

Global Market Strategy Research

Environmental Issues & Country Valuations: What Matters?

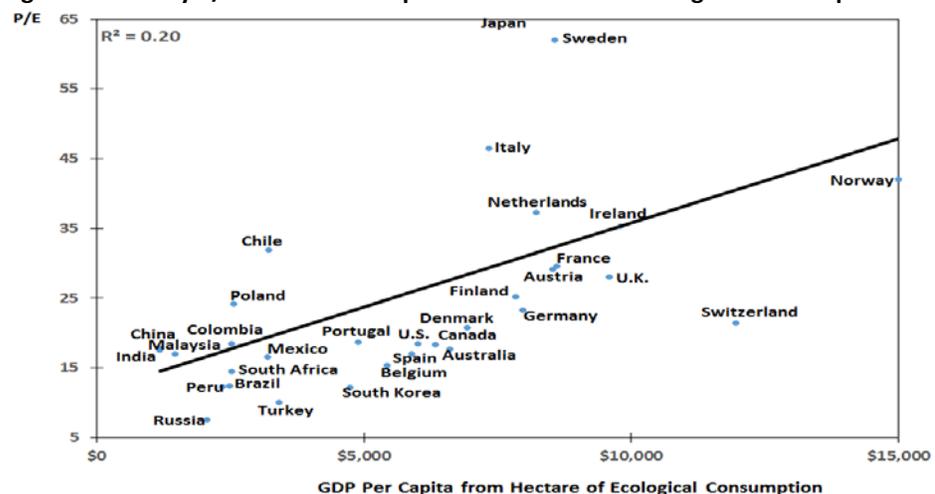


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- **What Matters?** — Some environmental issues that are the subject of popular focus — such as carbon dioxide emissions — do not appear to be statistically significant for global investors. Moreover, many countries’ environmental “health” has moved in the *opposite* direction of their economic development i.e., more pollution *and* higher per capita GDP.
- **Environmental Flows versus Stocks** — What matters more to wealth generation is how an economy uses *flows* of raw materials, rather than the country’s *stocks* of natural resources. Many resource-rich countries have lower levels of per capita GDP than resource-poor states that efficiently transform raw materials into wealth.
- **Intangible Capital Drives Wealth Creation** — Intangible capital, which includes measures of human, social and institutional capital, is the key driver of wealth creation. The share of *natural* capital in total wealth is relatively large in poor countries, but levels of *intangible* capital are very high in rich economies.
- **Environmental and Governance Factors Both Matter** — Environmental factors generate an R-squared of 0.20 with country equity valuations; governance factors generate an R-squared of 0.16.

Figure 1: Country P/E vs. GDP Per Capita from Hectare of Ecological Consumption



Source: Bloomberg, Global Footprint Network

Executive Summary

- Pollution does not appear to be a factor in the valuation of a country's debt or equity markets. Water scarcity, the loss of biodiversity and climate change undoubtedly pose risks to economic growth, yet research shows little correlation to date between environmental issues and investment metrics.
- Many countries' environmental "health" has moved in the *opposite* direction of their economic development i.e., more pollution *and* higher per capita GDP.
- A lot of resource-poor countries have higher levels of per capita GDP than resource-rich countries. What matters more to wealth generation is how an economy uses *flows* of raw materials, rather than the *stocks* of natural resources within the country.
- "The Ecological Footprint," which is calculated by the Global Footprint Network, is a unique measure of a country's consumption of flows of natural resources. It measures, in hectares per capita, the amount of biologically productive land and marine area required to produce all the resources a country consumes.
- The Ecological Footprint — a measure of *consumption* of natural resources — can be compared to the amount of wealth *generated* within a country. For 32 countries we calculate the amount of GDP per capita generated by each hectare of ecosystem services consumed per person. There is a reasonably robust relationship (R-squared of 0.20) between (i) GDP per capita generated by each hectare of ecosystem services consumed per person and (ii) a country's P/E multiple.
- The implication is that a country which is quite efficient in transforming flows of ecosystem services into wealth is "rewarded" with a relatively high P/E multiple e.g., the Netherlands. Conversely, a country that is resource rich — such as Russia — but that is inefficient in transforming its natural resources into wealth is assigned a relatively low P/E multiple.
- It would seem that the efficiency with which natural resources are transformed into wealth is important to a country's valuation *primarily because it is an indicator of the social and institutional development of the country.*

The Investment Significance of ESG Factors

In previous reports, we have looked at the investment significance of certain Environmental, Social and Governance (ESG) factors:

- [Gauging Governance Globally: Macro and Micro Metrics](#), September 15, 2014. We examined the significance of governance for country equity valuations using both “top-down” (governance at the national level) and “bottom up” (governance at the corporate level) metrics.
- [The Economics of Environmental Issues in Sector Strategy](#), October 20, 2014. We studied the implications of a potential increase in key environmental costs for ten industry sectors.
- [The Social Costs of Business: Implications for Sector Strategy](#), December 16, 2014. Utilizing a number of metrics — (i) costs of community support; (ii) costs of “cheap” labor; (iii) costs of committed and safe employees; (iv) costs of attracting and retaining customers — we estimated the “social costs of business” for the ten sectors in the MSCI All Country World Index (ACWI).

