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Working Paper: Redefining the Economical Power of Nations

Kiss, Christian

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Working Paper: Redefining the Economical Power of Nations

Working paper
Economics/ Macroeconomics/ Econometrics/ Statistics

Author: Christian Kiss
For a new horizon and a clearer picture



Picture from: <http://therealityinstitute.net/wp-content/uploads/2012/02/greetings-from-reality.jpg>

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Abstract

The measurement of economies no longer by GDP alone, but by an Index that includes other important factors as well, a *Social factors relativized GDP*.

Social factors relativized GDP: $GDP - GDP \times GINI = K_Index$

Written differently: $(1 - GINI) \times GDP = K_Index$

Inflation indexed Version: $(1 - GINI - Inflation) \times GDP = K_Index_Infl.$

Productivity Index: $K_Index / Labor\ Force = K_PROD$

Inflation indexed Productivity Index: $K_Index_Infl. / Labor\ Force = K_PROD_Infl.$

Debt-to-K_Index: $National\ debt / K_Index = K_Debt$

Debt-to-K_Index_Infl: $National\ debt / K_Index_Infl. = K_Debt_Infl.$

1 The Problem

Economists all around the world, from Stiglitz to less well-known people, were looking for a way to deal with the weaknesses of the GDP. These efforts went so far, that many considered replacing it with alternatives like the Gross National Happiness¹. In my Bachelor study of Economics, I thought about this problem and invented the K_Index. This Index relativizes the GDP with the famed GINI coefficient. In later studies, I refined it further with the factor of Inflation and diversified it with productivity and debt-ratio variants.

How did the nations develop, when you include two simple and widely acknowledged factors (GINI and inflation) in the GDP, and use this new index as a basis for some further clarifying measurements?

The scientific gain is a clearer picture and more adequate ranking of the economies. This works also ex-post recalculating the recent years, or decades, and therefore showing the rise and fall of economies resetting some rankings without too many statistical problems.

¹ Especially in the recent economical crisis

2 The Index and its Versions

2.1 GDP - GDP x GINI

$$(1 - \text{GINI}) \times \text{GDP} = \text{K_Index}^2$$

This was the original invention from my early days in my Bachelor course. The GINI-coefficient is a highly aggregated statistical measure for income inequality. In short, the incomes of a Nation are put in relation with an absolutely even distribution of all incomes. Figure underneath.

Why would you want to mix this coefficient into the “holy” GDP?

