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Analysis

The end of economic growth? A contracting threshold hypothesis

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ABSTRACT

This paper argues that GDP growth in both developed and developing countries has associated costs that can outweigh the benefits and thus reduce sustainable well-being. This conclusion is based upon the findings of empirical applications of the Genuine Progress Indicator (GPI) to a range of countries in the Asia-Pacific region. The studies conducted on seven Asia-Pacific countries indicate that, in the case of five of the seven nations, more recent GDP growth has reduced the sustainable well-being experienced by the average citizen residing within them. Moreover, the threshold point at which the costs of GDP growth outweigh the benefits appears to be contracting (i.e., occurring at a much lower per capita level of GDP). This paper therefore introduces a new contracting threshold hypothesis: as the economies of the Asia-Pacific region and the world collectively expand in a globalised economic environment, there is a contraction over time in the threshold level of per capita GDP. As a consequence, the threshold point confronting growth late-comers (i.e., developing countries) occurs at a much lower level of sustainable welfare than what wealthy nations currently enjoy. The consequences of this for developing countries are clearly significant and require a new approach to economic development.

1. Introduction[1]

Strategies to achieve GDP growth have been implemented in the developing world as the primary tool to lift income levels and to improve the lives of the poor (see for example ADB 1999, 2000; IMF and WB 2004, 2005). Whilst the effectiveness of GDP growth in lifting people out of poverty in developing countries has been contested (Ravallion and Chen, 1997; Ng and Ng, 2001; Dollar and Kraay, 2002; Amann et al., 2006; Inder, 2004), Kingsbury et al. (2008) note that GDP growth has for much of the past sixty years been considered analogous to development. Indeed, the centrality of GDP growth to the aid-effectiveness literature (McGillivray et al., 2006) is further testament to the importance that GDP growth has within the current development climate. Perhaps given the high correlation between per capita GDP and the majority of non-economic development indicators, this importance is not unexpected (Clarke and McGillivray, 2007). Certainly, the strategies to achieve GDP growth have been very successful, especially in the Asia-Pacific region where GDP growth over the past two decades has been higher than any other region in the world (World Bank, 2006).

However, in this paper, we argue that GDP growth serves merely as an indication that a nation's economic output is growing. It does not indicate whether the growth in output is 'economic' in the literal sense of increasing benefits faster than it increases costs. Only when the growth in output is 'economic' does sustainable well-being increase, suggesting, therefore, that the growth in a nation's output can also be 'uneconomic' if it reduces a nation's sustainable well-being. Why is GDP unable to signal whether growth is economic or uneconomic? We shall go into greater detail soon; however, in a nutshell, it is because GDP fails to take account of the costs as well as the benefits associated with a growing economy. As such, GDP cannot possibly expose the full impact of output growth on the sustainable well-being of the average citizen.

Of course, it has long been understood that the emphasis placed on GDP growth as a measure of well-being is deeply flawed (Abramovitz, 1961; Denison, 1971; Okun, 1971). We argue further that GDP growth also fails to reveal the potential impact that economic expansion has on the capacity of the natural environment to sustain well-being into the future. We also believe that an absolute reliance on conventional macroeconomic indicators, such as GDP, as a means to designing current and future policies may prove perilous. Without indicators to properly account for the full impact of GDP growth on sustainable well-being, future policy measures are likely to lead a country down

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[1] The journal Ecological Economics is the leading international journal in this discipline and it is therefore appropriate that this paper be published here. However, the authors also saw merit in publishing this work in journals addressing other relevant economics disciplines, including development economics and welfare economics. Unfortunately, though, this paper was not accepted by these journals. Challenging orthodox economic theory remains very difficult within mainstream economic journals.

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an undesirable pathway where extrication will be both difficult and costly.

Also lurking in the background is a plethora of conflicting information relating to the economic, social, and environmental well-being of nations. Whilst various statistics paint an apparently favourable picture of recent developments in most countries and regions across the world, many other statistics indicate otherwise or, alternatively, suggest that a range of problem areas are likely to emerge in the near future (WRI, 2005; Global Footprint Network, 2006). The contrasting nature of the economic, social, and environmental data renders any assessment of genuine progress extremely difficult.

Overcoming these assessment difficulties requires the development of a range of new indicators. We believe that at least one of these indicators must be a new measure of sustainable well-being. Fortunately, one such measure already exists. Originally devised by Daly and Cobb (1989) and called an Index of Sustainable Economic Welfare, this new measure of sustainable well-being is now commonly referred to as the Genuine Progress Indicator (GPI).[2] The GPI is specifically designed to ascertain the impact of a growing economy on sustainable well-being. Usually comprised of around twenty individual benefit and cost items, the GPI integrates the wide-ranging impacts of GDP growth into a single monetary-based index (see Lawn and Clarke (2006) for a full explanation of how the GPI is calculated).

This paper reports on recent studies in which the sustainable well-being of seven Asia-Pacific countries has been empirically measured using the GPI (Lawn and Clarke, 2008). These studies suggest that, in five of the seven nations, GDP growth has recently reduced their sustainable well-being. Believing that these results have major policy consequences for developing countries, we later present some preliminary policy options to address what might be the end of economic growth as we currently know it.

The remainder of this paper is set out as follows. Section 2 briefly discusses how well GDP and the GPI are able to assess the sustainable well-being of nations. Section 3 outlines the results of the recent GPI case studies for a number of developed and developing countries in the Asia-Pacific region. Section 4 introduces a contracting threshold hypothesis before Sections 5 discusses the policy implications of this new hypothesis for developing and developed countries. The paper is concluded in Section 6.

2. Assessing Sustainable Well-being

Standard national accounting identities, such as per capita GDP, were never designed to measure society's well-being (Kuznets, 1941, 1968). Yet, from their inception, they have assumed this role both in the economic literature and in public debate (Beckerman, 1974, 1992, 1994; Hjalte et al., 1977; Gylfason, 1999). Indeed, prior to the current formulation of standard national accounts, other estimates of a nation's productivity were also used as indicators of well-being (Pigou, 1920; Hicks, 1959).

Seeking to increase per capita GDP has become an important element of public policy for both developed and developing countries. Given that the per capita GDP of virtually every country across the Asia-Pacific region has increased over the twenty-year period from 1985 to 2004, Asia-Pacific countries have been very successful in meeting this goal. More precisely, the annual rate of GDP growth for Asia averaged 4.0% during this twenty-year period and 3.3% in the decade from 1995 to 2004. This constitutes a doubling in real GDP across Asia over the past twenty years and occurred despite the Asian financial crisis in the late 1990s. The average rate of GDP growth in Oceania between 1995 and 2004 was 3.7% per annum, which was higher than the rate of GDP growth in Asia (see Table 1). Although the average annual growth rate over the twenty-year period from 1985 to 2004 was, at 3.3%, lower in Oceania than in Asia, it was bettered only by the Middle-East and North Africa.

Table 1
GDP growth rates of selected Asia-Pacific countries and world regions.

Country/region	Average annual growth rate (%)	Average annual growth rate (%)
	1985–2004	1995–2004
Asia	4.0	3.3
Cambodia	N.A.	6.9
China	9.8	9.2
India	5.8	6.1
Indonesia	5.1	3.2
Japan	2.4	1.2
Malaysia	6.1	5.2
Pakistan	3.8	4.6
Philippines	3.1	4.0
Singapore	6.5	5.1
South Korea	6.8	5.1
Thailand	6.2	3.3
Vietnam	6.6	7.3
Oceania	3.3	3.7
Australia	3.5	3.8
Fiji	N.A.	2.4
New Zealand	2.4	3.3
Papua New Guinea	0.5	3.1
World	3.0	3.0
Europe	2.3	2.4
North America	3.2	3.3
C. America and Caribbean	2.8	3.0
South America	2.7	2.2
M-East and North Africa	3.9	4.0
Sub-Saharan Africa	2.8	3.8

Source: World Bank (2006).