Quantifying the Investment Significance of Environmental Issues in Regions

In this report we turn our focus to the significance of environmental issues for global equity investors looking across *regions*. These issues should be of particular interest to “Universal Owners.” According to the UN-backed *Principles for Responsible Investment* (PRI):¹

- Large Institutional Investors are, in effect, “Universal Owners”, as they often have highly-diversified and long-term portfolios that are representative of global capital markets. Their portfolios are inevitably exposed to growing and widespread costs from environmental damage...

In terms of “the environment,” the PRI stated:

- Society and the economy are dependent on functioning ecosystem services. Plants, animals, microbes and the physical environment provide “free” inputs such as food and raw materials, pollination and genetic resources. Forests, grasslands, wetlands and marine areas provide life-supporting services such as nutrient cycling, freshwater and climate regulation.

The objective of this report is to quantify environmental factors of relevance to global equity investors.

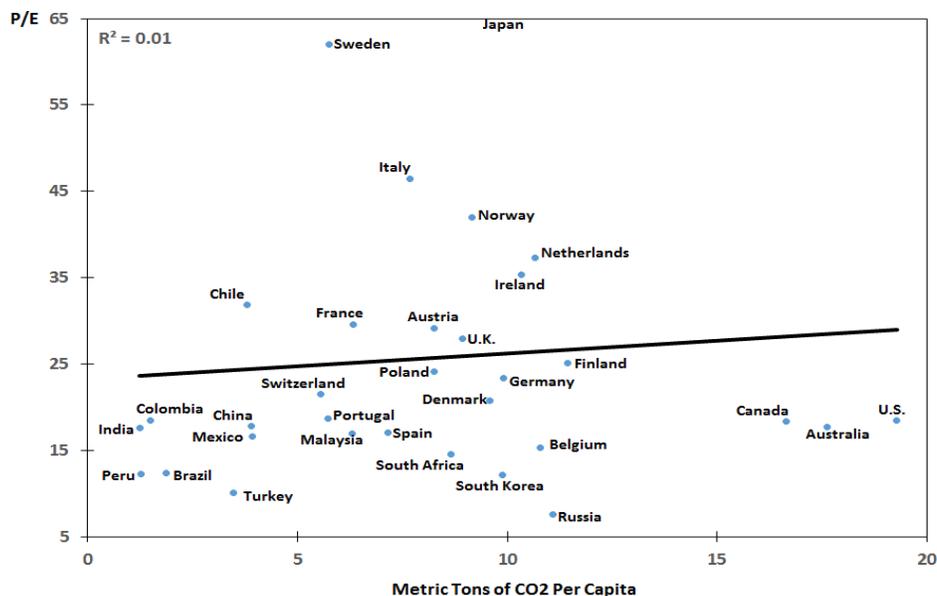
In that regard, some of the report’s methodology may not seem comparable to — or might even appear to conflict with — conventional analysis of environmental issues. One reason for this is that some issues that are the subject of popular focus *do not appear to be statistically significant* for global investors.

So, for example, while the topic of climate change garners a lot of attention, a fixed income analyst pointed out² that “CO2 is not well correlated with a country’s credit worthiness.” Similarly, there seems to be *no relationship* between a country’s carbon dioxide emissions and its equity valuation — Figure 2 shows an R-squared of 0.01. (Note that we have only plotted data for the 32 countries with the largest weights in the MSCI ACWI.)

¹ “Universal Ownership: Why environmental externalities matter to institutional investors,” *PRI and UNEP Finance Initiative*, 2011

² “Fixed Income: ESG in the world’s largest asset class,” *Responsible Investor Insight*, February 2014

Figure 2: Country P/E vs. Metric Tons of Carbon Dioxide Per Capita



Source: Bloomberg and United Nations

As noted, it’s not just equity investors who have wrestled with the investment significance of various environmental issues. When writing about sovereign bonds and ESG risks, another PRI report³ pointed out that:

- Water scarcity, the loss of biodiversity and climate change undoubtedly pose risks to economic growth. Yet research shows *little correlation* to date between environmental issues and bond performance. *One of the biggest problems is agreeing on which indicators should be used to measure environmental risks* [italics added].

As the quote illustrates, another stumbling block seems to be that many fixed income and equity analysts have focused solely on the *risks or costs* associated with a country’s environmental issues. An aforementioned study⁴ pointed out an inherent problem with such an approach:

- Integrating environmental factors into...investing might be counter-intuitive at first, as *environmental management performance often moves in the opposite direction of a country’s economic development....e.g., intensive resource use is often a sign of industrial development...* [italics added].

On that point, a history⁵ of the Victorian era in the United Kingdom highlighted a visible sign of resource depletion during a period when U.K. GDP per capita rose from 139% of the level in Western Europe in 1820 to 162% in 1870:

- By the 1830s...the country had the look of a well-tended garden, particularly since, unlike continental countries, England had been almost completely stripped of native woodland.

³ “Sovereign Bonds: Spotlight on ESG Risks,” *PRI*, 2013

⁴ “Fixed Income: ESG in the world’s largest asset class,” *Responsible Investor Insight*, February 2014

⁵ “The Victorians,” *A.N. Wilson*, Arrow Books, 2003

Then, too, there was the toll on Victorians' health that resulted from industrialization:

- Whatever the category of worker examined, the same story is told: the exploitation of workers to the point where the urban proletariat of Victorian England have become stunted in growth and subject to a whole range of debilitating illnesses...The doctor in the North Staffordshire Infirmary...enumerated the pneumonia, phthisis, bronchitis and asthma, as well as disorders of kidney and stomach to which his 'ill-shaped and frequently ill-formed' patients were subject...

