Costa Rica, superstar? some reflections on the global drivers and bottlenecks of the happy planet index

Tausch, Arno
Innsbruck University, Department of Political Science,
Corvinus University of Budapest

07. September 2011

Costa Rica, superstar? Some reflections on the global drivers and bottlenecks of the Happy Planet Index

Arno Tausch[1]

Visiting Professor of Economics, Corvinus University Budapest
and
Adjunct Professor of Political Science at Innsbruck University, Austria
E-mail: arno.tausch@uibk.ac.at

6566 words

ABSTRACT

For some years now, the Happy Planet Organization presents the so-called 'Happy Planet Index' (HPI), which is an index of measuring the trade-off between ecological footprint data and life quality (Happy Life Years, HLYE). Costa Rica emerges from these comparisons as the world's 'best practice nation', using a minimum amount of natural resources to achieve a maximum of human happiness. So is Costa Rica the pathway for humanity? There are shortcomings in the formula, with which the index is calculated (Happy Life Years divided by Ecological Footprint per capita, and some constants added). Using a re-formulation, the global ranking with Costa Rica on top is indeed confirmed. We present some evidence on the cross-national drivers and bottlenecks of our re-formulated Happy Planet Index (HPI) performance on a global scale: a wide variety of standard globalization variables have little influence on HPI performance. Big countries with large population resources perform somewhat better, and low military expenditures per GDP are a constraint on HPI performance. Beneficial effects are also wielded by received worker remittances. Efficiency tends to increase and then to decrease with rising development levels.

Keywords:

ECOLOGICAL AND ENVIRONMENTAL PHENOMENA
ECOLOGICAL FOOTPRINT
GLOBALIZATION
HAPPY PLANET INDEX
INEQUALITY
LIFE EXPECTANCY

[1] The author would like to thank Professor Almas Heshmati, Korea University, for many important insights and suggestions in the context of the development of the present research agenda. All quoted internet sources were re-accessed on August 6 for a final check.

MIGRATION
MILITARY EXPENDITURES

Costa Rica, Superstar? Some Reflections on the global drivers and bottlenecks of the Happy Planet Index

1. Introduction

On an international level, the Happy Planet Organization indicators[2] – Ecological Footprint, Happy Life Years, and the derived measure Happy Planet Index (HPI), which measures the ecological efficiency with which human well-being is delivered around the world, increasingly gain importance. The attractiveness of the Happy Planet Organization indices indeed merits the attention of science, geography, the social sciences, and the public health profession at the same time. At first sight, the measure is of a compelling simplicity, capturing at the same time the growing global ecological concerns about the validity of our lifestyle, needing more and more energy to produce a stagnant or even shrinking rate of human happiness. Decades ago, some 'alternative economists' already developed such ideas which now led to these indices, most notably Ernst Friedrich Schumacher (1911-1977).[3] The basic logic of the Happy Planet Index must be traced back especially to Schumacher's writings. [4] Schumacher's *'Buddhist economics'* are based on an envisaged minimum material consumption in relation to life quality. Our article is part of this growing awareness in the international scientific community, inspired by Schumacher, of the necessity to centre development accounting squarely within the larger framework of what is being increasingly referred-to as *'the environmental efficiency of well-being'* (EWEB, see also Dietz, Rosa and York, 2007 and 2009; Knight and Rosa, 2011). Knight and Rosa, 2011 highlight the fact that the environmental efficiency of wellbeing (EWEB) takes into account the benefits societies are able to produce from their demands on the environment. According to the Knight and Rosa study, 2011, countries vary widely in the efficiency with which they transform the Earth's resources into well-being. Knight and Rosa compare in their study the ecological footprint per capita and average life satisfaction (as a measure of subjective well-being). Our article departs from this approach, since we feature not on Life Satisfaction, but on Happy Life Years in relation to ecological footprint. Happy Life Years – a variable, developed by the Happy Planet Organization[5], combines, Gallup[6] and World Values Survey[7] data on a 0-10 scale of global respondent's individual feeling of overall happiness with average life expectancy (on the HPI Index, see also Ng, 2008a and 2008b; Veenhoven, 1996).

[2] http://www.happyplanetindex.org/
[3] The most important ideas by Schumacher were stated in Schumacher, 1973a, 1973b, 1976, 1977.
[4] see http://www.resurgence.org/education/schumacher-circle.html#ne
[5] http://www.happyplanetindex.org/
[6] http://www.gallup.com/Home.aspx
[7] http://www.worldvaluessurvey.org/

Since our article does not feature primarily on ecological footprint, but on the Happy Planet Index, which is mathematically derived from it, it sufficed to say here that ecological footprint (g ha /cap)[8], as it is universally well-known by now, is indeed a one-catch all-indicator of ecological strain, caused by human activity. Ecological footprint and its measurement cannot be further debated in the framework of article and at this stage must be regarded as a 'given' (for studies about the logic and determinants of footprint per capita see also Dietz *et al.*, 2007 and 2009). It suffices to say here that it is measure of the amount of land required to provide for all their resource requirements plus the amount of vegetated land required to sequester (absorb) all their CO2 emissions and the CO2 emissions embodied in the products individuals consume. This figure is expressed in units of 'global hectares'. In 2005, the per capita footprint for the rich OECD nations was 6.0 global hectares[9]. A second variable is then used by the Happy Planet Index Organization to measure the Happy Planet Index – it is global life satisfaction: Happy Life Years, which have to be maximized in relationship to the 'ecological price' of happiness, ecological footprint.

It is then of course very tempting to calculate – in a Schumacherian tradition – the 'environmental price' of human happiness. The Happy Planet Organisation calculates the HPI in the following way:

$$(1) \qquad HPI_i = \left((HLYE_i)/(EFPC_i + \alpha)\right) \times \beta$$

where Happy Life Years (HLYE) is obtained as the product of life expectancy (LE) and average life satisfaction (LS) index. In its currently used formula, the Happy Planet Organization adds a constant (α) to ecological footprint. The result of the division: [Happy Life Years divided by Ecological Footprint plus the constant (α)] is then multiplied by another, equally arbitrarily chosen constant (β) to normalize the efficiency index. In the Happy Planet Organization formula, the constants have the following numerical values: $\alpha = 3.35$ and $\beta = 6.42$.