As impressive as these GDP growth rates are, it is argued here, and elsewhere (see Clarke, 2006, Lawn, 2007, Seers, 1972; Bello, 1995; Barkley and Seckler, 1972; Irvine and Miles, 1982; Kumar and Yuan, 1991; Islam and Choi, 2000), that GDP growth is not an adequate driver of sustainable well-being. Furthermore, major criticisms levelled against using per capita GDP as a measure of sustainable well-being have been identified (Clarke and Islam, 2004). These include the following:

- GDP ignores many of the benefits generated by economic activity (e.g., the value of household and volunteer work and the services provided by existing consumer durables);
- GDP counts the production of additional human-made capital as a current benefit when, in fact, the benefits of newly produced human-made capital – such as durable producer and consumer goods – are enjoyed in future years;
- GDP counts some of the costs of economic activity as benefits. For example, the cost of defensive and rehabilitative expenditures is counted as a benefit yet it constitutes the opportunity cost of economic activity because the resources used are diverted from potentially benefit-yielding endeavours;
- GDP fails to include the subtraction of any natural capital depletion costs, which is important given that income is best defined as the maximum amount that can be produced and consumed in the present without depleting the stock of income-generating capital; and
- GDP fails to take into account the welfare impact of a changing distribution of income and the social costs of rising unemployment, crime, family breakdown, and increasing foreign debt levels.

The GPI, on the other hand, has been specifically designed to ascertain the impact of a growing economy on sustainable well-being.

[2] Daly and Cobb's Index of Sustainable Economic Welfare was an expansion of Nordhaus and Tobin's (1973) adjusted measure of GDP — the Measure of Economic Welfare. Also see Sametz's (1968) original call for an adjusted GDP to overcome the constraints in assessing well-being.

Table 2
Items used to calculate the GPI.

Item	Welfare contribution	Item notes
Consumption expenditure (CON)	+	CON = private sector + public sector consumption expenditure
Defensive and rehabilitative expenditures (DRE)	−	DRE is usually confined to expenditures on health and education (private and public) but is often extended to the cost of vehicle accidents and insurance services (private consumption); and defence, environmental protection, and public order and security (public consumption)
Expenditure on consumer durables (ECD)	−	ECD equals the sum of all household expenditure on consumer durables
Service from consumer durables (SCD)	+	Equal to the depreciation value of the existing stock of consumer durables
Adjusted consumption		Timing adjustment to consumption benefits • Adjusted CON = CON − DRE − ECD + SCD
Distribution Index (DI)	±	DI based on the change in income distribution over the study period (first year of study period has an index value of 100.0)
Adjusted consumption (weighted)		Adjusted CON weighted by the Distribution Index
Welfare generated by publicly-provided infrastructure (WPPI)	+	Welfare assumed to equal the depreciation value of the existing stock of publicly-provided infrastructural capital
Value of non-paid household labour	+	Equal to the number of non-paid household labour hours × assumed wage
Value of volunteer labour	+	Equal to the number of volunteer labour hours × assumed wage
Cost of unemployment and underemployment	−	Calculated by multiplying the number of unemployed people by the estimated cost per unemployed person
Cost of crime	−	Calculated by multiplying various crime indexes by the estimated cost of each crime category
Cost of family breakdown	−	Calculated by multiplying the approximate number of dysfunctional families by the estimated cost per family breakdown
Change in foreign debt position	±	Annual cost (benefit) equals the annual change in net foreign liabilities
Cost of non-renewable resource depletion	−	Equal to the opportunity cost of lower non-renewable resource stocks
Cost of timber depletion	−	Equal to the opportunity cost of lower timber stocks brought about by harvesting rates exceeding the rate of timber regeneration and plantation establishment
Cost of air pollution	−	Equal to the estimated annual cost of air pollution
Cost of waste-water pollution	−	Equal to the estimated annual cost of waste-water pollution
Cost of long-term environmental damage	−	Calculated to reflect the amount required to compensate citizens for the long-term environmental impact of energy consumption

Usually comprised of around twenty individual benefit and cost items, the GPI integrates the wide-ranging impacts of GDP growth into a single monetary-based index. As such, the GPI includes benefits and costs of the social and environmental kind as well as those of the standard economic variety. Whilst the GPI embraces some of the national accounting values used in the computation of GDP, its calculation accounts for a number of benefits and costs that normally escape market valuation. Since the aim of the GPI is to provide a more appropriate measure of sustainable well-being, its construction is primarily based on overcoming the shortcomings associated with GDP. Table 2 lists the items typically used in the construction of the GPI.

Of course, the GPI is not without some imperfections. One of the major weaknesses of the GPI is the lack of a standardised set of items and valuation techniques used in its calculation that arises because the GPI is essentially an artefact of the methodology used in its construction (Neumayer, 1999, 2000). Variations between the GPI methodologies adopted for each case study and the difference in the valuation methods used to estimate the monetary values of particular items exist. These differences no doubt limit the conclusions that can be drawn from direct GPI comparisons of each country. It would therefore be misleading to suggest that the per capita GPI provides a definitive measure of a nation's sustainable well-being.[3] But nor does the per capita GDP and we argue that, as imperfect as the GPI might be at this stage of its methodological development, it constitutes a far superior indicator of genuine progress.

As mentioned, the GPI has recently been applied to a range of developed and developing Asia-Pacific countries, including Australia, New Zealand, Japan, China, India, Thailand and Vietnam (see Lawn and Clarke, 2008 for a full discussion of each of these case studies). Since these case studies include countries still in the process of industrialisation and others which have long been industrialised, we believe they provide a good overall picture of the pattern of development that has taken place within the Asia-Pacific region over the past twenty to thirty years. As such, it is possible to undertake at least some form of comparative analysis. Therefore, we seek to draw some cautious lessons from the general pattern of development across the Asia-Pacific region and the relationship between the per capita GDP and the rate of genuine progress experienced by each of the studied countries.

3. Asia-Pacific GPI Case Studies

To assist in the following discussion, we have converted the per capita GPI of the seven case study nations to 2004 International dollars (Int$)[4] (see Table 3). As Table 3 shows, there is an enormous disparity between the per capita GPI values of the wealthy countries (Australia, New Zealand, and Japan) and the poorer countries (China, India, Thailand, and Vietnam) (see Fig. 1). Despite the danger associated with GPI comparisons (Daly and Cobb, 1989; Cobb and Cobb, 1994), it is safe to conclude that: (a) the per capita GDP generally overstates the sustainable well-being that a nation's citizen enjoys; and (b) the sustainable well-being enjoyed by wealthy countries far exceeds the sustainable well-being experienced by their poorer inter-regional neighbours.

Looking specifically at the group of wealthy nations, the per capita GPI of Australia and New Zealand declined for an extended period after

[3] It could be argued that the GPI is merely a measure of economic welfare, not of 'sustainable' economic welfare. Although the GPI includes the various costs of natural capital depletion, a true indication of a nation's sustainability performance requires biophysical assessments, since sustainability is a biophysical condition. In other work by the authors (e.g., Lawn, 2007; Lawn and Clarke, 2008), it has been recommended that the GPI be supplemented with a measure of a nation's ecological footprint, which can then be compared with the nation's biocapacity to determine whether the welfare being experienced is in any way 'sustainable' (i.e., an ecological footprint larger than a nation's biocapacity connotes a state of 'unsustainability').