Contrasting Environmental Issues in *Global Sectors* versus *Local Countries*

In terms of quantifying environmental factors, in our October 20, 2014 report, [The Economics of Environmental Issues in Sector Strategy](#), we examined various issues as they pertained to the ten GICS in the MSCI All Country World Index. By aggregating data from the company level, we examined the sensitivity of sectors' costs — and, by implication, their profit margins — to increases in the “price” of three environmental factors: Greenhouse gas (GHG) emissions, water usage and waste discarded.

An intuitive approach might be to redo that analysis by sorting the company data according to *country* rather than *sector*. Such an approach would, however, be flawed. A key reason for this is that the country in which a company manufactures a product or generates a service oftentimes is not the same country in which that company is headquartered. On that point, in a recent report,⁶ *Cornerstone Capital Group* analyst Margarita Pirovska observed that:

- Conventional wisdom explains growing inequalities within developed countries as resulting from [a number of causes, including] globalization, which allows companies to engage in wage arbitrage for certain manufacturing (and, increasingly, service) functions.

So, for example, the American companies **Nike** and **Apple** both rely heavily on manufacturing activities in overseas countries. In our October 2014 report, we estimated a portion of the “ecological footprint” of the Consumer Discretionary (Nike) and Information Technology (Apple) sectors *globally*. Clearly, attributing those ecological footprints *entirely* to the country where a company is headquartered — the U.S. in the case of both Nike and Apple — would be misleading.

A similar issue arises when trying to calculate a *country's* true environmental “costs” (e.g., GHG emissions, water usage, waste discarded, etc.), given that companies in rich nations can “export” their pollution by, for example, moving toxic operations to poorer countries more focused on job creation than the environment.

Finally, most sectors *eventually reach a limit* in their ability to transform natural resources into *revenues*. Neither Nike nor Apple will sell more running shoes or smartphones, respectively, simply by having access to more raw materials. But, given that most natural resources are freely traded — natural resources amount to around one-quarter of all merchandise exports — a resource-poor country can *continuously* import raw materials to facilitate the transformative process by which its economy generates wealth. So the fact that Japan is lacking in most natural resources did not stop that country becoming the world's third largest economy.

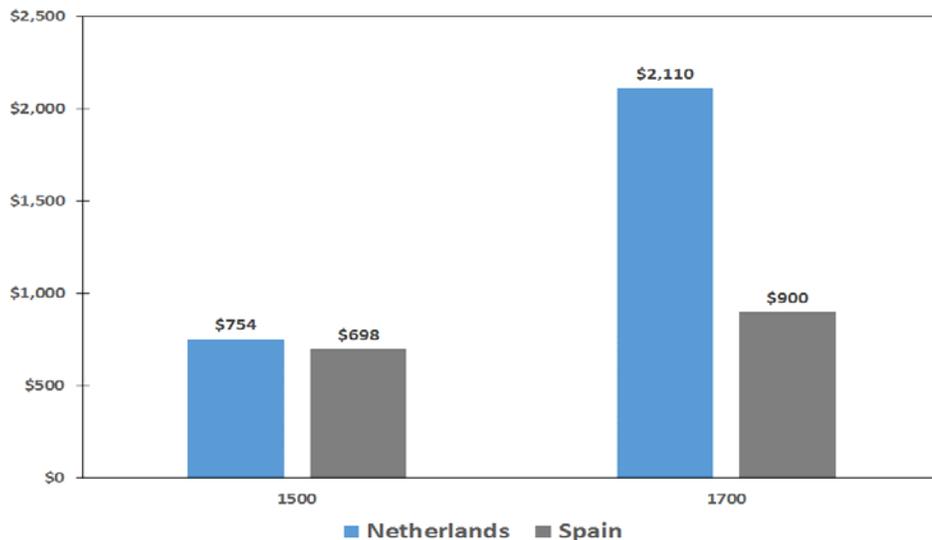
⁶ “Income Inequality: Market Mechanism or Market Failure,” *Cornerstone Capital Group*, Margarita Pirovska, November 13, 2014.

The Natural Resource “Curse?”

In contrast to Japan, some countries that are abundant in natural resources are among the world’s poorest, as measured by GDP per capita. In a well-known paper published in 1997, two economists⁷ pointed out some oddities of economic history:

- In the seventeenth century, resource-poor Netherlands eclipsed Spain, despite the overflow of gold and silver from the Spanish colonies in the New World [Figure 3].