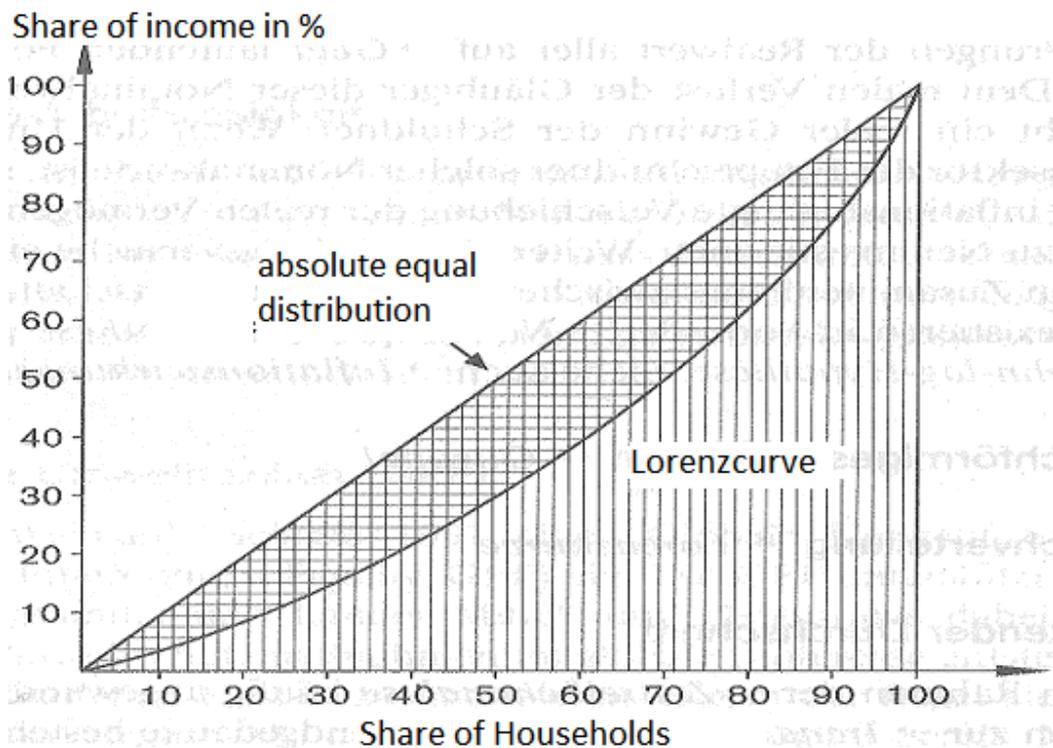


Figure 1 The GINI³

Economists tend to view those Economies as healthier, which have a population and workforce that actually can afford things (goods and services). In its extremes, it is also

² Its K because of the beginning of my last name, call me arrogant ;D but it seemed reasonable in the working process, later I simply kept it

³ Hohlstein, Michael (2003): Lexikon der Volkswirtschaft, p.317

known as domestic demand driven economy. Of course, import and export plays also a big role in this, the balance of these two factors is important for long-term stability.

Economies that are simply exporting raw materials have also a high GDP very often, but their people are poor, cannot afford goods or services, while an often corrupt elite finds ways to cut its share off the exports. The country gets looted, very few get very rich, but the people generally are chanceless and miserable.

When it comes to GDP, both nations are equal.

The simple introduction of this additional factor GINI coefficient ranks the less developed nation a lot lower, and the developed nation only a little bit lower, depends on how well the income is distributed. Period. End of story? Not quite yet.

2.2 GDP – [(GDP x GINI) + (GDP x Inflation)]

$(1 - \text{GINI} - \text{Inflation nominal}) \times \text{GDP} = \text{K_Index_Infl.}$

It seemed a good approach to relativize less healthy economies⁴ with the income distribution. But there are further pressures on the economy that could also help rate economies clearer. One of these pressures is Inflation.

It's viewed by the "tiny homo Oeconomicus" (the individual) as "everything got so expensive" or as "why is so much month left over at the end of the paycheck, it was enough earlier..." or "...what? Grandpa? Cinema for 50 cents in 1950?". For the "large homo Oeconomicus" (the Investors, Companies) it means the investment made doesn't pay off anymore, the profit is eaten up by inflation, or the savings need an investment method *at least* above this inflation level. For the "supersized homo Oeconomicus" (the States) it means on one hand cheaper exports, and on the other hand more expensive imports. So it depends if you have a balanced trade budget⁵, or if you are an export

⁴ If the complete economy relies on exporting oil or ore, the whole nation becomes *very* dependant on pricing and vulnerable to external shocks. Reagan pressured the Soviet Union with lowering the oil price, and while the oil price was high in the 70s, the Soviets invaded Afghanistan, while- what a surprise?- once the oil price was down in the 80s, they had to retreat. The complete raw materials exports of the whole empire basically barely topped the years earning of just one of many American multi nationals (like GE) at the time.

⁵ Italy for instance

driven nation⁶, or if you are an importer (for instance of energy), the effects mean something good or bad to you⁷. Generally, inflation is *not* good for the most.

Including the factor of inflation in the relativization of the GDP was therefore a good idea to downgrade nations that undermine the spending power/buying power of its people or gambles with its fiscal stability, while ranking those that act responsibly above the irresponsible. However, the relativization is a lot less grave than the relativization over the GINI, it should serve as the pinnacle in tight rankings.

Now we have a beautiful way to measure the nations with a more realistic view of the economy. I admit it, I just single handedly destroyed the beauty of GDP –GDP x GINI with the technical and quirky additional inflation relativization. However there are variants doable, and as a German proverb goes: nothing is as good that it cant be enhanced a little bit further, so lets not stop here⁸, and check some variants.

