward M. 2000. *Fighting the Wrong Enemy: Antiglobal Activists and Multinational Enterprises*. Washington, DC: Institute for International Economics.

Grimes, Peter, and Jeffrey Kentor. 2003. Exporting the Greenhouse: Foreign Capital Penetration and CO2 Emissions 1980–1996. *Journal of World-Systems Research* IX (2):261–275.

Grossman, Gene M., and Alan B. Krueger. 1995. Economic Growth and the Environment. *Quarterly Journal of Economics*:353–377.

Gueorguieva, Anna, and Katherine Bolt. 2003. A Critical Review of the Literature on Structural Adjustment and the Environment. Washington, DC: World Bank.

Gurr, Ted R., and Keith Jaggers. 1995. Tracking Democracy's Third Wave with the Polity III Data. *Journal of Peace Research* 32 (4):469–482.

Gwartney, James, and Robert Lawson. 2003. *Economic Freedom in the World 2003: The Annual Report*. Vancouver: The Fraser Institute.

Gylfason, Thorvaldur. 2000. Natural Resources, Education, and Economic Development. London: Center for Economic Policy Research.

Haas, Peter, Robert Keohane, and Marc Levy, eds. 1993. *Institutions for the Earth: Sources of Effective International Environmental Protection*. Cambridge, MA: MIT press.

Hamilton, Kirk. 2001. The Sustainability of Extractive Economies. In *Resource Abundance and Economic Development*, edited by R. M. Auty. Oxford: Oxford University Press.

Hamilton, Kirk, and Michael Clemens. 1999. Genuine Savings Rates in Developing Countries. *The World Bank Economic Review* 13 (2):333–356.

Hardin, Garrett. 1993. *Living Within Limits: Ecology, Economics, and Population Taboos*. New York: Oxford University Press.

Hardt, Michael , and Antonio Negri. 2000. *Empire*. Cambridge, MA: Harvard University Press.

Hoogvelt, Ankie. 2001. *Globalization and the Postcolonial World: The New Political Economy of Development*. Basingstoke: Palgrave.

Kaufmann, Daniel, Art Kraay, and Pablo Zoido-Lobaton. 1999. Governance Matters. Washington, DC: World Bank.

Klein, Michael, Carl Aaron, and Bita Hadjmichael. n.d. Foreign Direct Investment and Poverty Reduction. Washington, DC: World Bank.

Korten, David C. 2001. *When Corporations Rule the World*. Bloomfield, CT: Kumarian.

Kunte, Arundhati, Kirk Hamilton, John Dixon, and Michael Clemens. 1998. Estimating National Wealth: Methodology and Results. Washington, DC: World Bank.

Levine, Ross, and David Renelt. 1992. A Sensitivity Analysis of Cross-Country Growth Regressions. *American Economic Review* 82 (4):942–963.

Lijphart, Arend. 1994. Democracies: Forms, Performance, and Constitutional Engineering. *European Journal of Political Research* 25:1-17.

Loayza, Norman, Humberto López, Klaus Schmidt-Hebbel, and Luis Servén. 1998. *Saving in the World: Stylized Facts*. Washington, DC: World Bank.

Loayza, Norman, K Schmidt-Hebbel, and L Serven. 2000. What Drives Private Saving Across the World? *Review of Economics and Statistics* LXXXII (2):165–181.

López, Ramón. 2003. The Policy Roots of Socioeconomic Stagnation and Environmemtal Implosion: Latin America. *World Development* 31 (2):259–280.

Mabey, Nick, and Richard McNally. 1998. Foreign Direct Investment and the Environment: From Pollution Havens to Sustainable Development. Godalming, Surrey: World Wildlife Fund, UK.

MacNeill, Jim, Peter Winsemius, and Taizo Yakushiji. 1991. *Beyond Interdependence: The Meshing of the World's Economy and the Earth's Ecology*. Oxford: Oxford University Press.

Martin, Hans-Peter, and Harald Schumann. 1997. *The Global Trap: Globalization and the Assault on Democracy and Prosperity*. London: Zed Books.

MEA, Millennium Ecosystem Assessment. 2003. *Ecosystems and Human Well-Being: A Framework for Assesssment*. Washington, DC: Island Press.

Meadows, Donella H., Dennis L. Meadows, and Jorgen Randers. 1993. *Beyond the Limits: Confronting Global Collapse, Envisioning a Sustainable Future*. White River Jct., VT: Chelsea Green.

Midlarsky, Manus I. 2001. Democracy and the Environment. In *Environmental Conflict*, edited by P. F. Diehl and N. P. Gleditsch. Boulder, CO: Westview.

Mikesell, Raymond F. 1992. *Economic Development and the Environment: A Comparison of Sustainable Development with Conventional Development Economics*. London: Mansell.

Milner, Helen. 1999. The Political Economy of International Trade. *Annual Review of Political Science* 2:91–114.

Myers, Norman, and Julian L. Simon. 1994. *Scarcity or Abundance? A Debate on the Environment*. London: W. W. Norton.