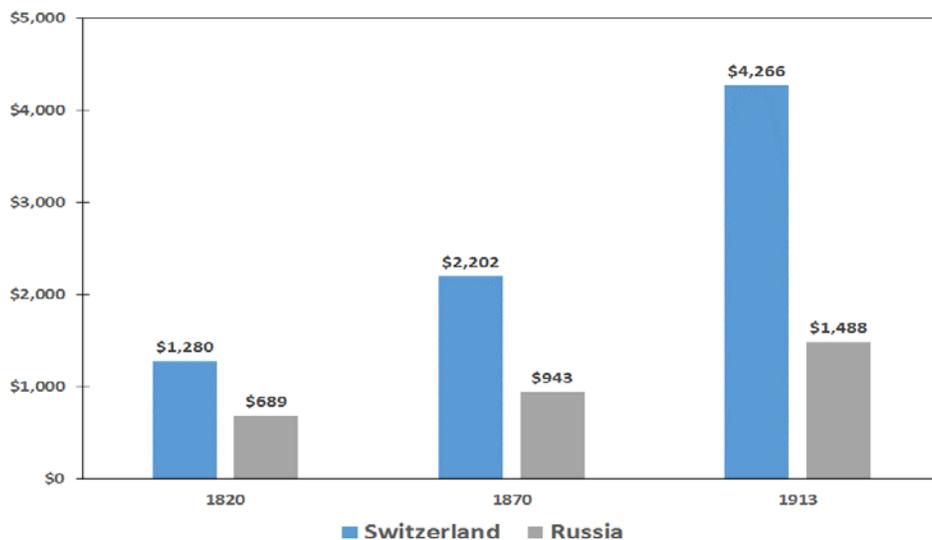
Figure 3: GDP Per Capita in 1500 and 1700



Source: “The World Economy: A Millennial Perspective,” Angus Maddison, 2001.

- In the nineteenth and twentieth centuries, resource-poor countries such as Switzerland...surged ahead of resource-abundant economies such as Russia [Figure 4].

Figure 4: GDP Per Capita in 1820, 1870 and 1913

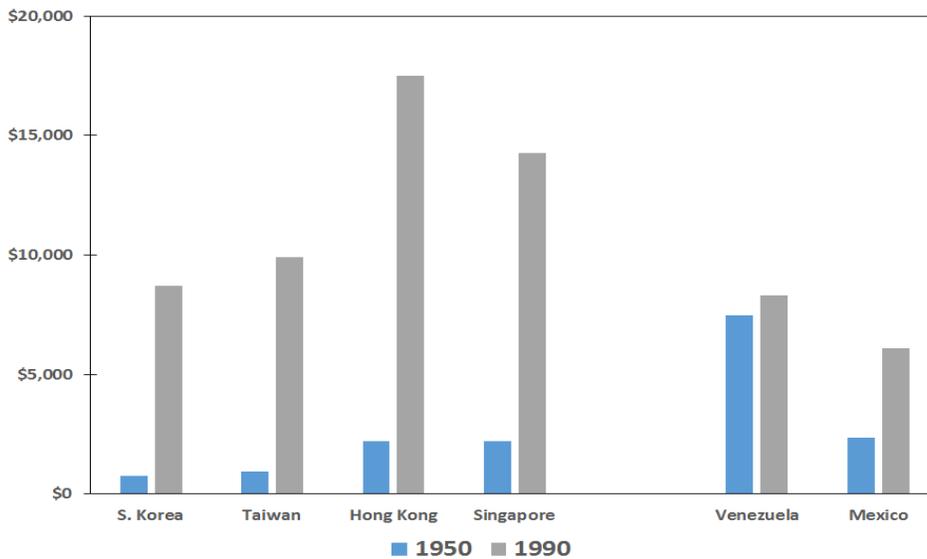


Source: “The World Economy: A Millennial Perspective,” Angus Maddison, 2001.

⁷“Natural Resource Abundance and Economic Growth,” *Center for International Development and Harvard Institute for International Development*, Jeffrey D. Sachs and Andrew M. Warner, November, 1997

- In the past thirty years, the world’s star performers have been the resource-poor Newly Industrializing Economies of East Asia — Korea, Taiwan, Hong Kong, Singapore — while many resource-rich economies such as the oil-rich countries of Mexico...and Venezuela, have gone bankrupt [Figure 5].

Figure 5: GDP Per Capita in 1950 and 1990



Source: “The World Economy: A Millennial Perspective,” Angus Maddison, 2001.

These oddities prompted the economists to ask:

- “Is there a curse to easy riches?”

Specifically, the focus of the economists’ analysis was on the relationship between a country’s natural resource-based *exports* as a percentage of GDP and its subsequent economic growth. The economists discussed a number of theories as to why this relationship has frequently been negative. So, for example, in 1576 the French political philosopher Jean Bodin attributed the phenomenon to social factors, namely that easy riches lead to sloth:

- Men of a fat and fertile soil, are most commonly effeminate and cowards; whereas contrariwise a barren country make men temperate by necessity, and by consequence careful, vigilant, and industrious.

To be sure, in their 1997 paper the economists acknowledged that, just because a country is abundant in some natural resources, it is not necessarily a negative for economic growth:

- Coal and iron ore deposits were the *sine qua non* for the development of an indigenous steel industry in the late nineteenth century. In that case, resource-rich economies such as Britain, Germany, and the U.S., experienced particularly rapid industrial development at the end of the last century.

The analysis in this report is *not* centered on countries’ exports of natural resources and subsequent economic growth. Instead, our focus is on *the relationship between a country’s consumption of natural resources and its equity valuation*.

Differentiating Between Environmental *Flows* and *Stocks*

One of the aforementioned PRI reports⁸ pointed out that:

- The environment provides...*flows* of materials including timber, freshwater and other natural resources...In economic terms, environmental resources can be understood as “natural capital”, and the *flow* of goods and services provided as “income” on that capital, while the *stock* that yields the flow is the natural capital itself [italics added].