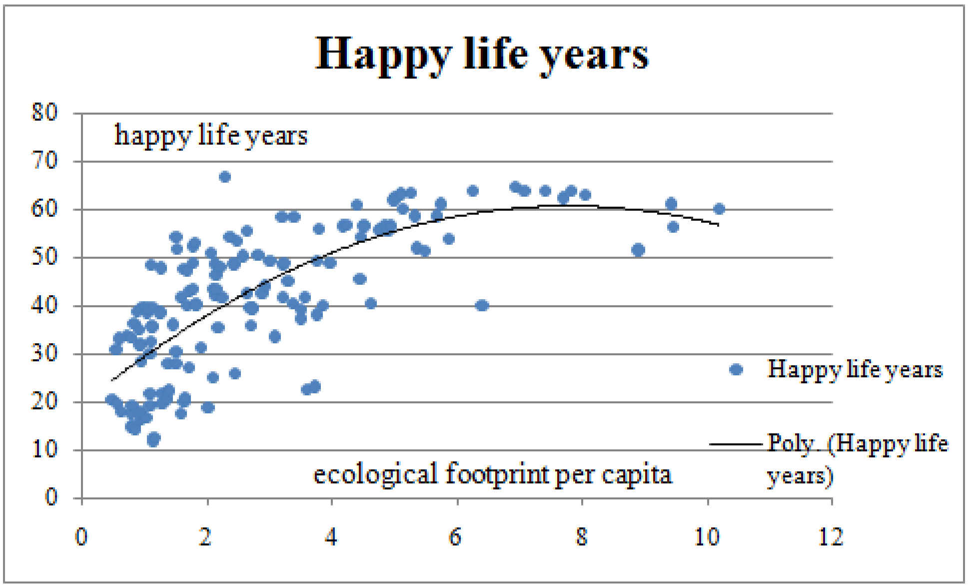
The highest global HPI score is that of Costa Rica (76.1 out of 100). Of the 10 best performing countries of the world, nine are in Latin America.[10] But unfortunately, the Happy Planet Organization's straightforward and simple methodology overlooks advances in the social sciences, which long ago already developed appropriate methodologies to relate life quality variables – like life expectancy – to GDP per capita or energy consumption levels in empirical, and non-linear mathematical formulations, which capture much better than the above simple equation the underlying non-linear tradeoffs between *'energy consumption and/or environmental strain'* and *'life quality'* (Goldstein, 1985). Goldstein's empirically developed idea that basic human needs indicators – like life expectancy – are a non-linear

---

[8] http://www.footprintnetwork.org/en/index.php/GFN/
[9] http://www.happyplanetindex.org/
[10] http://www.happyplanetindex.org/

function of development levels has been so widely received in the social science literature that is has become a real international standard nowadays (see Afxentiou, 1990a, 1990b; Anand and Ravillion, 1993; Anson, 1988, 1991; Cheng, 1989; Dixon, 1987; Dixon and Moon, 1986, 1989; Fosu, 2009, 2010a, 2010b, 2010c; Kakwani, 1993, 1995; Khan, 1991; King, 1998; Knight and Rosa, 2011; Mazumdar, 1996, 2000; Moon and Dixon, 1992; Newman and Thomson, 1989; Rudra, 2009; Tausch and Prager, 1993). The neglect of such a basic non-linear function (whatever its concrete mathematical formulation[11]) is a major shortcoming of the currently used Happy Planet Index calculation. The global public health research tradition, too, produced massive evidence on the cross-national determinants of life expectancy and other life quality variables (to quote but a few studies: Wilkinson, 1992; Wilkinson and Picket, 2006; Tausch, 2010). This growing methodological convergence of the social sciences, geography and earth sciences, and public health research on predictors of life quality at different stages of development should be taken into account in this article (Fain, et al. 1997; Mostafa, 2010a and 2010b; Mostafa and Nataraajan, 2009; Shandra, 2007a, 2007b, Shandra, Leckband, McKinney and London, 2009). Graph 1 depicts the trade-off between ecological footprint and happy life years; the (standardized) residuals in our graph are our reformulated Happy Planet Index:

Graph 1: The non-linear relationship between Happy Life Years (HLYE, vertical Y) and ecological footprint (horizontal X), n=140 countries in 2005.



Variable	Coefficient	Std Error
Ecological Footprint per capita	10.541***	1.313

[11] The most often encountered formulation in the literature is a double logarithmic expression, based on the natural logarithm of development level/energy consumption and its square.

Ecological Footprint per capita^2	–0.677***	0.147
Constant	19.631***	2.246
N =	140	
Adj. R^2 =	54.1%	
F-test =	83.081	
p-value =	0.000	

Significance level: **p* <0.05, ***p* <0.01, ****p* <0.001;

2. Method

Established[12], as the Happy Planet Index might be in its present form, it does not escape our criticism. As we already explained, the hitherto existing calculations of the HPI, provided by the Happy Planet Organization, are merely based on simple arithmetical principles.

Following Heintz, 1972 we propose as an alternative method a residual method, and calculate our Happy Planet Index as the standardized residuals from Graph 1. The standardized residual values are computed as observed minus predicted Happy Life Years (HLYE) divided by the square root of the residual mean square:

$$(2) \qquad SDP_i = (HLYE_i - \hat{HLYE}_i) / \hat{\sigma}$$

High positive outlayers imply a very high Happy Planet Index performance, while countries below the trend line are the countries with a low Happy Planet performance. Thus, our method is much more straightforward than the simple arithmetical procedure, used by Happy Planet Organization.