[4] An international dollar (Int$) is a fictitious monetary unit which represents the equivalent purchasing power of a nation's currency over its GDP as a US dollar has over its economic output in the United States. It thus indicates an equivalent quantity of goods or services that can be purchased irrespective of the country in question.

Table 3
Per capita GPI and per capita GDP of the seven Asia-Pacific case study countries.

	Australia		New Zealand		Japan		India		China		Thailand		Vietnam	
Year	p.c. GPI	p.c. GDP	p.c. GPI	p.c. GDP	p.c. GPI	p.c. GDP	p.c. GPI	p.c. GDP	p.c. GPI	p.c. GDP	p.c. GPI	p.c. GDP	p.c. GPI	p.c. GDP
1967	19,842.4	14,518.8	–	–	–	–	–	–	–	–	–	–	–	–
1968	20,167.3	14,999.3	–	–	–	–	–	–	–	–	–	–	–	–
1969	20,275.1	15,722.0	–	–	–	–	–	–	–	–	–	–	–	–
1970	20,590.1	16,518.5	13,108.8	12,826.8	5143.1	12,550.0	–	–	860.8	538.9	–	–	–	–
1971	20,516.1	16,445.6	13,893.8	13,068.7	6208.3	12,892.8	–	–	863.5	561.4	–	–	–	–
1972	20,787.6	16,790.1	14,026.2	13,164.2	7337.5	13,784.4	–	–	870.6	569.8	–	–	–	–
1973	21,233.4	16,980.8	14,533.6	13,502.9	7949.2	14,690.0	–	–	883.7	600.8	–	–	–	–
1974	**21,583.3**	17,386.0	13,947.9	14,215.9	7232.4	14,335.7	–	–	866.0	603.4	–	–	–	–
1975	21,081.8	17,378.8	14,969.1	14,529.8	7342.7	14,583.3	–	–	8 66.2	644.8	1633.2	2278.1	–	–
1976	20,649.1	17,670.7	15,266.4	14,760.9	7761.8	15,023.5	–	–	856.6	625.7	1771.5	2447.8	–	–
1977	19,981.8	18,077.7	15,100.9	14,758.4	7963.0	15,538.0	–	–	868.7	664.4	1629.7	2632.4	–	–
1978	19,256.4	18,027.7	15,281.1	14,340.7	8568.8	16,202.3	–	–	868.7	732.2	1708.7	2833.5	–	–
1979	18,636.3	18,580.0	15,714.0	14,753.9	8318.2	16,948.7	–	–	863.5	777.5	2047.4	2924.0	–	–
1980	18,255.6	18,929.2	15,312.3	15,117.5	7966.7	18,231.8	–	–	870.8	828.3	2194.4	3023.2	–	–
1981	18,116.9	19,270.8	**16,040.0**	15,165.8	8503.2	18,560.9	–	–	877.1	859.4	2171.0	3140.6	–	–
1982	17,852.7	19,540.3	15,623.0	15,792.3	8824.1	18,829.9	–	–	901.5	923.1	2144.7	3243.0	–	–
1983	17,620.9	18,816.7	15,165.2	15,775.1	9482.4	18,992.5	–	–	983.8	1010.2	2201.5	3377.7	–	–
1984	17,616.0	19,462.4	14,487.8	16,560.1	10,272.4	19,548.7	–	–	994.8	1148.7	2195.6	3496.7	–	–
1985	17,732.6	20,227.4	14,510.1	17,296.7	10,914.8	20,509.1	–	–	1024.7	1285.4	2117.3	3573.5	–	–
1986	17,389.9	20,822.6	14,879.3	17,143.9	11,330.5	21,192.5	–	–	1037.0	1377.0	2082.5	3687.8	–	–
1987	16,675.0	21,003.9	14,510.7	17,590.2	11,632.8	21,832.4	1280.0	1618.2	1038.4	1511.5	2127.9	3970.9	–	–
1988	17,169.6	21,729.3	14,192.4	17,748.1	11,677.6	23,208.9	1298.5	1740.0	1104.5	1656.1	2212.6	4409.5	–	–
1989	16,988.3	22,155.4	14,175.2	17,660.9	11,988.2	24,367.4	1222.5	1813.6	1048.9	1698.4	2155.2	4865.1	–	–
1990	17,093.2	22,689.7	13,501.6	17,566.0	12,275.7	25,474.6	1295.1	1879.9	1029.5	1737.8	2153.5	5368.5	–	–
1991	16,978.8	22,258.7	12,835.7	17,132.5	12,522.4	26,273.3	1179.1	1859.1	1056.4	1873.2	2428.9	5760.7	–	–
1992	16,917.7	22,009.1	14,185.4	17,086.0	13,120.6	26,452.4	1287.4	1918.8	1072.7	2114.6	2502.6	6137.0	996.5	1239.9
1993	16,551.4	22,590.9	9840.2	17,899.0	13,484.3	26,312.9	1237.2	1969.2	1081.2	2383.3	2742.3	6581.1	1034.5	1317.1
1994	16,721.6	23,270.9	11,878.8	18,570.0	13,309.6	26,424.6	1340.7	2076.4	1132.1	2665.5	2853.8	7080.3	1096.3	1409.5
1995	16,861.7	24,022.5	12,130.3	19,025.9	13,659.6	26,887.5	1366.9	2191.6	1226.6	2925.1	2921.0	7687.0	1160.0	1518.9
1996	17,064.9	24,684.7	12,963.0	19,506.6	13,439.0	27,772.4	1402.8	2306.1	1353.4	3184.2	3095.9	8051.9	1201.6	1634.4
1997	17,071.8	25,367.8	10,962.0	19,958.6	13,724.1	28,192.0	1350.5	2364.2	1421.5	3445.5	3209.9	7850.0	1177.6	1740.3
1998	17,051.2	26,230.0	11,857.1	20,057.9	**14,075.2**	27,806.4	1406.2	2459.7	1498.8	3680.5	3027.4	6950.8	1166.7	1812.5
1999	17,305.5	27,273.8	14,237.0	20,963.2	13,539.3	27,743.4	1478.1	2587.4	1498.4	3928.0	3168.6	7235.6	1107.8	1870.8
2000	17,573.2	28,021.7	14,208.3	21,344.0	13,427.0	28,336.9	1439.1	2639.1	1481.5	4225.8	3222.0	7301.7	1109.7	1971.0
2001	17,711.1	28,184.8	14,205.8	21,821.5	13,408.3	28,313.5	1517.1	2726.1	1531.9	4544.8	**3492.3**	7372.7	1102.5	2078.8
2002	17,949.1	28,907.1	12,910.8	22,457.5	13,518.0	28,208.5	1460.3	2789.6	**1538.8**	4926.5	3439.1	7665.7	1176.7	2196.9
2003	17,579.7	29,470.7	13,925.0	22,978.9	13,954.7	**28,525.3**	**1561.7**	**2981.5**	1490.3	5386.7	3253.9	8101.5	1216.8	2323.9
2004	18,185.1	30,331.0	14,286.0	23,413.1	–	–	–	–	1525.2	5896.0	3173.7	**8494.5**	**1259.4**	**2470.5**
2005	18,101.6	30,762.7	14,461.7	**23,537.3**	–	–	–	–	1511.9	**6459.2**	–	–	–	–
2006	18,161.2	**31,218.8**	–	–	–	–	–	–	–	–	–	–	–	