To be sure, a country can have a large *stock* of natural resources, but the subsequent *flow* of materials can be relatively paltry. So, for example, it was pointed out⁹ that:

- Some countries with ample resources but poor efficiency, such as Russia, run the danger of wasting their natural head start through inefficiency.

Conversely, as referenced above, there have been countries — such as the Netherlands in the seventeenth century, and Switzerland in the nineteenth and twentieth centuries — whose *stocks* of natural resources were comparatively low but used imported *flows* of raw materials to generate substantial economic wealth.

That said, natural resources do not necessarily have to be imported for a country to generate more wealth than other countries that are *more abundant* in natural resources. On that point, it was noted¹⁰ that:

- In 1913, the United States was the world’s dominant producer of virtually every major industrial mineral even though other countries initially seemed to have more mineral reserves. New deposits were continuously discovered. The U.S. *share of world mineral production in 1913 was far in excess of its share of world reserves*; mineral rich countries like Brazil, Chile, Russia, Canada, and Australia did much worse in developing new reserves... [italics added] —Figure 6.

Figure 6: Percentage of World 1913 Output and Estimated Percentage of 1913 World Reserves

Commodity	U.S.		Russia		Latin America		Australia	
	% 1913 Output	% 1913e Reserves						
Petroleum	65%	20%	29%	18%	7%	22%	NA	NA
Copper	56%	20%	3%	5%	13%	27%	5%	4%
Phosphate	43%	36%	0%	19%	0%	NA	NA	NA
Coal	39%	23%	3%	21%	0%	1%	1%	9%
Bauxite	37%	1%	0%	2%	0%	29%	0%	21%
Zinc	37%	14%	0%	9%	1%	12%	22%	11%
Iron Ore	36%	12%	6%	36%	0%	12%	0%	9%
Lead	34%	18%	0%	11%	5%	13%	22%	15%

Source: “Increasing Returns and the Genesis of American Resource Abundance,” *Oxford University Press*, David and Wright, 1997

⁸ “Universal Ownership: Why environmental externalities matter to institutional investors,” *PRI and UNEP Finance Initiative*, 2011

⁹ “Sustainability rating of sovereign bonds, the Sarasin approach,” *Dutch Investment Manager Survey*, 2011

¹⁰ “Natural Resources: Curse or Blessing?” *Journal of Economic Literature*, Frederick van der Ploeg, June 2011

But are these country comparisons really “apples-to-apples?” As two economists pointed out:¹¹

- Russia’s failure to develop its vast reserves of coal and iron ore is often attributed to the inconvenient location of major deposits thousands of miles from population centers, as well as to unevenness of ore quality, high transportation cost and the lateness of discoveries.

Their rejoinder:

- Virtually all of these rationalizations could equally well have been applied to the USA...

Similarly, the economists wrote:

- Although Australia was a leading gold-mining country in the nineteenth century, [Figure 6] shows that the country was an underachiever in virtually every other mineral, particularly coal, iron ore and bauxite. While it is true that a combination of adverse factors discouraged resource exploitation in Australia, *many of these also were present in the USA*. Certainly the population of Australia has been small for a country of its size, not exceeding 8 million as late as the 1940s. Further, the harsh climate of the large desert areas has discouraged migration from coastal areas. *But the American Far West shared many of these conditions: San Francisco had only 450 inhabitants in 1847, and Utah and Arizona are not famous for their gentle climates [italics added]*.

Finally, as alluded to in the quotes above, a country’s *stocks* of natural resources are valuable *only if* they are readily accessible. A recent academic study¹² pointed out that:

- \$15 billion of gold sitting in a mountainside cannot be transformed into shareholder [value] with financial, engineering, and marketing inputs alone. It also requires the...support of key stakeholders including not only members of the economic value chain but also...community leaders, and members of civil society...The contingent nature of property rights faced by owners of gold mines has widespread analogues in other industrial contexts. The argument clearly applies to other natural resources...e.g., minerals, oil or gas, agriculture and water.

¹¹ “Increasing Returns and the Genesis of American Resource Abundance,” Oxford University Press, David and Wright, 1997

¹² “Spinning Gold: The Financial Returns to Stakeholder Engagement,” *Strategic Management Journal*, Henisz, Dorobantu, Nartey, September 2013.

Valuing Flows — Not Stocks — of Natural Resources

It's because of issues such as the ones above — namely inconsistencies between a country's *reserves* of a commodity and its *output* of the commodity — that members of the academic and scientific communities have chosen to concentrate on *the valuation of flows* rather than stocks of natural resources. In a comprehensive report about biodiversity that was conducted for the European Commission (“The Cost of Policy Inaction” or “COPI”),¹³ the international team of authors stated that:

- At the core of the methodology in this study is the “valuation of biodiversity”, in other words the assessment of the (total) value of ecosystems to mankind. *We concentrate on the valuation of the “flows” (the ecosystem goods and services) rather than on valuation of the biodiversity “stock”* [italics in original].