2.3 GDP_per_capita, and GNP variants

$(1 - \text{GINI}) \times \text{GDP_per_capita}$

$(1 - \text{GINI} - \text{Inflation nominal}) \times \text{GDP_per_capita}$

$(1 - \text{GINI}) \times \text{GNP}$

$(1 - \text{GINI}) \times \text{GNP_per_capita}$

The advantage of this formula construction is it works with anything. GDP_per_capita, and as my old Professor⁹ (from the Bachelor Thesis long ago) suggested, Gross National Product GNP¹⁰ (or better GNP_per_capita). The advantage of the GNP would be that it removes the inflation already, but I simply do not like the balance sheet adjustments of the import/export calculations. (All nationals abroad are counted in, but all people within the state borders that are foreign nationals are counted out etc.). This would transform the K_Index to an *income distribution index*, away from a *reality adjusted national economic power index*. I did gently reject it, but it sure deserves a mentioning here. Let's enhance it all further and have a look at productivity when we apply this K_Index.

⁶ Japans famed Abenomics devalued the Japanese currency Yen to make the exports cheaper and to leave a decade long stagnation over export surpluses.

⁷ The mechanism of artificially downgrading the currency to make the nation and its products cheaper is important for "staying in the game" of export, attract investments etc. There are furthermore anticipation games, when all expect things to get cheaper tomorrow you don't spend today, but when you know its more expensive tomorrow and the savings are less valuable then you're likely to invest today.

⁸ The German proverb goes: the better is the enemy of the good

⁹ Prof. Dr. Enke, who I would love to thank for the support and encouraging me to pursue this Index further

¹⁰ In German it's the BNE = Bruttonationaleinkommen

2.4 Productivity Index (K_Index_Infl. / Labor Force)

$$K_Index / Labor\ Force = K_PROD$$

$$K_Index_Infl. / Labor\ Force = K_PROD_Infl.$$

Each economy is in a different state of development. The less developed an economy is, the less value the working force creates per work hour or per worker. A lower developed economy that has half of its labor force in agriculture, and barely earns a proper GDP is not equal to an economy where the same workers create turbines in the same work time.

When the K_Index is applied as the basis of this input-output question, the productivity is also more realistically adjusted than the classical GDP based productivity index, since less developed economies tend to have a higher GINI coefficient. A nation that exports oil or ore, has almost no workers in that industry, but gets over the high GDP a good productivity Index. This does not reflect realistically the situation of the country. Poor people watching a pipeline aside their village until they become terrorists or sabotage it to get some fuel, *is not valid productivity* (in economical sense).

2.5 Debt ratios K_Debt or K_Debt_Infl.

$$\text{National Debt} / K_Index = K_Debt$$

$$\text{National Debt} / K_Index_Infl. = K_Debt_Infl.$$

The Debt-to-GDP ratios are very common in economics. Using these K_Index and K_Index_Infl. values as basis for a debt-ratio makes sense only to a certain point, namely when there is an interest in a *broader scope about the economy*, and therefore in more than the *strict financial ability* of a nation to pay its debts. Early warning systems that analyze the development path of nations might get sooner warning signs with the K_Index_Infl. than with debt-to-GDP ratios alone. All values are of course higher percentages than classical debt-to-GDP numbers, since K_Index and K_Index_Infl. generally lowers the GDP values.

2.6 Useful digression: Four- or Five-Sector-Model

X-raying the *sectoral structure* of economies helps further to clarify the picture. Usually the economy is segmented in three sectors with the “three sector hypothesis”. Primary, Secondary and Tertiary Sector. Economies tend to grow towards the third sector, the higher developed the economy is.

Table 1 Three sector hypothesis

Sector I	Extraction of raw materials + fishing (developed Nation 1-5%/ undeveloped 50% or more)
Sector II	Industry, manufacturing, construction (developed Nation 20 to 30%/ undeveloped 20%)
Sector III	Services (developed Nation 50% or more/ undeveloped 10%)

Table 2 Modified three sector hypothesis with two additional sectors and readjusted third sector

Sector I	Extraction of raw materials + fishing
Sector II	Industry, manufacturing, construction
Sector III	Services + I.T. (with communications industry)
Sector IV	State sector and Nonprofit (Govt. Jobs, churches, red cross etc.)
Sector V (option)	Shadow economy (problem to get correct numbers, usually 15-20%)

The modified sector model removes the distortions from Government overheads or non-profit economy sizes. If the numbers about the shadow economies are credible or available at all, helps also to judge countries more adequately (especially those that have a problem with good-governance). Aging population in mind shows also a possible usefulness of this model¹¹.

