

2003

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### Recommended Citation

Power, T. NNP “Nowhere Near Perfect”. Dublin, Property valuer, 2003. doi:10.21427/8n58-pe80

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## NNP “Nowhere Near Perfect”

**Key words:** Net National Product, Pigovian taxes, shadow prices, quality of life, economic welfare

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*The aim of this essay is to examine two views and conclusions on the now commonly recognised inadequacies of Net National Product as an indicator of aggregate national well-being. It outlines Dasgupta’s simplified model of the effect of environmental losses on NNP and reviews Douthwaite’s treatment of NNP.*

### **PREFACE:**

A consensus now exists among economists that NNP as a measure of the real well-being of a nation has major deficiencies. Attempts have been made to model all-embracing solutions to overcome these deficiencies. The greatest hurdle involved in factoring social elements into a measurement of aggregate welfare is the difficulty of quantifying such elements. The Pigouvian approach of including only cash measurable items is seen as no longer sufficient.

Side-by-side with this quantitative difficulty there exists a qualitative reservation associated with any efforts at a solution. Perception of happiness may be relative, we may feel the need to keep up with (or ahead of) the "Jones". No doubt a valid scientific solution will be found in the future. In the meantime, I merely review the attempts to date including a broad theoretical treatment by Dasgupta which does not even attempt to address the complexities of quantity/quality inherent in welfare costs.

Note: Douthwaite uses GNP as his target for attack. I will use NNP (which is merely GNP with distortions factored out) as our benchmark in order that the points of comparison and contrast between the two authors may more easily be noted.

### **Dasgupta on NNP.**

Dasgupta asserts that while in principle there exists a set of accounting (or shadow) prices which, if used in estimating NNP, will reflect aggregate well-being. In practice NNP is biased because the prices used in valuing certain categories differ from their accounting prices. This is demonstrably so in the treatment of natural resources. These are not included in NNP i.e. their values are set to "zero" when in fact their accounting prices are positive. The result is that NNP is overestimated. The rate of growth is consequentially overestimated. The suggested remedy is to deduct depreciation of a country's resource stocks, valued at their accounting (social) prices from its conventional NNP. This 'adjusted NNP' should more accurately reflect economic performance.

Dasgupta uses models to show how even apparently insignificant percentages of NNP attributable to environmental losses, can significantly affect our assessment of how the economy is performing.

### MODEL 1:

Let  $Y(t)$  = Per capita "conventional" NNP in any year "t"

Let  $D(t)$  = Depreciation of environmental resources in any year "t"

Take two success years "1" and "2". Then  $Y(1)$ ,  $Y(2)$  and  $D(1)$ ,  $D(2)$  represent the relevant NNPs and depreciations.

Let  $D(1) = 1\%$  of  $Y(1)$  (a negligible amount!)

Then,  $D(1) = .01Y(1)$

Let growth between year 1 and year 2 be  $2\%$  (a good performance!).

Then  $\{Y(2) - Y(1)\} = .02$  and  $Y(2) = 1.02Y(1)$

Assume a rise in environmental losses of two points i.e. depreciation in year 2 is  $3\%$  of NNP in year 1.

Then  $D(2)/Y(1) = .03$  and  $D(2) = .03Y(1)$

Growth under the "adjusted" NNP is given by

$$\frac{\{NNP(2) - Depreciation(2)\} - \{NNP(1) - Depreciation(1)\}}{\{NNP(1) - Depreciation(1)\}}$$

i.e.  $\frac{\{Y(2) - D(2)\} - \{Y(1) - D(1)\}}{\{Y(1) - D(1)\}}$

Converting all variables to  $Y(1)$  we get as numerator

$$\begin{aligned} & \{[1.02Y(1) - .03Y(1)] - [Y(1) - .01Y(1)]\} \\ & = .99Y(1) - .99Y(1) \\ & = \text{ZERO} \end{aligned}$$

Thus the introduction of insignificant environmental losses into our NNP estimates has produced a zero-growth economy as compared to a 2% growth in our conventionally measured economy.

The position is further complicated when it is realised that many natural resources have a double effect on welfare, as stocks and service flows. An example is tropical forests which give a service flow (timber for consumption) and a direct stock-related welfare benefit (prevention of soil erosion and recycling of carbon dioxide).

If we ignore the direct well being effects of the stock of natural resources we overestimate even the "adjusted" NNP, explained above!

## MODEL 2:

Let  $Y(t)$  = aggregate well being at time "t"

Let  $C(t)$  = flow of consumption at time "t"

Let  $S(t)$  = stock of resources at time "t"

Let  $U[C(t), S(t)]$  = flow of aggregate well being at time "t"

Then:

$$Y(t) = C(t) + dS(t)/dt \text{ (instantaneous rate of change of resource stock at "t")} + \{U_s/U_t\}S(t)$$

Note:

$U_s$  = marginal aggregate well being of resource stock

$U_c$  = marginal aggregate well being of consumption flow

$C(t) + dS(t)/dt$  is equivalent to our "adjusted" NNP of MODEL 1. This leaves the third term on the right to be considered.  $U_s$  (and thus the whole term) will be positive if the stock is beneficial (as with the stock of ozone layer).  $U_s$  (and thus the whole term) will be negative if the stock is detrimental (as with pollution). Thus ignoring the effects of environmental degradation in our estimation of aggregate well being leads to a further overestimation.

As the ultimate goal of investment is the maximisation of NNP at any time "t", the foregoing model suggests that environmental resources need to be factored into any policy decisions on investment. Effectively this means discounting of environmental resources.