As indicated, the authors make a distinction between *biodiversity* and *ecosystems*:

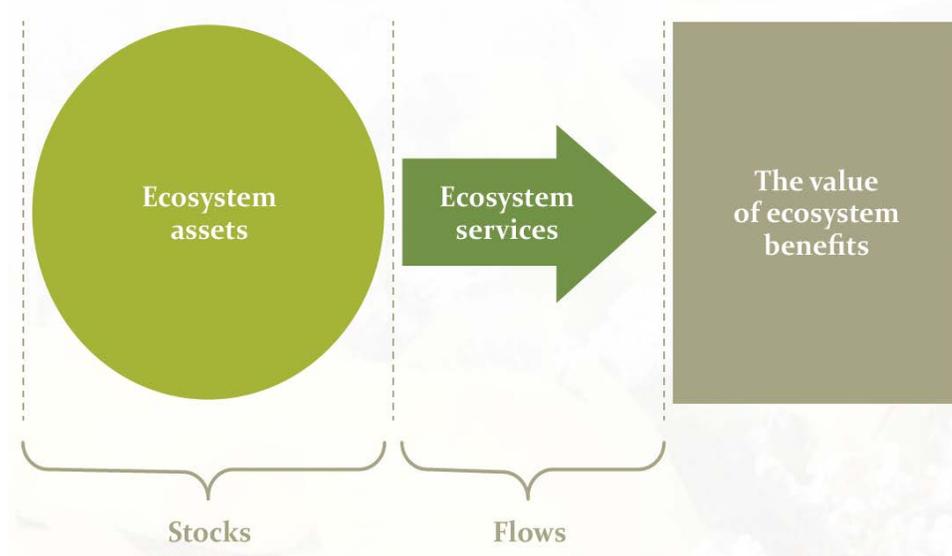
- *Biodiversity* is the diversity of species, populations, genes but also communities, and ecosystems. Direct benefits of *ecosystems* to humans such as food, timber, clean water, protection against floods, and aesthetic pleasures all depend on biodiversity...[italics added].

Land-based ecosystems include scrublands, grasslands and forests. Other forms of ecosystems include wetlands, swamps, floodplains, mangroves and marine ecosystems such as coral reefs. It is from natural ecosystems such as these that the total flow of *ecosystem services* — food, timber, clean water, etc. — is derived.

Conversion of natural ecosystems to other forms — e.g., land that is used, say, for cropland, pasture land or urban land — *alter the total flow of ecosystem services*. As the COPI authors pointed out:

- From an economic view-point, *it is these ecosystem services that are of value* and not biodiversity itself...[italics added] — Figure 7.

Figure 7: Ecosystem Assets and Ecosystem Services: Stocks and Flows



Source: United Nations Environment Programme

¹³ “The Cost of Policy Inaction,” *Study for the European Commission, Directorate General Environment*, 2008

“The Ecological Footprint”

With regard to the flow of ecosystem services, the Global Footprint Network¹⁴ has calculated the “Ecological Footprint” of hundreds of countries over several decades. This unique metric measures the amount of biologically productive land and marine area required to produce all the resources a country consumes, and to absorb the waste it generates, given prevailing technology and resource management practices.

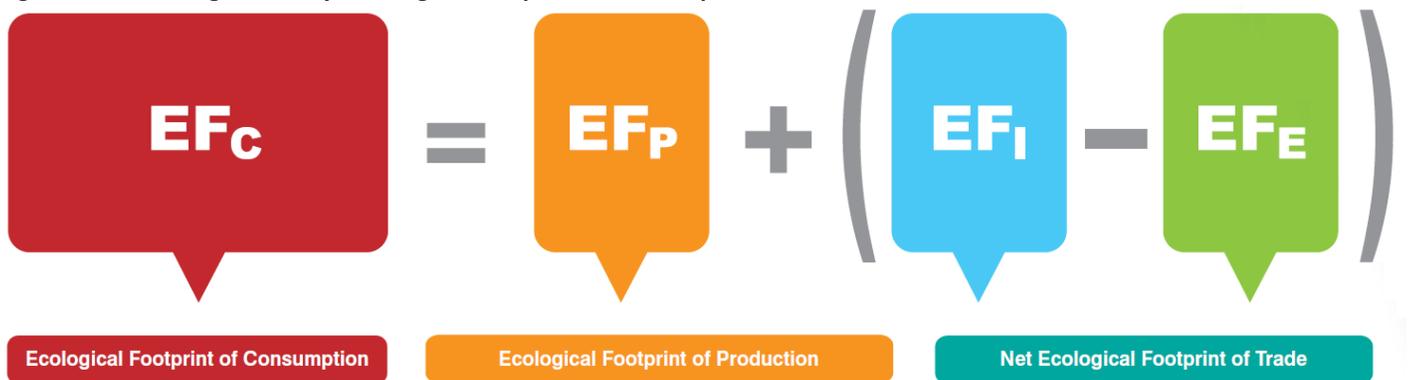
Each country’s land and marine area is scaled according to its biological productivity. This scaling makes it possible to compare ecosystems with differing bioproductivity in the same unit — *a global hectare*, which represents a hectare with world average productivity.

The Ecological Footprint tracks human demand for ecological services in terms of six major categories:

- Cropland.
- Grazing land.
- Forest for timber and fuel wood.
- Forest land for carbon dioxide uptake — this represents the waste absorption of a world average hectare of forest needed to absorb human induced carbon dioxide emissions.
- Fishing grounds.
- Built-up land.