3 Examples

3.1 Example *K_Index* and *K_Index_Infl.*

Country **A** and Country **B** have a GDP of 2.5 Trillion Euro each.

Country A (Less developed):

Gini	0.40
Inflation	7% = 0.07 nominal
Relativization	0.47
GDP	2,500,000,000,000 Euro
Labor Force	42,000,000

$$\begin{aligned}
 K_Index \text{ (without Inflation): } & (1 - 0.4) \times 2,500,000,000,000 = 1,500,000,000,000 \\
 K_Index_Infl. : & (1 - 0.4 - 0.07) \times 2,500,000,000,000 = \mathbf{1,325,000,000,000}
 \end{aligned}$$

¹¹ Analyzing the Greek economy or the German economy over this model could be interesting.

Country B: (Higher developed)

Gini	0.28
Inflation	2% = 0.02 nominal
Relativization	0.3
BIP	2,500,000,000,000 Euro
Labor Force	42,000,000

$$K_Index \text{ (without Inflation): } (1 - 0.28) \times 2,500,000,000,000 = 1,800,000,000,000$$

$$K_Index_Infl. : (1 - 0.28 - 0.02) \times 2,500,000,000,000 = \mathbf{1,725,000,000,000}$$

Comparison of the results:

Even if both nations have a similar GDP, the picture looks very different when only two further factors are included (Gini and Inflation). The difference between K_Index and $K_Index_Infl.$ is small, but will be important in tight rankings.

$$\text{Country A (less developed) relativized GDP} : \mathbf{1,325,000,000,000}$$

$$\text{Country B (higher developed) relativized GDP} : \mathbf{1,725,000,000,000}$$

3.2 Example Productivity K_PROD or $K_PROD_Infl.$

$$K_Index / \text{Labor Force} = K_PROD$$

$$K_Index_Infl. / \text{Labor Force} = K_PROD_Infl.$$

Productivity county A (with inflation)

$$K_PROD_Infl. = 1,325,000,000,000 \text{ Euro} / 42,000,000 = \mathbf{31,547} \text{ Euro per capita}$$

Productivity country B (with inflation)

$$K_PROD_Infl. = 1,725,000,000,000 \text{ Euro} / 42,000,000 = \mathbf{41,071} \text{ Euro per capita}$$

Productivity country USA level (with inflation)

$$(1 - 0.49 - 0.032) \times 11.363 \text{ Trillion Euro} = K_Index_Infl. = 5.431 \text{ Trillion Euro}$$

$$5.431 \text{ Trillion Euro} / 142\text{m Labor Force} = K_PROD_Infl. = \mathbf{38,250} \text{ Euro per capita}$$

Productivity country China level (with inflation)

$$(1 - 0.47 - 0.054) \times 6.23 \text{ Trillion Euro} = K_Index_Infl. = 2.965 \text{ Trillion Euro}$$

$$2.965 \text{ Trillion Euro} / 802\text{m Labor Force} = K_PROD_Infl. = \mathbf{3,697} \text{ Euro per capita}$$

The new numbers of productivity are generally lower, but the productivity of the less developed economies with a high inequality is now more realistic.

4 Criticism

Does it matter how realistically you relativize the GDP downwards, and how adequate the new picture is, when all that matters is the de-facto nominal GDP (and therefore spending power) that's been generated?

Does it matter when you downgrade a raw materials exporting economy, when all that counts is the nominal cash the economy generates, i.e. *the ability to pay off its debts*? A debt-to-K_Index_Infl. ratio will always be worse (higher) than the classical debt-to-GDP ratio. How relevant can the Index therefore be, when used to measure debt ratios? A sinking K_Index_Infl. (maybe due to worsening GINI or Inflation) just warns the economists sooner about internal problems in the economy/ society (that might or might not be addressed/quelled).