All currencies valued in International Dollars (2004 prices).

peaking in 1974 and 1981 at Int$21,583 and Int$16,040 respectively (Table 3). In both instances, the per capita GPI recovered towards the end of the study period. However, the final per capita GPI values were still well short of their peak levels; 15.8% lower in the case of Australia, and 9.8% lower for New Zealand. Japan began with a much inferior per capita GPI than Australia and New Zealand. Its per capita GPI rose quite

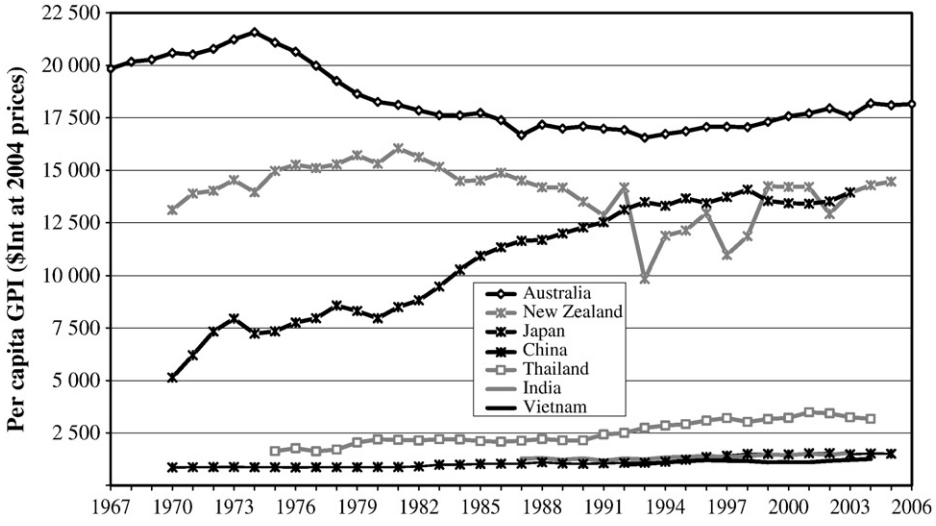

Fig. 1. Per capita GPI of selected Asia-Pacific countries (converted to International dollars).

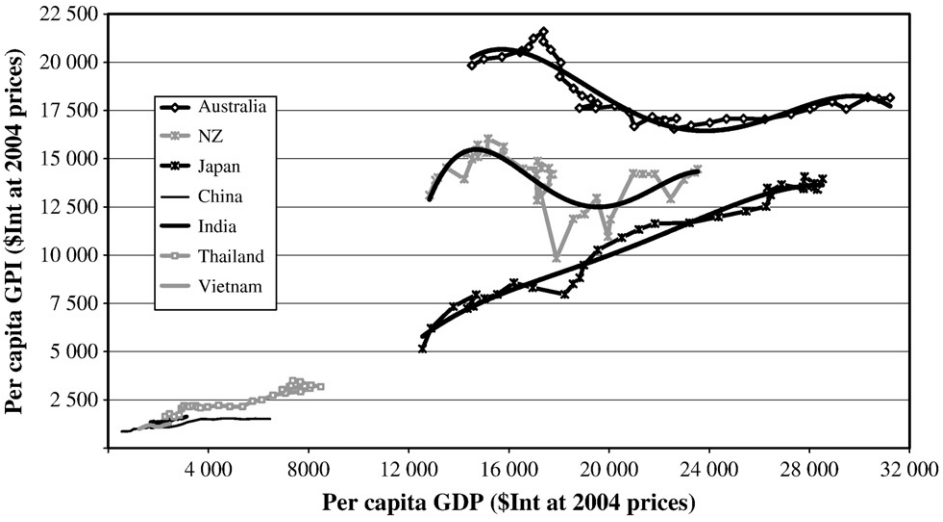

Fig. 2. Per capita GPI versus per capita GDP of selected Asia-Pacific countries.

considerably in most years but, like Australia and New Zealand, peaked prior to the end of the study period. Unlike Australia and New Zealand, Japan's per capita GPI reached its zenith of Int$14,075 much later in the study period (1998). Although Japan's per capita GPI declined overall between 1998 and 2003, it was only 0.9% lower at the end of the study period than its 1998 peak value.

A focus on the four poorer nations reveals that Thailand's per capita GPI, whilst much lower than that of Australia, New Zealand, and Japan, was at all times significantly higher than the per capita GPI of China, India, and Vietnam (see Table 3). As weak as conclusions drawn from GPI comparisons are when disparities between values are relatively small, it is probably safe to conclude that Thailand enjoyed a higher level of sustainable well-being over the study period than China, India, and Vietnam. However, all four poorer nations at no stage achieved the same rate of genuine progress that Japan experienced between 1970 and 1993, or that Australia achieved between 1967 and 1974, and New Zealand likewise between 1970 and 1981.

Of significant interest and potential importance is the evidence showing that the per capita GPI of India and Vietnam was still on the rise at the end of the study period (Int$1562 and Int$1259 respectively), but had peaked early for China in 2002 (Int$1539) and Thailand in 2001 (Int $3492). This indicates that China and Thailand may have reached a point where the additional costs associated with the growth of their economies is now exceeding the additional benefits (i.e., GDP growth in these countries has been rendered uneconomic).

This switch from economic to uneconomic growth, which also appears to have afflicted Australia, New Zealand, and Japan, is not new. Some time ago, a number of authors predicted that this phenomenon would eventually by experienced by most developed countries (see Daly, 1971; Barkley and Seckler, 1972; Heller, 1972; Boulding, 1972; Zolotas, 1981).[5] The prediction was based on the applicability of the principles of diminishing marginal benefits and increasing marginal costs in a finite world subject to the first and second laws of thermodynamics where human beings possess a limited physiological capacity to experience well-being. Following the release of initial GPI studies, it became clear that the switch to uneconomic growth had taken place in the USA and a number of European countries during the 1970s and 1980s (Diefenbacher, 1994; Moffat and Wilson, 1994; Rosenberg and Oegema, 1995; Jackson and Stymne, 1996; Jackson et al., 1997; Stockhammer et al., 1997; Guenno and Tiezzi, 1998; Lawn and Sanders, 1999; Lawn, 2000). Discovery of such a phenomenon led to the establishment of a so-called threshold hypothesis whereby the GDP level at which growth shifts from being economic to uneconomic was coined the 'threshold point' (Max-Neef, 1995).[6] Consideration within this paper is given to whether the 'threshold point (can) be reached only by a so-called wealthy society?' (Max-Neef, 1995, p. 117), or whether it is possible for developing nations to reach it at much lower levels of per capita GDP?

3.1. The Relationship Between the Per Capita GPI and Per Capita GDP

In order to consider the threshold hypothesis issue as it relates to the Asia-Pacific region, the annual per capita GPI values of each surveyed country have been plotted against the corresponding per capita GDP values (see Fig. 2). A superimposed 'line of best fit' has been added to indicate the trend change in the relationship between the per capita GDP and the sustainable welfare experienced by each of the studied countries.[7] The regression results of cubic and 4th-degree polynomial trend-lines are revealed in Table 4. They show that, for Australia, New Zealand, and Thailand, the 4th-degree polynomial is the better fit with a latter downward trend (declining per capita GPI as per GDP rises). As for Japan and China, the cubic and 4th-degree polynomials are of equal fit, both with a latter downward trend (declining per capita GPI as per GDP rises). Finally, in the cases of India and Vietnam, the better fitting 4th-degree polynomials reveal a latter upward trend (increasing per capita GPI as per GDP rises).