Table 1 summarizes the results from our freely available statistical data[13]:

[12] Although we presume the main contemporary global environment indicators to be known, we refer our readers especially to the very comprehensive Yale/Columbia environmental data series, available at http://sedac.ciesin.columbia.edu/es/esi/ and http://epi.yale.edu/Home . The important new ‘grammar’ of the global footprint discourse can be found at http://www.footprintnetwork.org/en/index.php/GFN/page/glossary/ .
[13] See see http://www.hichemkaroui.com/?p=2383 ; Social Sciences and Humanities- MESOJ- ISSN 2109-9618- (2010) Volume 1 No 2; Dataset for ‘Globalization, the human condition and sustainable development in the 21st Century. Cross-national perspectives and European implications‘

Table 1: The Happy Planet Index and a necessary reformulation

	Ecological footprint per capita	trend value Happy Life Years (calculated from Graph 1)	Happy life years (observed, real values)	Residuals, which form the basis for the new, unbiased HPI	Happy Planet Index, HPI, as calculated by the Happy Planet Organization	Global rank according to the original HPI, as calculated by the Happy Planet Organization	rank for our recalculated HPI	bias of the HPI, as calculated by the Happy Planet Organization
Costa Rica	2,271	40,549	66,723	26,174	76,117	1	1	0
Dominican Republic	1,488	33,971	54,167	20,196	71,779	2	2	0
Jamaica	1,087	30,122	48,518	18,397	70,086	3	3	0
Guatemala	1,506	34,136	51,787	17,651	68,372	4	4	0
Vietnam	1,261	31,836	47,850	16,014	66,517	5	6	-1
Colombia	1,790	36,658	52,997	16,340	66,103	6	5	1
Cuba	1,762	36,415	52,370	15,955	65,679	7	7	0
El Salvador	1,619	35,157	47,632	12,475	61,459	8	10	-2
Brazil	2,356	41,195	54,297	13,102	61,014	9	8	1
Honduras	1,773	36,513	48,736	12,223	60,987	10	11	-1
Nicaragua	2,050	38,814	50,984	12,170	60,541	11	12	-1
Egypt	1,666	35,579	47,197	11,618	60,321	12	14	-2
Saudi Arabia	2,625	43,132	55,627	12,495	59,705	13	9	4
Philippines	0,870	27,886	38,862	10,976	59,025	14	16	-2
Argentina	2,456	41,928	53,373	11,445	58,950	15	15	0
Indonesia	0,948	28,707	39,517	10,810	58,923	16	17	-1
Bhutan	0,996	29,192	39,661	10,469	58,498	17	18	-1
Panama	3,193	46,804	58,526	11,722	57,367	18	13	5
Laos	1,056	29,811	39,416	9,605	57,335	19	20	-1
China	2,106	39,265	48,596	9,331	57,110	20	21	-1
Morocco	1,130	30,550	39,667	9,117	56,753	21	22	-1
Sri Lanka	1,024	29,483	38,590	9,107	56,547	22	23	-1
Mexico	3,382	47,900	58,331	10,431	55,575	23	19	4

Pakistan	0,824	27,404	36,186	8,782	55,560	24	24	0
Ecuador	2,201	40,011	48,013	8,002	55,461	25	27	-2
Jordan	1,706	35,930	43,050	7,120	54,587	26	33	-7
Belize	2,557	42,657	50,229	7,572	54,527	27	30	-3
Peru	1,567	34,695	41,705	7,010	54,374	28	35	-7
Tunisia	1,763	36,423	43,311	6,888	54,309	29	39	-10
Trinidad and Tobago	2,130	39,456	46,328	6,872	54,206	30	40	-10
Bangladesh	0,575	24,686	33,130	8,444	54,094	31	25	6
Moldova	1,233	31,560	38,662	7,102	54,078	32	34	-2
Malaysia	2,419	41,663	48,628	6,965	54,046	33	38	-5
Tajikistan	0,704	26,114	33,833	7,719	53,482	34	29	5
India	0,894	28,140	35,114	6,974	53,028	35	36	-1
Venezuela	2,811	44,398	50,431	6,033	52,494	36	43	-7
Nepal	0,762	26,745	33,307	6,562	51,905	37	42	-5
Syria	2,078	39,044	43,447	4,403	51,320	38	53	-15
Myanmar	1,108	30,330	35,629	5,299	51,227	39	47	-8
Algeria	1,664	35,564	40,067	4,503	51,225	40	52	-12
Thailand	2,131	39,462	43,509	4,047	50,901	41	56	-15
Haiti	0,534	24,234	30,821	6,587	50,843	42	41	1
Netherlands	4,390	52,789	61,052	8,263	50,597	43	26	17
Malta	3,787	50,058	56,035	5,977	50,356	44	44	0
Uzbekistan	1,812	36,848	40,317	3,469	50,070	45	60	-15
Chile	3,001	45,629	49,242	3,613	49,721	46	59	-13
Bolivia	2,118	39,361	42,082	2,721	49,346	47	63	-16
Armenia	1,440	33,535	36,077	2,542	48,277	48	66	-18
Singapore	4,163	51,823	56,500	4,677	48,240	49	50	-1
Yemen	0,912	28,334	31,980	3,646	48,086	50	58	-8
Germany	4,226	52,101	56,779	4,679	48,072	51	49	2
Switzerland	5,001	55,024	62,551	7,527	48,051	52	31	21
Sweden	5,100	55,341	63,218	7,877	47,991	53	28	25
Albania	2,230	40,240	41,695	1,455	47,908	54	72	-18
Paraguay	3,218	46,953	48,952	1,999	47,800	55	69	-14
Austria	4,979	54,953	61,924	6,971	47,693	56	37	19
Finland	5,248	55,786	63,303	7,517	47,234	57	32	25