The Ecological Footprint of consumption for a given country measures the biocapacity required by the final consumption of all the residents of the country. Specifically, a country’s Footprint of consumption is calculated by summing the Footprint of production and the Footprint of imports, and subtracting the Footprint of exports — Figure 8.

Figure 8: Calculating a Country’s Ecological Footprint of Consumption

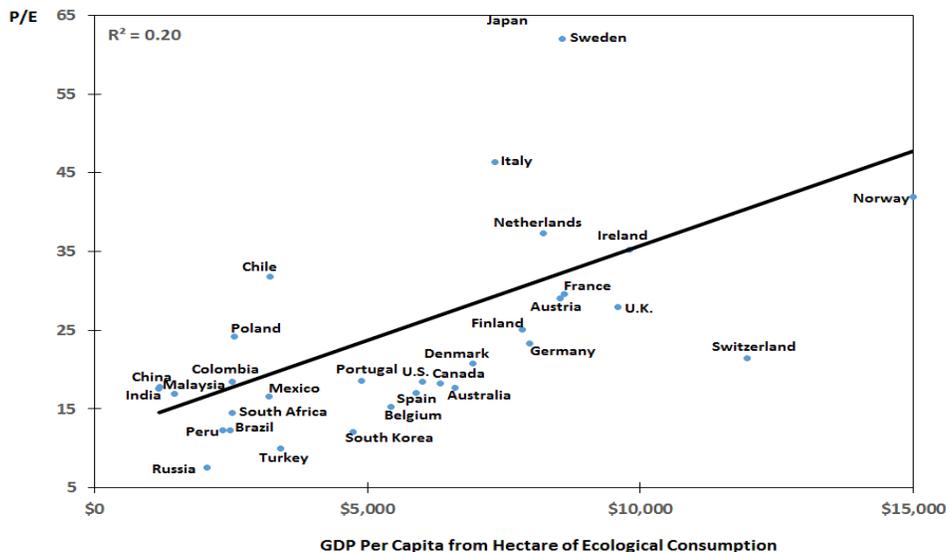


Source: Global Footprint Network

¹⁴ <http://www.footprintnetwork.org>

In order to compare individual countries, the Ecological Footprint per person is calculated i.e., global hectares per person. This measure of *consumption* of ecosystem services can then be compared to the amount of wealth *generated* within a country. In Figure 9, the horizontal (x) axis shows for 32 countries the amount of *GDP per capita generated by each hectare of ecosystem services consumed per person*.

Figure 9: Country P/E vs. GDP Per Capita from Hectare of Ecological Consumption



Source: Bloomberg, Global Footprint Network

The vertical (y) axis in Figure 9 plots the average Price-to-Earnings multiples of the 32 countries over a fifteen year period. As the R-squared of 0.20 indicates, there is a *reasonably robust relationship between the two variables*. This suggests that a country that is quite efficient in transforming flows of ecosystem services into wealth is “rewarded” with a relatively high P/E multiple e.g., the Netherlands. Conversely, a country that is resource rich — such as Russia — but that is inefficient in transforming its natural resources into wealth is assigned a relatively low P/E multiple.

The Value of *Intangible Capital* versus *Natural Capital*

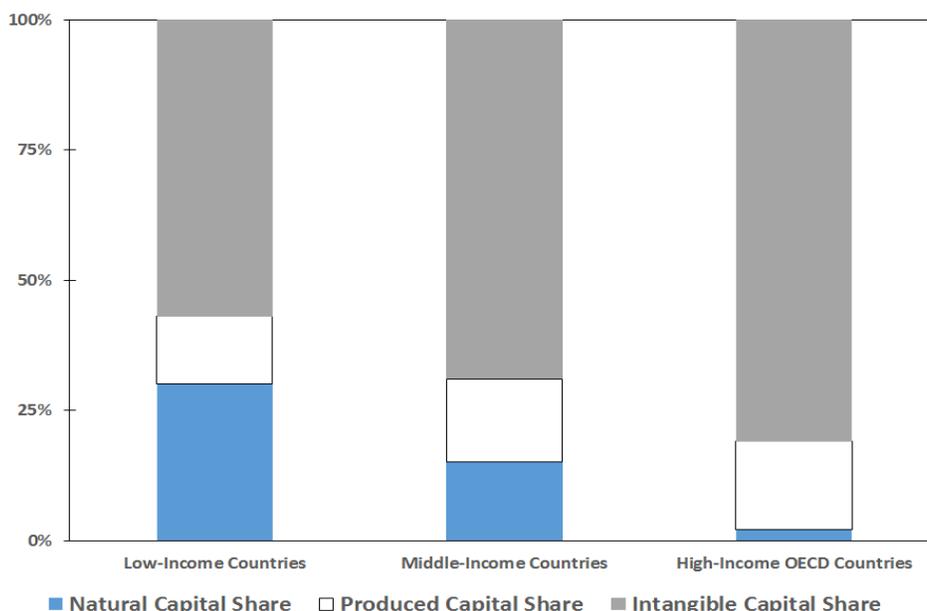
Why are some countries better at transforming natural resources into wealth than others? To answer that question, it’s helpful to reference a framework developed by economists whereby *total national wealth* is the sum of produced capital, natural capital and intangible capital.