It is clear from Fig. 2 and Table 4 that Australia, New Zealand, and Japan have all reached a threshold level of per capita GDP. Despite a slight recovery in Australia and New Zealand beyond the Int$20,000 level of per capita GDP, the end-of-period trend in the relationship between per capita GDP growth and sustainable welfare was weakly negative for Australia and neutral for New Zealand. What also stands out is that Australia's per capita GPI was significantly lower in 2006 than its 1974 peak value despite its per capita GDP being much higher in 2006 at Int$31,219 compared to Int$17,386 in 1974. The same applies to New Zealand where the per capita GPI in 2005 was also much lower than its 1981 peak value even though its per capita GDP was considerably higher at Int$23,573 in 2005 compared to Int$15,166 in 1981.

Whilst Japan eventually reached a threshold level of per capita GDP, it appears to have avoided the threshold point for a considerably longer time

[5] Recent studies of developed countries show that it is possible for the GPI to recover, before falling again (e.g., Nourry (2008) for France), and for a revision of the component parts of the ISEW to give the impression that the threshold point has been pushed back (Bleys, 2008). In our opinion, these individual studies are not yet robust enough to render the original threshold thesis false.

[6] The consideration of such a point was also posited by Hicks (1959), Pigou (1920) and Ng and Ng (2001).

[7] A line of best fit was not superimposed over the curves for China, India, and Vietnam owing to the shortness of their length and their close proximity.

Table 4
The relationship between per capita GPI and per capita GDP.

Function type/nation	Fitted equation	Latter trend	R^2
Australia			
Cubic polynomial	$y = 2.10^{-9}x^3 - 7.10^{-5}x^2 + 0.34x$	Upwards	0.76
4th-degree polynomial	$y = -10^{-12}x^4 + 10^{-7}x^3 - 4.10^{-3}x^2 + 52.7x$	Downwards	0.87
New Zealand			
Cubic polynomial	$y = 3.10^{-8}x^3 - 2.10^{-3}x^2 + 26.2x$	Upwards	0.45
4th-degree polynomial	$y = -6.10^{-12}x^4 + 5.10^{-7}x^3 - 0.01x^2 + 161.3x$	Downwards	0.55
Japan			
Cubic polynomial	$y = -4.10^{-10}x^3 + 2.10^{-5}x^2 + 0.3x$	Downwards	0.97
4th-degree polynomial	$y = -3.10^{-13}x^4 + 3.10^{-8}x^3 - 9.10^{-4}x^2 + 11.9x$	Downwards	0.97
China			
Cubic polynomial	$y = -7.10^{-9}x^3 + 5.10^{-5}x^2 + 0.08x$	Downwards	0.97
4th-degree polynomial	$y = 3.10^{-13}x^4 - 10^{-8}x^3 + 7.10^{-5}x^2 + 0.05x$	Downwards	0.97
Thailand			
Cubic polynomial	$y = 3.10^{-10}x^3 + 7.10^{-6}x^2 + 0.2x$	Upwards	0.89
4th-degree polynomial	$y = -2.10^{-11}x^4 + 3^{-7}x^3 - 3.10^{-3}x^2 + 8.5x$	Downwards	0.94
India			
Cubic polynomial	$y = -2.10^{-7}x^3 + 2.10^{-3}x^2 - 3.8x$	Downwards	0.87
4th-degree polynomial	$y = 6.10^{-10}x^4 - 6.10^{-6}x^3 + 0.02x^2 - 33.4x$	Upwards	0.89
Vietnam			
Cubic polynomial	$y = 10^{-6}x^3 - 5.10^{-3}x^2 + 10x$	Upwards	0.87
4th-degree polynomial	$y = -7.10^{-10}x^4 + 6.10^{-6}x^3 - 0.02x^2 + 25.8x$	Upwards	0.88

y = per capita GPI.
x = per capita GDP.

than Australia and New Zealand. This can be attributed to two main factors. Firstly, in 1970, Japan was still completing the process of industrialisation as part of its post-war reconstruction. Unscathed by World War II, Australia and New Zealand were already fully industrialised at the beginning of their respective study periods. In a sense, Japan was still 'catching up' on Australia and New Zealand and logically took longer to reach a threshold level of per capita GDP. Secondly, unlike Australia and New Zealand, Japan is not richly endowed with huge quantities of natural resources. It therefore relies heavily upon the importation of raw materials of which the cost is largely financed by Japan's extensive exports of manufactured products and services. Because of this pattern of trade, Japan has managed to offload many of the environmental costs associated with the growth of its economy onto other countries.[8] This is very much evidenced by the massive decline in Japan's environmental costs from ¥30,293 billion in 1970 to ¥12,377 billion in 2003 (Makino, 2008). Conversely, the environmental costs of Australia (Lawn, 2008) and New Zealand (Forgie et al., 2008) increased over the study period.

Because of the possible distortion that international trade may inflict on a nation's GPI, there are now calls to establish an open-economy GPI on the basis that the long-term cost of satisfying the demands of a resource-importing country is borne by the extracting (exporting) country but not by the consuming (importing) country (Makino, 2008; Clarke, 2007). Hence, it is possible via international trade for the GPI of a resource-importing country to remain artificially inflated. This could well have happened in the case of Japan. If so, Japan's pattern of trade has enabled its sustainable well-being to appear higher than it would otherwise have been, thereby extending its threshold level of per capita GDP while at the same time contracting the threshold point of other nations.

Table 3 and Fig. 2 appear to confirm the earlier apprehension regarding China and Thailand's premature arrival at a threshold level of per capita GDP. Of even greater concern to China is that its threshold point was reached at a per capita GDP in the order of Int $5000 whereas it was reached by Thailand at a per capita GDP closer to Int$7500. Either way, both fall far short of the Int$15,000–$25,000 threshold range experienced by Australia, New Zealand, and Japan.

4. A New 'Contracting Threshold' Hypothesis

The experience of China and Thailand begs the question as to what the level of per capita GDP will be for India and Vietnam when both these countries arrive at their respective threshold points. If the trend in Fig. 2 is accurate, it is likely that the threshold point will be crossed at less than Int $5000. Furthermore, it is possible that India, with a per capita GDP of around Int$3000, is already on the verge of reaching its peak per capita GPI value. It is also reasonable to assume that Vietnam, with a per capita GDP of around Int$2500, will soon follow closely in India's footsteps.

These assumptions rest on two main observations. Firstly, it appears that the later a nation experiences an initial GDP growth phase (i.e., the later it undergoes an initial period of rapid economic expansion), the lower is the per capita GDP when its per capita GPI begins to stagnate or decline. This is illustrated in Fig. 2 by the tunnelling of the per capita GPI–GDP curve of each nation below the corresponding curve of its growth predecessor. Secondly, and largely as a result of the first factor, the peak per capita GPI values of the growth late-comers – in effect, China, Thailand, India, and Vietnam – are considerably less than the peak per capita GPI values of their wealthier inter-regional neighbours. The consequences of this are significant. Should current policies to achieve GDP growth remain unchanged, it is possible that the poor countries in the Asia-Pacific region (and presumably throughout the world generally) might never attain the per capita GPI levels currently enjoyed by wealthy nations.