As for the GINI coefficient, a lower GINI coefficient means only a more equal income distribution, but it says nothing about the *level* of income. When all are equally poor, the GINI is low. This however would only be likely in a low GDP nation, a high GDP with a good income distribution is a very good sign in contrary.

As for the productivity Index K_PROD or K_PROD_Infl., a lowered GINI coefficient (inequality gets better) is *technically not a productivity increase*, the same with a lowered Inflation rate. On the other hand, the classical productivity index is also "just a theoretical value", which includes distortions from the famed upper 10% of income and GDP.

A professor¹² mentioned once that not all nations might see inequality as a bad thing. I agree that for instance Calvinistic societies¹³ might tolerate inequality more than European economies, but the general acceptance of the GINI coefficient makes this worry irrelevant in my opinion. The formula uses the GINI and a high GINI value is commonly acknowledged as a not overly positive thing.

Is a relativization for instance of 1 Trillion in a 2.5 Trillion economy with high GINI, and a relativization of 700 Billion in a similar sized economy with a good GINI overkill-downgrading? (That's a relativization of 28-40% depends on whether the GINI is 0.28 or 0.40). I think it's perfectly elegant with the right aggregated value, due to the countless problems inequality creates¹⁴. Almost every developed country spends about 30-35% on social matters (which often tries to deal with inequality problems).

¹² Prof. Dr. Hayo from University Marburg

¹³ USA/ UK and Anglo-American influenced

¹⁴ From long-term economic development, to social stability to spending power and its effects on trade

5 Conclusion

A social factors relativized GDP is the basis for a variety of *more realistic economical indicators*¹⁵, including productivity and debt-ratios. Countries with a bad income distribution and a high inflation rate are downgraded strongly, while countries with a good GINI coefficient and a low inflation are relativized downward only by a small margin. The now more realistic picture to differentiate nations with a similar GDP can help to identify problems and instabilities sooner.

It repairs some of the weaknesses of the classical GDP as well while relying on established methods of measurement. The K_Index or K_Index_Infl. cannot be questioned by its coherent logical construction¹⁶, or by the widely acknowledged factors used in the formula, only by its relevance when used in debt-ratios (where only the *nominal* financial credit generated counts).

¹⁵ Scientific gain

¹⁶ Its mathematical beauty in simplicity neither

6 References

Well it's a working paper about my invention, which is almost self-explaining. So not much here this time.

Hohlstein M. (2003): Lexikon der Volkswirtschaft, 2. Auflage, DTV Verlag München, 2003, ISBN 3-423-05898-6

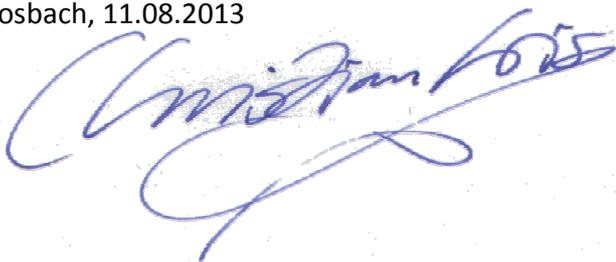
7 Ehrenwörtliche Erklärung (German declaration)

Ich erkläre hiermit ehrenwörtlich:

- dass ich dieses working paper selbstständig und ohne fremde Hilfe angefertigt habe
- dass ich die Übernahme wörtlicher Zitate aus der Literatur sowie die Verwendung der Gedanken anderer Autoren an den entsprechenden Stellen innerhalb der Arbeit gekennzeichnet habe.

Ich bin mir im Weiteren darüber im Klaren, daß die Unrichtigkeit dieser Erklärung zur Folge haben kann, dass ich von der Ableistung weiterer Prüfungsleistungen ausgeschlossen werden und dadurch die eventuelle Zulassung zu einem weiteren Studiengang verlieren kann.

Mosbach, 11.08.2013



Christian Kiss
Buchenweg 14/7
D-74821 Mosbach
Germany
Christian.Kiss@gmx.com