Croatia	3,205	46,875	48,268	1,393	47,226	58	74	-16
Kyrgyzstan	1,096	30,212	32,665	2,453	47,090	59	67	-8
Cyprus	4,504	53,245	56,558	3,313	46,193	60	61	-1
Guyana	2,631	43,173	42,558	-0,615	45,632	61	81	-20
Belgium	5,133	55,442	59,983	4,542	45,361	62	51	11
Bosnia and Herzegovina	2,923	45,133	43,976	-1,157	44,956	63	83	-20
Slovenia	4,460	53,073	54,217	1,144	44,528	64	76	-12
Israel	4,846	54,504	56,838	2,334	44,488	65	68	-3
Korea (Republic of)	3,742	49,827	49,120	-0,707	44,427	66	82	-16
Italy	4,760	54,205	55,656	1,451	44,021	67	73	-6
Romania	2,870	44,790	42,576	-2,214	43,894	68	85	-17
France	4,927	54,781	56,594	1,813	43,862	69	70	-1
Georgia	1,076	30,007	30,103	0,096	43,597	70	79	-9
Slovakia	3,289	47,368	45,051	-2,317	43,523	71	86	-15
United Kingdom	5,330	56,022	58,598	2,576	43,310	72	65	7
Japan	4,892	54,662	55,572	0,909	43,253	73	77	-4
Spain	5,741	57,083	61,196	4,114	43,189	74	55	19
Poland	3,960	50,897	48,723	-2,174	42,751	75	84	-9
Ireland	6,262	58,153	63,849	5,696	42,619	76	45	31
Cambodia	0,943	28,650	28,362	-0,288	42,344	77	80	-3
Iran	2,676	43,488	39,548	-3,940	42,085	78	91	-13
Bulgaria	2,715	43,754	39,764	-3,990	42,045	79	92	-13
Turkey	2,713	43,739	39,423	-4,316	41,699	80	95	-15
Hong Kong, China (SAR)	5,683	56,946	58,571	1,624	41,599	81	71	10
Azerbaijan	2,160	39,696	35,415	-4,281	41,209	82	94	-12
Lithuania	3,201	46,850	41,775	-5,075	40,900	83	98	-15
Djibouti	1,485	33,949	30,505	-3,444	40,443	84	89	-5
Norway	6,915	59,104	64,570	5,467	40,360	85	46	39
Canada	7,068	59,270	63,973	4,703	39,399	86	48	38
Hungary	3,549	48,823	41,805	-7,018	38,864	87	102	-15
Kazakhstan	3,371	47,842	40,395	-7,448	38,544	88	104	-16
Czech Republic	5,357	56,100	51,996	-4,103	38,310	89	93	-4

Mauritania	1,901	37,599	31,296	-6,303	38,209	90	101	-11
Iceland	7,398	59,560	63,890	4,330	38,141	91	54	37
Ukraine	2,694	43,613	35,887	-7,726	38,074	92	106	-14
Senegal	1,357	32,757	27,926	-4,831	38,028	93	97	-4
Greece	5,860	57,353	53,950	-3,403	37,583	94	88	6
Portugal	4,435	52,972	45,463	-7,510	37,458	95	105	-10
Uruguay	5,477	56,427	51,243	-5,184	37,241	96	99	-3
Ghana	1,486	33,954	27,984	-5,969	37,098	97	100	-3
Latvia	3,490	48,500	39,105	-9,395	36,670	98	112	-14
Australia	7,809	59,805	63,725	3,920	36,642	99	57	42
New Zealand	7,696	59,750	62,335	2,585	36,210	100	64	36
Belarus	3,853	50,384	40,064	-10,320	35,674	101	114	-13
Denmark	8,036	59,889	62,934	3,044	35,468	102	62	40
Mongolia	3,495	48,532	37,303	-11,229	34,951	103	119	-16
Malawi	0,471	23,518	20,557	-2,961	34,471	104	87	17
Russia	3,746	49,848	38,132	-11,717	34,468	105	120	-15
Chad	1,701	35,890	27,000	-8,889	34,267	106	110	-4
Lebanon	3,083	46,141	33,666	-12,475	33,560	107	126	-19
Macedonia	4,608	53,645	40,522	-13,123	32,664	108	128	-20
Congo	0,543	24,333	19,706	-4,627	32,435	109	96	13
Madagascar	1,081	30,062	21,804	-8,259	31,538	110	108	2
United States	9,422	59,788	61,166	1,379	30,733	111	75	36
Nigeria	1,342	32,607	22,210	-10,398	30,345	112	115	-3
Guinea	1,271	31,934	21,810	-10,124	30,252	113	113	0
Uganda	1,375	32,923	22,266	-10,657	30,208	114	117	-3
South Africa	2,082	39,071	25,153	-13,917	29,693	115	130	-15
Rwanda	0,793	27,074	19,128	-7,947	29,587	116	107	9
Congo (Democratic Republic of the)	0,612	25,099	17,954	-7,145	29,040	117	103	14
Sudan	2,439	41,803	25,773	-16,030	28,550	118	133	-15
Luxembourg	10,192	59,418	60,082	0,664	28,472	119	78	41
United Arab Emirates	9,460	59,773	56,219	-3,554	28,164	120	90	30
Ethiopia	1,352	32,705	20,610	-12,094	28,099	121	122	-1
Kenya	1,067	29,917	19,135	-10,782	27,768	122	118	4

Cameroon	1,268	31,902	19,612	-12,290	27,223	123	125	-2
Zambia	0,770	26,829	17,474	-9,355	27,180	124	111	13
Kuwait	8,887	59,935	51,559	-8,376	27,037	125	109	16
Niger	1,636	35,309	20,951	-14,358	26,940	126	131	-5
Angola	0,908	28,290	17,790	-10,500	26,775	127	116	11
Estonia	6,394	58,379	40,125	-18,254	26,419	128	136	-8
Mali	1,620	35,168	19,978	-15,190	25,771	129	132	-3
Mozambique	0,932	28,540	16,444	-12,096	24,611	130	123	7
Benin	1,009	29,328	16,717	-12,611	24,581	131	127	4
Togo	0,821	27,375	15,154	-12,221	23,283	132	124	8
Sierra Leone	0,772	26,848	14,845	-12,004	23,080	133	121	12
Cen African Rep,	1,585	34,852	17,611	-17,241	22,880	134	134	0
Burkina Faso	2,005	38,451	18,707	-19,744	22,400	135	138	-3
Burundi	0,836	27,534	14,267	-13,266	21,842	136	129	7
Namibia	3,707	49,653	23,220	-26,433	21,103	137	139	-2
Botswana	3,605	49,119	22,609	-26,509	20,851	138	140	-2
Tanzania	1,145	30,696	12,476	-18,221	17,791	139	135	4
Zimbabwe	1,118	30,430	11,563	-18,867	16,588	140	137	3