Lest these observations simply be considered an empirical artefact, it is necessary now to discuss two possible structural factors that may explain them. Leading ecological economist, Herman Daly, has frequently expressed his concerns about a 'full' world in the sense of a world increasingly laden with more human beings and more physical goods created via the physical transformation of natural capital to human-made capital (Daly, 1991, 1996, 1999). As Daly points out, economic logic informs us that the marginal costs of an increment of GDP growth in a full world are likely to be substantially higher than in an 'empty' world. Thus, in a full world, we can expect the marginal costs of economic expansion to more rapidly approach the associated marginal benefits — meaning, of course, that if expansion continues, the former will quickly exceed the latter, thereby causing sustainable well-being to decline early on in a nation's development process. For countries that were fortunate enough to experience economic expansion when the world was much emptier, the marginal costs of expansion were considerably less.[9] As a result, countries such as Australia and New

[8] This may have occurred as a result of a deliberate policy on the part of Japan. We are more inclined to believe it was the inadvertent result of a pattern of trade that evolved following the gradual increase in the international mobility of financial capital (see Daly, 1996; Lawn, 2007). If the latter is correct, Japan cannot be held solely responsible for whatever environmental costs have occurred elsewhere in the Asia-Pacific region and the world generally.

[9] As a means of illustration, the economies of Australia and New Zealand grew rapidly in the early post-World War 2 period of the 1960s and 1970s. In 1961, the ecological footprint of the world was 50% of the world's biocapacity (Global Footprint Network, 2006). It is reasonable to assume that the world was 'half full' at that point in time. By 1970, when Australia and New Zealand had fully industrialised, the ecological footprint of the world had grown significantly but was still just 65% of the world's biocapacity. For many of the poorer case study nations, their initial expansion phase did not occur until the 1980s and 1990s. In 1987, the ecological footprint of the world caught up with the world's biocapacity. The world was, in effect, '100% full'. It is therefore clear that the conditions under which Australia and New Zealand engaged in a rapid initial phase of economic expansion differed greatly to the conditions confronted by countries like China, India, and Vietnam.

Zealand (keeping faithful to the case studies reviewed in this paper) were able to extend their period of fruitful GDP expansion beyond what would be possible in today's full world.

The second explanatory factor is undeniably more controversial. Within the international trade literature, there is a growing support for what is generally termed the pollution haven hypothesis. Since international trade in a globalised world is governed by the principle of absolute advantage – a consequence of the free international mobility of capital (Daly and Cobb, 1989; Daly, 1996; Lawn, 2000) – many transnational corporations have progressively shifted their operations to countries with low wages, low corporate tax rates, feeble workplace laws, and deficient environmental regulations.[10] Virtually all such nations have a low per capita GDP. Not surprisingly, it has been claimed that many poor countries have become a haven for polluting industries and for firms generally seeking to enjoy a competitive advantage from the lower associated cost of production. One of the major fallouts from the shift in location of 'dirty, low wage' production is the rapid increase in the excessive rates of resource depletion and industrial pollution in poorer nations. Conversely, there is a significant relative decline in the total cost of environmental degradation in wealthier countries (i.e., a fall in depletion and pollution costs as a proportion of real GDP).[11] From the social perspective of poor nations, industrial flight – the relocation of capital to countries with weaker workplace and environmental standards – has also contributed significantly to rising income inequality, rural underdevelopment, urban over-population, and the loss of previously self-reliant communities.

In as much as industrial flight has boosted the volume of economic activity in the poorer 'host' nations of the Asia-Pacific region, it has almost certainly forced them to bear a disproportionately large burden of the social and environmental costs of regional, if not global, GDP growth. In doing so, it has brought forward their threshold level of per capita GDP whilst simultaneously extending the threshold point of wealthier countries. This might explain why Australia and New Zealand, after respectively reaching a threshold level of per capita GDP in 1974 and 1981, managed to stage a minor GPI recovery in the decade following 1993.

The pollution haven hypothesis has not gone uncontested. In the relevant literature, the majority of studies support the position that differences in labour costs account for numerous instances of industrial flight (Leonard, 1988; Hodge 1995; Ratnayake and Wydeveld 1998). However, the position in relation to environmental regulations is not as clear. Whilst initial studies conducted in the late-1980 s and 1990s concluded that environmental stringency had very little impact on the choice of production location (Dean 1992; Pearce and Warford 1993; Jaffe et al., 1995; Garrod 1998), more recent studies now show that disparate environmental regulations do result in capital flight to countries with weaker environmental standards (Wilson et al., 2002; Cole 2004; Grether et al., 2006; MacDermott 2006; Akbostanci et al., 2007; Levinson and Taylor, 2008). The shift in the conclusions is explained through improvements in the availability of data and the models used to test the pollution haven hypothesis.

These two structural explanations – a full world and the rise in pollution havens – support the empirical findings presented in this paper. On this basis, we therefore present a new contracting threshold hypothesis: as the economies of the Asia-Pacific region and the world collectively expand in a globalised economic environment, there is a contraction over time in the threshold level of per capita GDP. As a consequence, the threshold point confronting growth late-comers (i.e., developing countries) is likely to occur at a much lower level of sustainable welfare than what wealthy nations currently enjoy. The consequences of the contracting threshold hypothesis are significant for both developing and developed countries.

It should be pointed out that his new hypothesis does not imply that genuine progress and improvements in sustainable well-being are no longer possible in low-income countries. However, radical shifts in policies must now occur if the threshold level of per capita GDP is to be extended and, more importantly, if developing countries are to approach the levels of sustainable well-being experienced in wealthy countries.

5. Implications of the Contracting Threshold Hypothesis

Although the course of action we are about to recommend involves a different development approach for the rich and the poor nations of the Asia-Pacific region, many of the policies we believe should be implemented apply to all countries regardless of their current state of development.

The main purpose of these policies is to extend the threshold level of per capita GDP for developing countries. This will enable their GDP growth to remain economic for some time to come and to thus increase their potential to enjoy, in the long-run, a level of sustainable well-being equivalent to that currently being enjoyed by wealthy nations. As optimistic as we are that this can be achieved, we do note two important caveats. Firstly, and this applies equally to all nations, there is an inevitable social and biophysical limit to economic expansion (Hirsch 1976; Daly 1996). Secondly, we believe that any extension of the threshold level of per capita GDP requires the adoption of an entirely new development approach that requires a radical shift in the policies of powerful international institutions, such as the World Trade Organisation and International Monetary Fund (Daly, 1996; Lawn, 2007), but more fundamentally a re-questioning of the dominate neo-liberal framework. A slight variation on the business-as-usual approach is unlikely to be successful.

Given our contention that wealthy countries have already reached their threshold level of per capita GDP, and there is little capacity for wealthy countries to extend their own threshold points without negatively impinging on the threshold points of developing countries, we believe that wealthy nations should immediately initiate the transition to what is commonly deemed a steady-state economy. An economy of this kind is one that does not physically grow but qualitatively improves in terms of its content of physical goods, the means by which the goods are produced and maintained, and the purpose for which the goods are intended (Daly, 1991). Provided this is achieved, the per capita GPI can still be increased without the need for GDP growth. A steady-state transition by wealthy countries also provides the 'room' that the poorer nations require to extend their threshold level of per GDP.

Of course, any extension of the threshold points of the region's poorer countries still depends largely upon the policies they themselves adopt. For this reason, the primary focus of the remainder of this section is on the policies we believe should be implemented by the governments of developing countries.