Neumayer, Eric. 2002. Trade Openness and Environmental Cooperation. *World Economy* 25 (6):815–832.

Neumayer, Eric. 2003. *Weak versus Strong Sustainability: Exploring the Limits of Two Opposing Paradigms*. Cheltenham: Edward Elgar.

Neumayer, Eric. 2004. Indicators of Sustainability. In *International Yearbook of Environmental and Resource Economics*, edited by T. Tietenberg and H. Folmer. Cheltanham: Edward Elgar.

Nye, Joseph S., and John D. Donahue, eds. 2000. *Governance in a Globalizing World*. Cambridge, MA & Washington, DC: Visions of Governance for the 21st Century & Brookings.

Ogaki, Masao, Jonathan Ostry, and Carmen Reinhart. 1995. Saving Behaviour in Low- and Middle-Income Developing Countries: A Comparison. Washington, DC: International Monetary Fund.

Pearce, David, and Giles Atkinson. 1993. Capital Theory and the Measure of Sustainable Development: An Indicator of Weak Sustainability. *Ecological Economics* 3 (103–108).

Pearce, David, and Jeremy Warford. 1993. *World Without End: Economics, Environment, and Sustainable Development*. Oxford: Oxford University Press.

Powell, Bingham J. 2000. *Elections As Instruments of Democracy : Majoritarian and Proportional Visions*. New Haven, CT: Yale University Press.

Reed, David. 1996. *Structural Adjustment, the Environment and Sustainable Development*. London: Earthscan.

Rich, Bruce. 1995. *Mortgaging the Earth: The World Bank, Environmental Impoverishment, and the Crisis of Development*. Bellbrook Park: Beacon.

Roberts, Timmons J., and Peter E. Grimes. 1997. Carbon Intensity and Economic Development 1962–71: A Brief Exploration of the Environmental Kuznets Curve. *World Development* 25:191–198.

Roberts, Timmons J., and Amy Hite, eds. 2000. *From Modernization to Globalization: Perspectives on Development and Social Change*. Oxford: Blackwell.

Røpke, Inge. 1994. Trade, Development and Sustainability--A Critical Assessment of the 'Free Trade' Dogma. *Ecological Economics* 9 (1):13–22.

Russett, Bruce, and John Oneal. 2000. *Triangulating Peace: Democracy, Interdependence, and International Organizations*, *The Norton Series in World Politics*. London: W. W. Norton and Company.

Sampson, Gary P., and Bradnee W. Chambers, eds. 2002. *Trade, Environment, and the Millennium*. 2nd Edition ed. New York: United Nations University Press.

Shafik, Nemat. 1994. Economic Development and Environmental Quality: An Econometric Analysis. *Oxford Economic Papers* 46:757–773.

Srinivasan, T. N., and Jagdish Baghwati. 1999. Outward-Orientation and Development: Are Revisionists Right? New Haven, CT and New York: Yale University and Columbia University.

Stata, Corporation. 2003. *Cross-Sectional Time-Series: Reference Manual Release 8*. College Station, TX: Stata Corporation.

Thomas, Vinod, Mansoor Dailami, Ashok Dhareshwar, Daniel Kaufmann, Nalin Kishor, Ramón López, and Yan Wang. 2000. *The Quality of Growth*. New York: Oxford University Press, for the World Bank.

Treisman, Daniel. 2000. The Causes of Corruption: A Cross-National Study. *Journal of Public Economics* 76:399–457.

UNCTAD. 2003. *World Investment Directory*. Geneva: United Nations Conference on Trade and Development.

Vogel, David. 1995. *Trading Up: Consumer and Environmental Regulation in the Global Economy*. Cambridge, MA: Harvard University Press.

Wackernagel, Mathis, Larry Onisto, Patricia Bello, Cllejas Alejandro Linares, López Susana Ina Falfán, Méndez Jesus García, Suaréz Isabel Ana Guerrero, and Suaréz Guadelupe Ma. Guerrero. 1999. National Natural Capital Accounting with the Ecological Footprint Concept. *Ecological Economics* 29:375–390.

WCED, World Commission on Environment and Development. 1987. *Our Common Future*. Oxford: Oxford University Press.

World Bank. 1997. *Expanding the Measure of Wealth: Indicators of Environmentally Sustainable Development*. Washington, DC: World Bank.

World Bank. 2002. World Development Indicators CD Rom. Washington, DC: World Bank.

York, Richard, Eugene A. Rosa, and Thomas Dietz. 2003. Footprints on the Earth: The Environmental Consequences of Modernity. *American Sociological Review* 68 (April):279–300.

Yu, Douglas. 1994. Free Trade is Green, Protection is Not. *Conservation Biology* 8 (4):989–996.

Zammit, Ann. 2003. Development at Risk: Rethinking UN-Business Partnerships. Geneva: United Nations Research Institute for Social Development (UNRISD).

Zorn, Christopher. 2001. Generalized Estimation Equation Models for Correlated Data: A Review with Applications. *American Journal of Political Science* 45 (2):470–490.