Source: our own calculations from the data, documented in this article

Having established a residual-based Happy Planet Indicator, we now can look more realistically at the cross-national determinants of the Happy Planet Index performance. Our chosen independent variables[14] cover a wide range of possible drivers and bottlenecks of happy life year performance, including cultural identity, demography, feminism, geography, economic policies, globalization and migration as well as state expenditures on the military and on education, global culture etc. Our list is thus corresponding to international research standard praxis in the discipline of general 'development accounting' (Barro and Sala-i-Martin, 2003; Dixon, 1987; Dixon and Moon, 1986, 1989; Durlauf et al., 2008; Fain, 1997; Fosu, 2009, 2010a, 2010b, 2010c; Moon and Dixon, 1992; Shandra, 2007a, 2007b; Shandra et al., 2009; Tausch and Prager, 1993). Compared to a recent approach on the subject (Knight and Rosa, 2011), we do include globalization-oriented variables as well, and not just levels of GDP, winters, social trust, democracy, inequality, and Latin America, former USSR, Africa, and Asia as 'dummy variables' (Knight and Rosa, 2011). There is a wide and well-established research tradition in international comparative sociology to include globalization-related drivers of environmental decay (Jorgenson, 2008, 2009a, 2009b, 2009c, 2009d). To exclude such variables and to introduce instead four geographically determined dummy variables (Latin America, former USSR, Africa, and Asia) does not necessarily increase the theoretical and predictive power of analysis. Our own independent variables to predict Happy Planet Index performance are presented in Table 2:

Table 2: The independent variables of our investigation

Independent variables, determinants of Happy Planet Index Performance	**Theoretical dimension**
Comparative price levels (US=1.00)	dependency and world systems research
Foreign savings rate	dependency and world systems research
FPZ (free production zones) employment as % of total population	dependency and world systems research
MNC outward investments (stock) per GDP	dependency and world systems research
MNC PEN - stock of Inward FDI per GDP	dependency and world systems research
MNC PEN: DYN MNC PEN 1995-2005	dependency and world systems research
Openness-Index, 1990 (export-share per GDP + import-share per GDP)	dependency and world systems research
Worker remittance inflows as % of GDP	migration
Immigration - Share of population 2005 (%)	migration
Net international migration rate, 2005-2010	migration
2000 Economic Freedom Score	Economic policies following the neo-liberal Washington Consensus
Muslim population share per total population	cultural identity of the Muslim world
% world population	demography
Annual population growth rate, 1975-2005 (%)	demography
Population density	demography
ln GDP per capita	development level
ln GDP per capita ^2	development level
Years of membership in the EU, 2010	EU in the world system
Years of membership in EMU, 2010	EU in the world system
% women in government, all levels	feminism
Absolute latitude	geography

[14] We have made our data completely and freely available on the Internet, so that the global research community can have free access to our data and check our results at http://www.hichemkaroui.com/?p=2383 . This internet site (materials III) offers the Microsoft EXCEL data (Table 1 of the EXCEL file) and a list of the sources (Table 2 of the EXCEL file). The independent variables are variables 42 – 67.

Public education expenditure per GNP	human capital formation
UNDP education index	human capital formation
Military expenditures per GDP	peace research
Military personnel rate ln (MPR+1)	peace research
Membership in the Islamic Conference	political systems in the Muslim world

The choice of a country to be included in the final analysis (175 countries) was determined by the availability of fairly good data series for these independent variables (if not mentioned otherwise, UNDP data for the middle of the first decade of the new millenium).

The statistical design of our study is thus based on the usual, SPSS-PAWS XVIII[15] ordinary least square standard regression of the **'kitchen sink type'** (Durlauf *et al.*, 2008) of economic growth and economic, social and political performance in the research tradition of Barro, 2003. To our knowledge, the term *'kitchen sink regression',* commonly used in econometrics of economic growth, was re-introduced in more recent standard social science journal vocabulary in Laver and Shepsle, 1999. Prior stepwise regression procedures selected the significant among the total list of 26 available predictors.

We explain the variations in Happy Planet Index performance, using multiple linear regression method as follows:

(1) $$SDP_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \ldots + \beta_J X_{Ji} + \varepsilon_i$$

where X is a vector of determinants of smart development and β is a vector unknown parameters to be estimated measuring the effects on and its sign suggest the nature of their relationships with the SDP. Again the ε is a random term capturing left out variables and measurement error in the SSD.

We have chosen to enter first a large list of possible outcome predictors for happy life years in such a 'kitchen sink' stepwise regression (for the complete list of predictors: see Table 2), and eliminated the insignificant predictors in the final forward regression procedures (see Table 3).

3. Results

The image of social realities suggested upon first inspection of the HPI values around the globe would suggest a Friedrich August Hayek vision (Hayek, 1945) of markets, inequality and a free society interacting with one another; there should be no blocks against inequalities in the name of whatever 'social justice', explaining then the phenomenal success of unequal Latin American societies on the parameters of the index. A the same time, the high-equality performers in global society (quintile share of less than 5.0) with a relatively high per-capita income are at the same time bad performers on the new 'Happy Planet Index' scale (performance below 50). Notably enough, several of these countries are members of the European Union and traditional developed western welfare states. This first glance at the data would suggest a complete turn-around from the 'European social model' in favour of a high-

[15] http://www-01.ibm.com/software/analytics/spss/products/statistics/

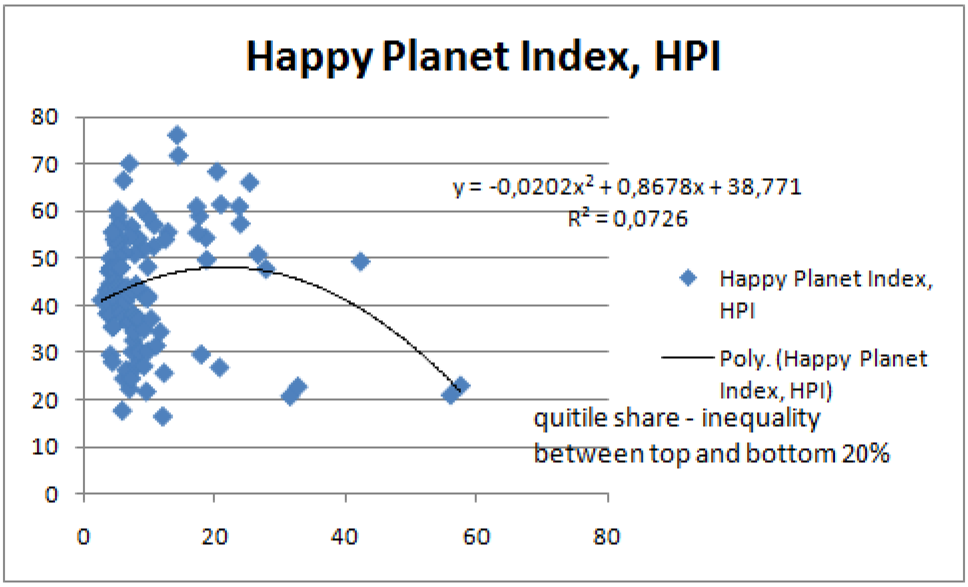
inequality, open to globalization 'Latin American model' (Tausch and Ghymers, 2006) as the best way to achieve a good 'Happy Planet Index' performance.