5.1. Population Stabilisation

For some time to come, the poorer nations of the Asia-Pacific region will unquestionably require a development approach based on GDP growth. But it will need to be a form of growth vastly different to what has been undertaken in the past. The first feature of this qualitatively new form of GDP growth stands out clearly from the rest. In view of current population projections, many of the region's poorer

[10] The use of the term 'pollution haven' clearly has connotations that go well beyond transnational corporations simply avoiding the cost of pollution abatement. It is an expression used more broadly to describe any instance involving the relocation of capital induced by cost savings arising from disparate regulations between countries.

[11] Of course, in an aggregate sense, depletion and pollution costs have risen for the majority of rich countries. For example, the cost of lost natural capital services (total environmental costs) for Australia increased by 149.9% between 1967 and 2006. However, as a percentage of real GDP, the cost fell from 26.7% to 17.7% over the same period. In the case of Japan, the aggregate environmental cost declined as well as the cost as a percentage of real GDP.

countries will need to take immediate action to stabilise their population numbers. This applies particularly to India, Cambodia, Indonesia, Malaysia, Pakistan, the Philippines, Thailand, and Vietnam. Population growth not only makes it more difficult to alleviate absolute poverty, it also leads to 'unnecessary' GDP growth in the sense that additional economic output is required merely to meet the basic needs of a larger population.

5.2. Distributional Equity

Even if population stabilisation can be successfully achieved, future GDP growth must be characterised by a more equitable distribution of future economic gains. Distributional equity is not only a moral imperative, it is necessary to maintain the social capital that underpins a healthy society and economy. In addition, a more equitable distribution of income and wealth increases the aggregate welfare contribution of a given level of consumption (Robinson, 1962). Since this reduces the GDP growth needed to alleviate poverty, it further lessens any unnecessary GDP growth and thus brings with it obvious benefits in terms of lower environmental and social costs. All in all, a more equitable distribution of income and wealth has the potential to both increase the per capita GPI for a given per capita GDP and extend the threshold level of per capita GDP confronting poor nations in the Asia-Pacific region.

5.3. Self-Sufficiency

Export-led growth requires a significant proportion of a nation's output to meet the consumer demands of relatively wealthier people living elsewhere in the world. The types of goods produced are usually at odds with the consumer demands, if not basic needs, of the impoverished. Whilst export-led growth generates some domestic employment benefits, it benefits the wealthy owners of export-producing capital significantly more, who need not concern themselves with the purchasing power within poorer countries but only that within wealthier nations.

We believe that the governments of the region's poorer countries should provide inducements to encourage the production of goods more specifically aimed at meeting their citizens' basic needs. This does not mean that exporting should be discouraged altogether, only that export programmes are probably best confined to the production and exportation of goods where a nation: (a) has a clear natural production advantage (e.g., the production of particular agricultural commodities due to geography and climate); and (b) can efficiently generate surplus output above domestic requirements.

Apart from tax incentives, some of the inducements required to achieve a 'self-sufficiency' growth strategy would include policies which strengthen the purchasing power of a nation's citizens. This requires healthy levels of domestically generated employment, a decent minimum wage, and an equitable distribution of income and wealth — all of which would boost the per capita GPI and further extend the threshold level of per capita GDP.

5.4. Increased Efficiency: Reducing the Resource Use Intensity of Economic Activity

In each of the case studies referred to in this paper, one of the most notable impacts of economic expansion is the rising cost of environmental degradation. Given that further GDP growth in the region's poorer nations will involve the production of more goods, these countries must do all they can to reduce the environmental impact per unit of economic activity.

There are many ways to lower the resource use intensity of economic activity. Perhaps the simplest means is to increase the efficiency of resource allocation within the economy. This can be achieved by internalising the environmental spillover costs of production that are regularly overlooked by markets. Depletion and pollution taxes would greatly assist in this regard as would well-designed systems of tradeable depletion and pollution permits. Given that efficiency is also facilitated by ensuring markets are suitably contestable (Baumol et al., 1982), governments of the Asia-Pacific's poorer nations should establish appropriate institutional mechanisms to preclude anti-competitive corporate mergers. They should also be mindful of the potential anti-contestable impact on domestic industries from having large transnational corporations relocate within their economies.

As any economist would attest, efficiency gains generated via the market reallocation of resources are eventually exhausted. To bring about greater resource use efficiency over time, it is necessary to encourage the development and application of resource-saving technology. The internalisation of environmental spillover costs would no doubt be of assistance since it would induce firms to employ new technologies in order to avoid the additional resource-related costs they would otherwise incur.

However, one of the potential problems with internalising environmental spillover costs in poorer countries is that, prior to the introduction of any resource-saving technology, many local firms are likely to have difficulty absorbing the higher resource costs and/or pollution charges. Other firms will simply find the cost of investing in resource-saving technology prohibitively expensive. This could result in an unhealthy number of business closures. An alternative approach worth considering is the introduction of subsidies (grants) or a system of tax rebates to reward firms that develop and employ resource-saving technology. Thus, rather than trying to increase the uptake of resource-saving technology by penalising firms, governments would offer a financial inducement to encourage firms to make a socially desirable form of investment. In recommending this alternative approach, we are mindful of the fact that the full internalisation of environmental spillover costs (i.e., full cost pricing) is necessary to promote genuine efficiency in the long-run. We therefore believe that the use of subsidies and tax rebates is a potentially useful means of initiating the resource-saving process, but not a long-run policy solution.

5.5. Natural Capital Investment and the Preservation of Critical Ecosystems

The great majority of investment spending in any country is generally directed towards the accumulation of human-made capital (plant, machinery, and equipment). Very little is directed towards the maintenance, let alone accumulation, of natural capital. Indeed, one could argue that the history of GDP growth has been overwhelmingly characterised by the conversion of natural capital to human-made capital. It is increasingly being recognised that natural capital maintenance is required to achieve strong sustainability. Since GDP growth will almost certainly result in resource throughput growth, the regenerative and waste-assimilative capacities of some existing forms of natural capital are likely to be exceeded. This will inevitably lead to some depletion of the natural capital stock.

In order to minimise natural capital depletion, the governments of the Asia-Pacific's poorer nations must encourage greater natural capital investment. Governments themselves can play a leading role by undertaking extensive reforestation programmes, restocking rivers and lakes with fish, and restoring and rehabilitating important wetlands. As for non-renewable resources, governments should consider introducing legislation to compel all resource liquidators (e.g., mining companies) to set aside a certain portion of their depletion profits into capital replacement accounts (El Serafy, 1989; Daly, 1996). The funds could then be used to cultivate renewable resources that, in turn, would offset the decline in non-renewable resource assets.

Unlike the natural resources used directly for economic purposes, it is very difficult to restore important ecosystems once they have been significantly disturbed. For example, better soil management can restore the fertility of agricultural land, but a radically modified ecosystem is often irreparably damaged. Given this and the fact that ecosystems generate non-substitutable services that are vital to the successful functioning of economic systems, we believe the exploitation of natural capital in the Asia-Pacific's poorer countries should be confined to areas already significantly modified by previous human activity. In addition, all critical ecosystems should be preserved via the establishment of an extensive National Park system of the type that exists in the majority of wealthy nations.