- *Produced capital*: Machinery, structures, and equipment, etc.
- *Natural capital*: Agricultural land, protected areas, forests, minerals, and energy, etc.
- *Intangible capital*: This includes measures of human, social, and institutional capital, the latter being factors such as the rule of law that contribute to an efficient economy.

Given this framework, an economist¹⁵ summarized the prevailing view that:

- The share of natural capital in total wealth is much higher in poorer countries while *the share of intangible capital in total wealth is substantially higher in richer economies* [Figure 10]...The results confirm what we know from the literature on economic growth that *intangible capital is the main engine of growth and wealth*.

Figure 10: Natural, Produced and Intangible Capital as a Percentage of Total Wealth



Source: World Bank

With regard to the mechanics of this engine of growth and wealth, the World Bank¹⁶ observed that:

- Growth of intangible capital is due partly to increased educational attainment in most countries, but a significant part of the increase in intangible capital results from improvements in institutions, *governance*, and other factors that contribute to better, more efficient use of all of a country's capital — produced, natural, and human [italics added].

In conclusion, the efficiency with which natural resources are transformed into wealth is important to a country's valuation primarily because it is *an indicator of the social and institutional development of the country*. Similarly, in our September 15, 2014 report, [Gauging Governance Globally: Macro and Micro Metrics](#), we identified a *positive* relationship between a country's equity valuation and the *quality of governance* at the national and corporate levels [R-squared of 0.16]. While there is some overlap in the two findings, we are confident in stating that the environmental and governance factors we have analyzed are *both* material to a country's valuation.

¹⁵ "Natural Resources: Curse or Blessing?" *Journal of Economic Literature*, Frederick van der Ploeg, June 2011

¹⁶ "The Changing Wealth of Nations: Measuring Sustainable Development in the New Millennium," World Bank, 2011

The Cornerstone Capital Regional Strategy Model

When we introduced the Cornerstone Capital regional strategy model in the April 2014 edition of [The Cornerstone Journal of Sustainable Finance & Banking](#), we wrote:

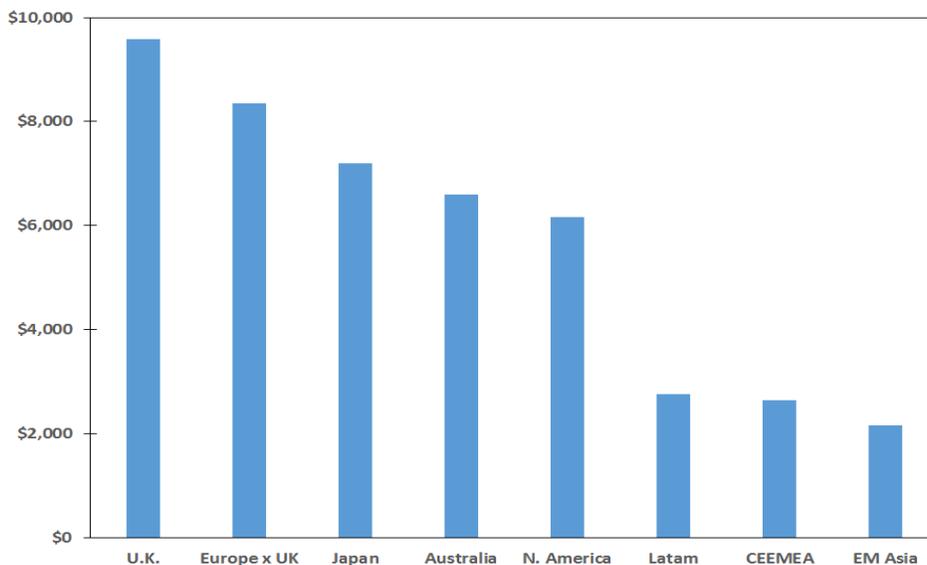
- We start with the assumption that only two things ultimately determine the fair value of equities: earnings and P/E. In the short term, other factors may play a role — e.g., sentiment (“fear” or “greed”), politics (including geopolitical issues), macroeconomic variables (e.g., Central Bank tightening or easing) etc. — but, in the long run, we believe it all comes down to earnings and the valuation of those earnings. A number of factors drive valuation multiples at any point in time, including perceptions of corporate governance.

We introduced our *sector* model in the May 2014 edition of [The Cornerstone Journal of Sustainable Finance & Banking](#) with our focus being on the ten GICS in the MSCI All Country World Index (ACWI). We emphasized (as we did with the regional model) that:

- This is a dynamic model, with factors and factor weightings reviewed on a regular basis for relevance.

In the *first* iteration of the *regional* model, valuation and earnings were equally weighted, with governance representing 10-15% of the *valuation* weight. We are now allocating 10% of the regional valuation weight to governance factors *and* 10% to the environmental factors discussed above (with *each* of these factors now having about a 5% weighting in the regional model overall). So, for example, Figure 11 illustrates that GDP per capita from each hectare of ecological consumption is relatively high in the U.K. and, on average, is relatively low in the Emerging Asia region.

Figure 11: Average GDP Per Capita from Hectare of Ecological Consumption



Source: Cornerstone Capital Inc.

While there is currently no material change in regional rankings, the new “environmental valuation” metric refines our regional strategy by explicitly incorporating factors that are oftentimes overlooked by traditional financial analysis.

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