The essence of the hitherto dominant low inequality → high life quality paradigm in the public health profession in the tradition of R. G. Wilkinson and associates seems to suggest by contrast:

'Great inequality is the scourge of modern societies. We provide the evidence on each of eleven different health and social problems: physical health, mental health, drug abuse, education, imprisonment, obesity, social mobility, trust and community life, violence, teenage births, and child well-being. For all eleven of these health and social problems, outcomes are very substantially worse in more unequal societies. We have checked the relationships wherever possible in two independent test beds: internationally among the rich countries, and then again among the 50 states of the USA. In almost every case we find the same tendency for outcomes to be much worse in more unequal societies in both settings.' [16]

Our first empirics[17] seem to suggest that there is a clear tendency of rising inequality, going hand in hand with a rising Happy Planet Index for the majority of countries in world society, whose inequality score is below a quintile ratio of 1:20. Only at the very top end of the inequality scale, a reversal sets in:

Graph 2: the relationship between inequality and the Happy Planet Index (original formulation) – total world sample



Source: our own calculations from the data, documented in this article

[16] http://www.equalitytrust.org.uk/why/evidence
[17] Based on our freely available dataset, see http://www.hichemkaroui.com/?p=2383 ; Social Sciences and Humanities- MESOJ- ISSN 2109-9618- (2010) Volume 1 No 2; Dataset for 'Globalization, the human condition and sustainable development in the 21st Century. Cross-national perspectives and European implications

As to multivariate analysis, first preliminary stepwise regression procedures with mean substitution of missing variables revealed a re-current pattern of the importance and predictive capability robustness of the chosen variables among the 26 variables with a theoretically well-plausible greater and significant effect on the dependent variable, Happy Planet Performance. The final results were achieved by forward multiple regression based on listwise deletion of the missing values, and based exclusively on the significant predictors from the prior preliminary stepwise regressions.

Our calculation about the drivers of and the bottlenecks of the reformulated HPI, based on the analysis of standardized residuals, is based on the 103 countries with complete data, and the R^2 is 29.0%, the F-value is 9.339, and the error probability of the entire equation is .000. All predictors, including the constant, are significant at least at the 10% level; the numerical sign of the constant is negative. There is a very clear inverse ecological Kuznets-curve at work (Kuznets, 1955), with 'modernization' (ln development level) increasing, and modernity (ln development level^2) decreasing the reformulated HPI, based on the analysis of residuals performance. In addition, we state:

- **Worker remittances** have a significant positive effect on the reformulated HPI, based on the analysis of residuals. Thus it emerges that worker remittances significantly re-distribute ecological efficiency to the South.

- **Military expenditures per GDP** significantly diminish the reformulated HPI, based on the analysis of residuals, indicating a *ceteris paribus* negative trade-off with **life quality as such**, as measured by the Happy Planet Indicator. The burden of the military effort thus has a negative effect on life quality.

Compared to the significant effects of our variables, documented in Table 3, a forced inclusion of the inequality variable into the equation yielded no significant results. We do not even report the results in detail: for the 95 countries in world society with complete data, all the chosen predictors retain their significance, while inequality slightly negatively affects the Happy Planet performance, but the effect has a high error probability of 22.6%.

Table 3: the drivers and bottlenecks of Happy Planet performance

Independent Variable	**B**	**standard error**	**Beta**	**t-value**	**error probability**
Constant	-124.628	42.647		-2.922	0.004
% world population	0.596	0.313	0.161	1.904	0.060
ln GDP per capita	26.062	10.069	3.136	2.588	0.011
ln GDP per capita ^2	-1.309	0.584	-2.731	-2.241	0.027
military expenditures per GDP	-1.098	0.376	-0.245	-2.922	0.004
worker remittance inflows as % of GDP	0.420	0.133	0.288	3.153	0.002
memorandum item: statistical properties of the equation	adj R^2	df	F	error probability of the entire equation	

	29.000	102.000	9.339	.000	

4. Discussion

Knight and Rosa, 2011 compare the ecological footprint per capita and average life satisfaction (as a measure of subjective well-being). Based on maximum likelihood estimations, they tested the effects of climate, political, economic, and social factors on EWEB with a sample of 105 countries. Knight and Rosa find a negative quadratic effect of economic development on EWEB, a negative effect of income inequality, and a positive effect of social capital (based on social trust data, contained in the *World Values Survey)*[18]. Our article, by contrast, departs from this approach, since we feature not on Life Satisfaction, but on Happy Life Years in relation to ecological footprint. Happy Life Years – a variable, developed by the Happy Planet Organization[19], combines, as we already highlighted, Gallup[20] and World Values Survey data on a 0-10 scale of global respondent's individual feeling of overall happiness with average life expectancy (on the HPI Index, see also Ng, 2008a and 2008b; Veenhoven, 1996). The indicator is superior to the life satisfaction variable (in our terminology: life quality), because it also highlights life expectancy (life quantitity). In several countries around the world, average life expectancy at birth today is below 50 years (ranked by their low life expectancy, Afghanistan, Lesotho, Swaziland, Zimbabwe, Zambia, Central African Republic, Congo (Democratic Republic of the), Angola, Sierra Leone, Nigeria, Mozambique, Guinea-Bissau, Mali, and Chad). Without taking into account available life quantity, the life quality variable 'life satisfaction' is almost meaningless.