Both the conventional treatment of environmental assets as "valueless" and the traditional Green view of "priceless" (or Douthwaite's "infinite" value) assets preclude discounting.

While Dasgupta's models are very broad expositions (not dealing for instance, with the complexities of actual valuation of environmental factors) they do nevertheless, support the view that NNP as conventionally estimated, is a very poor indicator of well being or as Douthwaite would like it "quality of life".

### **Douthwaite on NNP.**

The general use and acceptance of NNP as a measure of national well being causes confusion. While NNP (and its corollary, growth rate) continues to be used as a universal public yardstick, private perception will be of "things getting better" which may be far from true. Douthwaite argues that while "standard-of-living" indices may go up it does not necessarily follow that the "quality-of-life" has improved. As "standard-of-living" is a technical term meaning "the per capita rate of consumption of purchased goods and services" it tells us very little about "quality-of-life" the more so because due to the insidious demands of growth a proportion of such per capita consumption is involuntary. He quotes a tentative finding of Nordhaus and Tobin ["Economic Growth" (1972)] in support of this - "A consumer's wants can be influenced by the producer - it may be that productivity does no more than satisfy the wants which it generates" (for example by way of advertising).

The reason NNP tells us very little about "quality-of-life" is because economic values (which are the sole input to NNP) do not constitute a very significant proportion of the factors which the individual uses to measure his total well being. According to the findings of a British Social Science Research Council (BSSRC) survey in the early seventies, consumption was merely one of many contributory factors to perception of "quality-of-life". Over 71% of replies in fact had little or nothing to do directly with cash, i.e. such things as "family and home life", "general contentment", "social values".

NNP (or "standard-of-living") only includes those social values which according to Pigou (1920), can be measured in cash terms i.e. "economic welfare". This classic approach was based on the assumption that if NNP were distributed on the same basis from year-to-year, ("Providing the dividend accruing to the poor is not diminished, increases in the size of the aggregate national dividend, must involve increases in

Economic welfare" - Pigou), then the amount of national welfare would be proportional to the size of the national income. Economists in their pursuit of a pseudo-scientific approach have forgotten Pigou's qualification on distribution according to Douthwaite. Even as a measure of Economic welfare therefore, NNP is suspect.

What then of its efficacy as a measure of "quality-of-life" which precisely encompasses all the elements of real national well being?

Even if NNP were hugely corrected to take account of such things as depletion of natural resources, exports (which are not consumed inside a country) and capital imports (which are not consumed but are used to increase a country's productive potential), the stripped-down figure would merely represent a "rag-bag" of disparate goods, some of benefit (food), others actually harmful (pornography?). This melange would include a high proportion of the involuntary consumptions referred to above. Furthermore, there is evidence that involuntary expenditure increases with growth. As a consequence, consumers find it more difficult to attain the level of frugality that was possible before NNP grew. This frugality is a necessary ingredient in any recipe which contributes to "quality-of-life". So not only does NNP not adequately reflect "quality-of-life", it is (in its manifestation as a growth-definer) the cause of a deterioration in the "quality-of-life".

Douthwaite reviews two attempts to measure economic welfare in a more scientific way. Nordhaus and Tobin's (1972) "measure of economic welfare" (MEW) and an index by Herman Daly and John Cobb (1990) in "For the Common Good".

MEW:

This index eliminated from GNP (1929 - 1965) everything that the public did not actually consume. Non-discretionary expenditure such as travel to work, security services road maintenance etc., health and education were treated as capital stock and adjustments were made to reflect such items as the disadvantage of living in cities and the benefits provided by capital stock such as leisure. Comparisons were then made between growth in per capita GNP and in per capita MEW for the years mentioned above and found that while GNP grew at 1.7% per annum over the period MEW grew by 1.1%. An apparently satisfactory result for the proponents of GNP as an indicator of economic performance.

Daly & Cobb:

The close correlation between GNP and MEW growth did not withstand scrutiny when shorter time frames were examined. The following table sets out the findings of Daly et al:

Time Frame	Per Capita GNP Growth	Per Capita MEW-Growth
1935-1945	90%	13%
1947-1965	48%	7.5%

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Conclusion: "With their own figures Nordhaus and Tobin have shed doubt on the thesis that national income accounts serve as a good proxy measure of economic welfare".

Daly and Cobb attempted their own index allowing for the destruction of natural resources and more realistic estimates of pollution damage. They dropped education and health ("human capital") from the capital and flow of benefits figures. Leisure was also dropped from flow of benefits figures. While the results are superior to those of Nordhaus and Tobin, their own qualifications are significant. They admit that some quantities have been estimated which are inherently unmeasurable and they are not happy that their "calculus of economic well being" does not take into account the "relativity of happiness" i.e. the fact that we often use other people's happiness as the yardstick to decide whether we are happy. (The "Jones" syndrome).

Douthwaite concludes that NNP has no necessary relation to the "quality-of-life". Because of its knock-on effects (pollution, involuntary consumption, income distribution) it is impossible to state from first principles whether growth in NNP is even a good thing!

### **SUMMARY:**

While there is no fundamental difference between them regarding the insufficiency of NNP as an instrument by which national welfare may be measured, Dasgupta and Douthwaite exhibit diametrically opposing philosophies in their consideration of the problem. Dasgupta's is a pragmatic approach, attempting to deal with the shortcomings of the conventional measurements in a scientific way. Douthwaite, on

the other hand, adopts an ideological stance. He would "throw out the baby with the bath water".

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