5.6. An Import-replacement Policy

Export-orientated strategies are considered important for developing countries seeking to expand their economy (Dollar and Kraay, 2001). We argue that developing countries should abandon export-oriented strategies, as opposed to abandoning the exportation of goods altogether, in favour of import-replacement policies. Export-orientated strategies often lead to over-specialisation and export revenue dependence. This locks countries into international trade, thereby reducing their freedom not to trade.[12] Export-orientated strategies also result in a standards-lowering form of competition (Wilson et al., 2002). In a globalised world of free capital mobility, this leads, in many cases, to lower minimum wages and the dilution of workplace and environmental standards. In some instances, it results in governments withholding the enactment of cost internalising regulations. Hence, rather than promoting genuine efficiency, the imperatives of export-oriented growth often force the governments of poor nations to adopt a policy stance that reduces efficiency—ironically, the very efficiency that needs to be increased in order to extend the threshold level of per capita GDP they confront.

The alternative we propose is an import-replacement policy. Import-replacement occurs when, instead of focusing on the need to boost exports, a country focuses on reducing its imports. This can be achieved when a nation increases the efficiency of its production to such an extent that it is able to produce a variety of goods at a lower cost than it previously cost to import them. Import-replacement policy is not 'anti-trade'. Nor does it require the imposition of tariffs and quotas to protect inefficient and under-performing industries. Import-replacement occurs when a country reduces its need to import, which it can do by increasing production efficiency so that locally produced goods become comparatively less costly than imported goods. Because an import-replacement policy leaves a country producing a greater range of goods, it increases its self-sufficiency while also reducing its exposure to volatile global market forces.[13]

5.7. Eventual Transition to a Steady-state Economy

As mentioned earlier, there are inevitable social and biophysical limits to the extension of the threshold level of per capita GDP. Once poorer nations of the Asia-Pacific region have reached this threshold point – whereby they ought to be experiencing a much higher level of sustainable welfare – they, like rich countries, will need to make the transition to a steady-state economy. Of course, if it is possible for poor nations to extend the threshold level of per capita GDP for some time, this transition may not be necessary for some decades.

A steady-state economy is, by definition, a sustainable economy. To achieve strong sustainability over the long-term, it will eventually be necessary for nations to keep their remaining stock of natural capital intact. Apart from preserving critical ecosystems, natural capital maintenance requires the rate of material and energy throughput to remain within the environment's regenerative and waste-assimilative capacities. Depletion and pollution taxes, which we recommended above to internalise environmental externalities, are unable to ensure the rate of resource throughput is restricted in the manner necessary to achieve strong sustainability (Daly, 1992; Lawn, 2007). This can only be achieved via the direct imposition of resource throughput constraints which are probably best introduced in the form of tradeable resource use permits (see Lawn, 2008 for a full explanation).

Caution is required, however. The imposition of resource use constraints has the potential to bring the growth of an economy to an abrupt halt.[14] Given the path dependent feature of economic systems (David, 1985), an overly aggressive approach could endanger the smooth transition to a steady-state economy. We therefore believe that depletion and pollution taxes are an ideal means of preparing economies for the eventual imposition of much harsher throughput constraints. However, tradeable permit systems will need to be introduced eventually and the throughput constraints embodied within them gradually tightened.[15]

5.8. Increased and Better Directed Foreign Aid to Developing Countries

This final consideration applies not only to the wealthy countries of the Asia-Pacific region, but of the world generally. Rich countries are undoubtedly in the privileged position of having undergone an initial expansion phase in a relatively empty world. In recognition of this good fortune, wealthy nations should increase the financial aid they provide to the region's poorer countries. At present, foreign aid spending averages 0.3% of GDP per wealthy nation (OECD Development Statistics Online). We believe that this is woefully inadequate. A target foreign aid rate of at least 0.7% of GDP would, in our opinion, be more appropriate and eminently more just.

There are five main areas where the increased aid money should be directed. Firstly, aid money should be used to provide basic goods and services to people suffering from extreme poverty, famine, war, and the impact of natural disasters. Secondly, in view of the need for many poorer nations to control their population numbers, aid money should be used to fund population stabilisation programs in circumstances where governments lack the necessary fiscal capacity. Thirdly, many of region's critical ecosystems (e.g., rainforests, wetlands, and coral reefs) exist in the poorer nations where further GDP growth is required. These ecosystems are likely to come under intense pressure at a time when preservation is more urgent than ever. While the preservation of ecosystems generates non-direct use benefits for all nations, it denies the host country any direct use benefits. To promote ecosystem preservation, the governments of wealthier nations should distribute aid money to compensate poorer countries for the direct use benefits they would subsequently forego. The aid money could then be redistributed by the recipient country to the citizens most affected by the lack of direct ecosystem access, and

[12] One of the fundamental conditions required for trade to be mutually beneficial is that it is and remains voluntary. This condition is compromised if the freedom not to trade is lost.

[13] Self-sufficiency was vehemently promoted as a desirable national goal in the United Nations Report on the World Summit on Sustainable Development that was held in Johannesburg in 2002.

[14] Given the potential to miscalculate the maximum sustainable rate of throughput and the complexity of ecosystems, it would be sensible to set the throughput constraint at something much less than the estimated maximum. This is often referred to as the 'precautionary principle'.

[15] We also believe that assurance bonds should be introduced to deal with the qualitative nature of pollution and waste (see Costanza and Perrings, 1990 and Lawn, 2007).

might take the form of direct compensation or, more productively, the establishment of a substitute industry (e.g., tourism to replace logging). Fourthly, aid should therefore be distributed to poor nations to boost their investment in natural capital — in particular, to augment reforestation programs, promote wetland restoration and rehabilitation, and assist in the adoption of sustainable land management practices. Finally, since rich countries would indirectly benefit from a reduction in resource use intensity in the region's poorer nations, the former should establish a transfer program to assist the latter in the uptake of resource-saving technology. This might best be achieved by allocating foreign aid money to subsidise and thus lower the purchasing price of expensive new technology.

6. Conclusion

We began this paper by making two bold declarations: (a) the per capita GDP of any given nation generally overstates the sustainable well-being it enjoys, and (b) the recent rate of genuine progress across the Asia-Pacific region has not been as marked as the rise in per capita GDP would indicate. Upon close examination of the relationship between the per capita GPI and per capita GDP, we argue that the threshold level of per capita GDP contracts over time as economies collectively expand. As a consequence, the threshold point of growth late-comers is reached at a significantly lower per capita GDP than wealthier nations. This suggests that poorer countries may never experience the per capita GPI levels currently enjoyed by wealthy nations.

This is not to say that well-being cannot be enhanced. It can, but it requires different strategies than what are currently in place. New strategies are required to ensure that GDP growth is: (a) clean, efficient, and equitable; (b) minimises natural capital depletion; (c) emphasises natural capital investment; (d) includes an import-replacement strategy that increases national self-sufficiency; and (e) avoids standards-lowering competition.

Wealthy countries also have a part to play in extending the threshold point of poorer nations. In particular, they need to halt the increase in their own GDP and immediately begin the transition to a steady-state economy. They also need to lend greater support to poorer countries in the form of increased foreign aid.

Provided the warning signs conveyed by the GPI results in this paper are heeded and an appropriate course of action is undertaken, there is no reason why the sustainable well-being in developing countries should not rise in coming decades. Nor is there any reason why the huge gap between the sustainable well-being experienced between poor and wealthy nations ought not to eventually narrow. However, if the warning signs are ignored and a business-as-usual approach continues, the future is pessimistic. Despite the enormous philosophical, political, and institutional barriers that stand in the way, we see no reason why the outcome should not be a positive one.

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