Our residuals-based reformulation of the Happy Planet Index realistically captures the trade-off between Global Ecological Footprint per capita and Happy Life Years and offers to us a better idea about Happy Life Years performance at different stages of socio-economic development. Our results show that traditional indicators of economic globalization and also inequality have little influence on the reformulated HPI performance. Efficiency tends to increase and then to decrease with rising development levels. Big countries with large population resources perform somewhat better on our scale, and military expenditures per GDP are a significant block against HPI performance. In a sense, our results also contradict the logic inherent in the beautiful, but unfortunately wrong *'small is beautiful'* analysis, proposed by Schumacher, 1973a: not the small countries, but the big countries find it easier to have a satisfactory Happy Planet Index performance in comparison to the ecological footprint, consumed by them. Our research also shows the beneficial effects of migration on the sending countries. Worker remittances have a significant positive effect on the HPI. Migration sending countries, as to be expected from neo-liberal economics, reap substantial benefits from receiving worker remittances, while other indicators of globalization hardly affect the HPI performance. Our calculation is based on the 103 countries with complete data, and the R^2 is 29.0%, the F-value is 9.339, and the error probability of the entire equation is .000. There is a very clear inverse ecological Kuznets-curve at work.

[18] http://www.worldvaluessurvey.org/

[19] http://www.happyplanetindex.org/

[20] http://www.gallup.com/Home.aspx and http://www.worldvaluessurvey.org/

5. Conclusion

We have to re-iterate first of all that worker remittances significantly enhance, and military expenditures significantly reduce the reformulated HPI, based on the analysis of residuals performance. As far as globalization is concerned, our message is equally clear: our globalization variables wield no significant effects, but migration does.

Since all existing major comparative empirical studies on drivers and bottlenecks of environmental quality only touched upon other dependent variables, and not the Happy Planet index, this our first international comparative study seems to suggest cautiously that future research efforts in comparative environmental science would be well advised to take the major predictor variables of the present study as well as the environmental plateau curve into account.

Datasource:

http://www.hichemkaroui.com/?p=2383

Social Sciences and Humanities- MESOJ- ISSN 2109-9618- (2010) Volume 1 No 2

Dataset for *'Globalization, the human condition and sustainable development in the 21st Century. Cross-national perspectives and European implications'*

Literature

Afxentiou, P.C. (1990a). Basic Needs – As Survey of the Literature. *Revue Canadienne d'Etudes du Developpement – Canadian Journal of Development Studies*, 11(2): 241-257.

Afxentiou, P.C. (1990b). The Rhethoric and Substance of Basic Needs. *South African Journal of Economics*, 58(1): 78-87.

Anand, S. and Ravallion, M. (1993). Human Development in Poor Countries. On the Role of Private Incomes and Public Services. *Journal of Economic Perspectives*, 7(1): 133-150.

Anson, J. (1988). Mortality and Living Conditions. Relative Mortality Levels and their Relation to the Physical Quality of Life in Urban Populations. *Social Science&Medicine*, 27(9): 901-910.

Anson, J. (1991). Demographic Indexes as Social Indicators. *Environment and Planning*. 23(3): 433-446.

Barro, R.J. (2003). Economic Growth in a Cross Section of Countries. *International Library of Critical Writings in Economics*, 159(1), 350-386.

Barro, R.J. and Sala-i-Martin, X. (2003). *Economic Growth.* Cambridge, MA: MIT Press, Second edition.

Bornschier, V. and Chase-Dunn, Ch.K. (1985). *Transnational Corporations and Underdevelopment.* N.Y., N.Y.: Praeger.

Cheng W.Y. (1989). Testing the Food-First Hypothesis. A Cross-national Study of Dependency, Sectoral Growth and Food-Intake in Less Developed Countries. *World Development*, 17(1): 17-27.

Dietz, T.; Rosa, E. A.; York, R. (2007). Driving the human ecological footprint. *Frontiers in Ecology and the Environment,* 5(1): 13-18.
Dietz, T.; Rosa, E. A.; York, R. (2009). Environmentally Efficient Well-Being: Rethinking Sustainability as the Relationship between Human Well-being and Environmental Impact. *Human Ecology Review,* 16, (1): 114-123.
Dixon, W.J. (1987). Progress in the Provision of Basic Human Needs. Latin America, 1960-1980. *Journal of Developing Areas,* 21(2): 129-140.
Dixon, W.J. and Moon, B.E. (1986). The Military Burden and Basic Human Needs. *Journal of Conflict Resolution,* 30(4): 660-684.
Dixon, W.J. and Moon, B.E. (1989). Domestic Political Conflict and Basic Needs Outcomes. An Empirical Assessment. *Comparative Political Studies*, 22(2): 178-198.
Durlauf, St.N., Kourtellos, A. and Tan, Ch.M. (2008). Are any Growth Theories Robust? *The Economic Journal,* 118(1), 329-346.
Fain, H.D. et al. (1997). World-System Position, Tropical Climate, National Development, and Infant Mortality: A Cross-National Analysis of 86 Countries. *Human Ecology Review,* 3: 197-203.
Fosu, A.K. (2009). Inequality and the Impact of Growth on Poverty: Comparative Evidence for Sub-Saharan Africa. *Journal of Development Studies,* 45(5): 726-745.
Fosu, A.K. (2010a). The Effect of Income Distribution on the Ability of Growth to Reduce Poverty: Evidence from Rural and Urban African Economies. *American Journal of Economics and Sociology,* 69(3): 1034-1053.
Fosu, A.K. (2010b). Does inequality constrain poverty reduction programs? Evidence from Africa. Journal of Policy Modeling, 32(6): 818-827.
Fosu, A.K. (2010c). Inequality, Income, and Poverty: Comparative Global Evidence. *Social Science Quarterly,* 91(5): 1432-1446.
Goldstein, J.S. (1985). Basic Human Needs – The Plateau Curve. *World Development,* 13(5), 595-609.
Hayek, F. A. (1945). The Use of Knowledge in Society. *American Economic Review,* 35, 4: 519-530.
Heintz, P. (1972). *A macrosociological theory of societal systems; with special reference to the international system.* Bern: H. Huber.
Jorgenson, A.K. (2008). Structural Integration and the Trees: An Analysis of Deforestation in Less-Developed Countries, 1990-2005. *The Sociological Quarterly,* 49(3), 503-527, Summer 2008.
Jorgenson, A.K. (2009a). Foreign Direct Investment and the Environment, the Mitigating Influence of Institutional and Civil Society Factors, and Relationships Between Industrial Pollution and Human Health. *Organization & Environment,* 22(2), 135-157.
Jorgenson, A.K. (2009b). Political-Economic Integration, Industrial Pollution and Human Health A Panel Study of Less-Developed Countries, 1980-2000. *International Sociology,* 24(1), 115-143.
Jorgenson, A.K. (2009c). The Sociology of Unequal Exchange in Ecological Context: A Panel Study of Lower-Income Countries, 1975-2000. *Sociological Forum,* 24(1), 22-46.
Jorgenson, A.K. (2009d). The Transnational Organization of Production, the Scale of Degradation, and Ecoefficiency: A Study of Carbon Dioxide Emissions in Less-Developed Countries. *Human Ecology Review,* 16(1), 64-74.
Kakwani, N. (1993). Performance in Living Standards. An International Comparison. *Journal of Development Economics,* 41(2): 307-336.

