Scaling national intangible capital NIC indexes

OR

IMPORTANCE OF ACCURACY

Motto

It takes something more than the usual

"willing suspension of disbelief"

to talk seriously of the aggregate production function.

Robert Solow
Technical Change and
the Aggregate Production Function
1957

Ranking vs Effect of NIC drivers

Scaling NIC drivers involves the question, wether the reference is per capita, per employed or per GDP etc.?

We will demonstrate that effects of NIC and underlying NIC drivers are utterly sensitive to scaling. Our research clearly indicates that in general

- Where the ranking remains the same the effect however either *improves* or *declines*.

In addition:

- In several cases where the ranking *improves* (*declines*) the effect de facto *decline* (*improve*).
- In several cases where the ranking seemingly is unchanged the effect de facto *significantly* improves or declines.

Scaling NIC drivers / per capita vs employed

Should we scale and measure a nations "FTE Researchers" by per capita or per employed?

Total R&D personnel nationwide per capita							
	Original		per Cap to per Emp	per Emp adjusted		Change	
	Value	Rank	Ratio	Value	Rank	Rank	Effect %
Denmark	8,24	4	1,98	7,66	4	0	-15,29
Finland	10,65	1	2,19	10,95	1	0	8,07
Iceland	9,97	2	1,82	8,51	2	0	-38,73
Norway	6,65	7	1,96	6,13	10	-3	-13,83
Sweden	8,29	3	2,06	8,00	3	0	-7,51
Germany	5,95	11	2,09	5,82	12	-1	-3,31
US	n/a	n/a	2,11	n/a	n/a	n/a	n/a
China	1,11	34	1,73	0,90	37	-3	-5,54
India	0,33	41	2,77	0,43	41	0	2,61

Note	Rank calculated out of 45 countries

Scaling NIC drivers / per capita vs cohort

Should we scale and measure a nations "Expenditure on education as % of GDP" by acknowledging the "Cohort of people under 15"?.

Expenditure of Education, % of GDP							
	Original		Cohort 0-15 yrs % of Pop	Cohort adjusted		Change	
	Value	Rank		Value	Rank	Rank	Effect %
Denmark	8,09	2	18,60	8,43	1	1	6,88
Finland	6,23	9	17,35	6,97	9	0	14,70
Iceland	7,18	4	21,80	6,38	12	-8	-15,93
Norway	6,06	12	19,57	6,01	15	-3	-1,12
Sweden	7,37	3	17,38	8,22	2	1	17,11
Germany	4,23	31	14,39	5,70	20	11	29,49
US	6,68	6	20,52	6,31	13	-7	-7,40
China	2,83	46	18,99	2,89	39	7	1,18
India	3,42	44	32,82	2,02	46	-2	-28,06

Note   Rank calculated out of 48 countries

Scaling NIC drivers / per capita vs resource

Should we scale and measure an nations "Patents per year" by acknowledging per capita or per R&D resources?

Scaling NIC drivers / per capita vs DGP

Or … Should we scale and measure an nations "Patents per year" by acknowledging per capita or per GDP?

According to our research NIC drivers generaly correlate negatively to a nations rural proportion and positively to its urban proportion. Should e.g. a nations Renewal Capital RC be aggregated acknowledging its metropol-urban-rural structure?

Renewal Capital RC / Trend 2011

	Original RC 2011 Trend		Mertop % of Pop	Enhancing via urbanization		Change	
	Value	Rank		Value	Rank	Rank	Effect %
Denmark	6,97	6	26,20	6,97	7	-1	0,01
Finland	7,60	2	21,06	7,27	4	-2	-14,03
Iceland	5,61	16	40,88	5,77	17	-1	6,77
Norway	6,09	11	30,86	6,04	13	-2	-2,12
Sweden	7,43	3	22,66	7,37	3	0	-2,58
Germany	6,45	8	28,20	6,35	10	-2	-4,18
US	7,12	5	61,50	7,42	2	3	13,07
China	3,23	37	19,00	3,01	40	-3	-9,17
India	3,61	31	14,29	3,24	34	-3	-16,05
Note	Rank calculated out of 48 countries						

Aggregating NIC drivers / capitalizing over time

Effects of investments in e.g. human capital via education materializes (and enter the labor markets) with a time lag — at least to some extent with a time lag. To measure effective NIC: Should we capitalize NIC and NIC drivers giving earlier indicator values a higher weight when expressing todays situation?

NIC Human Capital HC 2010

	Original HC 2010			Capitalizing 2001 - 10		Change	
	Value	Rank		Value	Rank	Rank	Effect %
Denmark	8,76	1		8,70	4	-3	-2,34
Finland	8,65	3		8,95	1	2	11,97
Iceland	8,72	2		8,81	2	0	3,60
Norway	8,50	4		8,56	9	-5	2,12
Sweden	8,46	7		8,80	3	4	13,48
Germany	7,95	20		7,88	19	1	-3,03
US	8,50	5		8,56	8	-3	2,45
China	6,13	44		5,72	47	-3	-16,69
India	5,60	48		5,54	48	0	-2,25

Note	Rank calculated out of 48 countries
	Only composite, aggregated HC capitalized

Two conclusions

The previous examples has two consequences:

1. From the point of view of NIC *effects* focusing on rankings is simply misleading and wrong. Rankings may improve while real effects decline and vice versa. Likewise the ranking says nothing of the effect of that ranking level.

2. When *augmenting* the production function, e.g. when NIC indexes are incorporated into the production function, conceptual accuracy is of the essence.