Kakwani, N. (1995). Structural Adjustment and Performance in Living Standards in Developing Countries. *Development and Change*, 26(3): 469-502.
Khan, H. (1991). Measurement and Determinants of Socioeconomic Development. *Social Indicators Research,* 24(2): 153-175.
King, L.A. (1998). Economic growth and basic human needs. *International Studies Quarterly,* 42(2): 385-400.
Knight, K.W. and Rosa E.A. (2011). The environmental efficiency of well-being: A cross-national analysis. *Social Science Research,* 40(3): 931-949.
Kuznets, S. (1955). Economic Growth and Income Inequality. *American Economic Review,* 45, 1: 1-28.
Laver, M. and Shepsle, K. A. (1999). Understanding Government Survival: Empirical Exploration or Analytical Models? *British Journal of Political Science,* 29(2), 395-401.
Mazumdar, K. (1996). An analysis of causal flow between social development and economic growth: The social development index. *American Journal of Economics and Sociology,* 55(3): 361-383.
Mazumdar, K. (2000). Causal flow between human well-being and per capita real gross domestic product. *Social Indicators Research,* 50(3): 297-313.
Moon, B.E. and Dixon, W.J. (1992). Basic Needs and Growth Welfare Trade-Offs. *International Studies Quarterly,* 36(2): 191-212.
Mostafa, M.M. (2010a). A Bayesian approach to analyzing the ecological footprint of 140 nations. *Ecological Indicators,* 10(4), 808-817.
Mostafa, M.M. (2010b). Clustering the ecological footprint of nations using Kohonens self-organizing maps. *Expert Systems with Applications*, 37(4), 2747-2755.
Mostafa, M.M. and Nataraajan, R. (2009). A neuro-computational intelligence analysis of the ecological footprint of nations. *Computational Statistics and Data Analysis,* 53(9), 3516-3531.
Newman, B.A. and Thomson, R.J. (1989). Economic Growth and Social Development. A Longitudinal Analysis of Causal Priority. *World Development,* 17(4): 461-471.
Ng, Y.-K. (2008a). Environmentally responsible happy nation index: Towards an internationally acceptable national success indicator. *Social Indicators Research,* (85), 3: 425-446.
Ng, Y.-K. (2008b). Happiness studies: Ways to improve comparability and some public policy implications. *Economic Record,* 84, June: 253-266.
Rudra, N. (2009). Why International Organizations Should Bring Basic Needs Back in. *International Studies Perspectives,* 10(2): 129-150.
Schumacher, E. F. (1973a). *Small is beautiful; economics as if people mattered.* New York: Harper & Row
Schumacher, E. F. (1973b). Western Europe's Energy Crisis: A Problem of Life-Styles. *Ambio,* Vol. 2(6): 228-232.
Schumacher, E. F. 1976. Patterns of Human Settlement. *Ambio,* 5(3): 91-97.
Schumacher, E. F. 1977. *A guide for the perplexed.* New York: Harper & Row
Shandra, J.M. (2007a). Economic dependency, repression, and deforestation: A quantitative, cross-national analysis. *Sociological Inquiry,* 77(4), 543-571.
Shandra, J.M. (2007b). International Nongovernmental Organizations and Deforestation: Good, Bad, or Irrelevant? *Social Science Quarterly*, 88(3), 665-689.
Shandra, J.M.; Leckband, Ch.; McKinney, L.A.; and London, B. (2009). Ecologically Unequal Exchange, World Polity, and Biodiversity Loss. A Cross-National Analysis of Threatened Mammals. *International Journal of Comparative Sociology,* 50(3-4), 285-310.

Tausch, A. (2010). Life expectancy, infant mortality and inequality - once again. Rapid Responses to: EDITORIALS: Kate E Pickett and Richard G Wilkinson Greater equality and better health, BMJ 2009; 339: b4320. *British Medical Journal*, (2 March 2010). http://www.bmj.com/cgi/eletters/339/nov10_2/b4320 (electronic edition)

Tausch, A. and Ghymers, Ch. (2006). *From the Washington towards a Vienna Consensus? A quantitative analysis on globalization, development and global governance.* Hauppauge NY: Nova Science.

Tausch, A. and Prager, F. (1993). *Towards a Socio-Liberal Theory of World Development.* Basingstoke and New York: Palgrave Macmillan/St. Martins Press.

Veenhoven, R. (1996). Happy Life-expectancy. A comprehensive measure of quality-of-life in nations. *Social Indicators Research*, (39), 1-58.

Wilkinson R.G. and Picket K.E. (2006). Income inequality and population health: A review and explanation of the evidence. *British Medical Journal, BMJ*, 62 (7): 1768-1784, April.

Wilkinson, R.G. (1992). For Debate – Income Distribution and Life Expectancy. *British Medical Journal, BMJ*, 304, 6820: 165-168, January 18

Wilkinson, R.G. (1997). Socioeconomic determinants of health - Health inequalities: Relative or absolute material standards? *British Medical Journal, BMJ*, 314, 7080: 591-595, published February 22, 1997.

Williamson, J.A. (2002). *Is Protection Bad for Growth? Will Globalization Last? Looking for Answers in History*. Presented at the 13th IEHA Congress, Buenos Aires, August 22-26, 2002 Draft Date: June 2002. Available at: *http://www.economics.harvard.edu/faculty/williamson/jwilliamworkingpapers* (download: August 1, 2011)