

SOCIAL FAIRNESS AND SUSTAINABILITY OF ECONOMIC PRODUCTIVITY

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Abstract

Economic productivity is a complex phenomenon that serves to highlight how efficient an economic process is. However, the existing paradigms for measuring productivity are not coherent, presenting us with a heterogeneous concept too scattered to prove significant for the policy makers. In this paper, we focus on the social implications of the economic development in our attempt to design an adequate measuring methodology able to capture the impact of the continuously growing productivity upon the quality of life in the selected countries. The research is based on statistical data provided by EU KLEMS, The World Bank, Eurostat and The New Maddison Project. The countries chosen for the empirical analysis belong to two groups: Baltic countries (Estonia, Latvia and Lithuania) and the Nordic countries (Denmark, Finland and Sweden). The research is based on input-output indexes used to emphasize productivity, together with its social fairness component and its sustainability over time. The fundamental research hypothesis of this paper is whether the current economic productivity, socially adjusted by GINI, is sustainable. The secondary hypothesis is whether high levels of economic productivity represent a strong enough incentive to countervail the limited biocapacity of a country. The empirical analysis will answer both questions, highlighting the importance of the ecological reserves and the importance of addressing productivity also from a social and an environmental perspective, and not only the obsolete economic perspective.

Keywords: economic productivity, social fairness, biocapacity, sustainability

INTRODUCTION

Europe has witnessed more than twenty years of economic growth baring as well the promise of increased standards of living. At the heart of the process stood the productivity as a mark of efficiency, as an identifier of areas of intervention in order to improve the efficiency and also as a determinant for ranking economies based on their performance. The concept of productivity is such a simple one, that it exerts a certain pressure upon researchers to complicate it.

In this paper we analyze productivity in relation with its capacity to support itself on the long run. The sustainability of the productivity is explored two fold, first from a social perspective and secondly from an environmental perspective. For the current research we have chosen to measure labor productivity as ratio of GNI to the number of people engaged – that is employees together with self-employed, and the capital productivity as ratio of GNI to the capital compensation. For the productivity of the analyzed countries we have used the sum of the two, being aware of the deficit of not considering the other types of inputs: energy, materials, know-how etc.

The social perspective of the productivity is captured by the use of GINI, which tones down the productive performance; the higher the GINI, the more important its effect on reducing the productivity of the country. The environmental perspective is captured by the use of the biocapacity concept, the ecological footprint of consumption and the relation between them reflected in the ecological reserve or deficit. The biocapacity of a country reflects its capacity to produce and store what it produces and the associated wastes. The ecological footprint is defined as the area used to support a defined population's consumption, including the absorption of CO₂ emissions. The ecological reserve is obtained when a country's ecological footprint is smaller than its biocapacity, while the ecological deficit occurs when the ecological footprint is larger than the biocapacity. Before the era of globalization the ecological deficit was predominantly an internal issue (except from the noxious emissions that transcended the country's borders), but the intensification of international trade and cooperation made possible the *false* increase of biocapacity. We say *false* because this wasn't really increased, it was just shifted from one country to another. Even so, this was not enough to cover the expanding needs of a growing world population, resulting into a huge global ecological deficit. According to the Global Footprint Network, today humanity uses the equivalent of 1.5 planets to provide the resources we use and absorb our waste. This means it now takes the Earth one year and six months to regenerate what we use in a year or, in other words, we have at our disposal resources to only live 8 months of a year.

The research hypotheses followed by this paper are: whether the current economic productivity, socially adjusted by GINI, is sustainable, respectively whether high levels of economic productivity represent a strong enough incentive to counteract the limited biocapacity of a country.

LITERATURE REVIEW

In the twentieth century, economists defined productivity as the relationship between the output produced and the inputs necessary to produce it (Antle & Capalbo, 1988; Manoilescu, 1986). This definition is attractive in its simplicity because it stands invariable no matter the political

system, social milieu or production apparatus; it captures the efficiency with which the productive factors are used (Samuelson & Nordhaus, 1995). However, current economic realities (liberalized and dynamic markets, constantly changing customer preferences, new structure of production and work, etc.) are leading to a rethinking of the notion of productivity. Whereas traditionally, productivity is viewed mainly as an efficiency concept, it is now viewed increasingly as an efficiency and effectiveness concept, effectiveness being how the enterprise meets the dynamic needs and expectations of customers (Durdyeva et al., 2014). Productivity is now seen as dependent on the value of the products and services (utility, uniqueness, quality, convenience, availability etc.) and the efficiency with which they are produced and delivered to the customers (Tolentini, 2004).

Although productivity does not represent a country's economic prosperity, living standards and the only measure of competitiveness *per se*, it has been the most widely accepted measure for at least the past 20 years (Lall et al., 2002). During the last half of century, international bodies together with national governments and several activists mainstreamed the need to approach the environment as the main casualty of the economic activity. Resource-responsible and environment-friendly, sustainable social development issues have become hot topics of general interest, that resulted into a bulk of research that has been concerned about the environmental controls for the impact of conventional total factor productivity (Jaffe et al., 1995). Traditional methods of measuring productivity take into account only the desired output, without considering the undesirable outputs, such as CO₂ emissions. Therefore, traditional methods of measuring productivity and productivity growth are telling just one side of the story (Zhao, 2012).

In economic theory, TFP is measured indirectly. It is the output growth not explicable by changes in the amount of inputs (often referred to as Solow residual). In economic practice, TFP is measured by productivity indexes or productivity indicators. Indexes have a multiplicative form, whereas indicators have additive form (Machek, Hnilica, 2012). Some of the most well-known methodologies for measuring productivity are the *Bennet-Bowley productivity indicator* (Bennet, 1920), *Fisher productivity index* (Fisher, 1922), *Törnqvist productivity index* (Törnqvist, 1936), *Malmquist productivity index* (Caves, Christensen, Diewert, 1982), *Hicks-Moorsteen productivity index* (Diewert, 1992) and *Luenberger productivity indicator* (Chambers, 1996).

In the present day society, built on the three pillars of knowledge, competitiveness and globalization, productivity is one of the fundamental success factors and that is why it constitutes a permanent priority intervention for improved results. The improvements of results can be obtained through various means, but all have limited possibilities: reducing the quantity of inputs, reducing the wastes, identifying cheaper resources, management techniques,

operations research and many others. However improvement of results needs to address also the sustainability of the processes that made those results possible.

Correspondingly, such broader conception of productivity calls for a wider set of indicators to catch and reflect the new elements and parameters involved. Some of these new parameters are the processes and methods used to improve productivity, sustainable development and green productivity, better value-chain and supply-chain management, and, especially, the human factor as key (Durdyeva et al., 2014).

Productivity has been and continues to be one of the most relevant issues from an economic perspective. The concept has become a priority for the economic growth of developing countries, because of its contribution to the improvement of the living standards and the economy as a whole. Furthermore, productivity is not only important for the sector it is measured, but also because it has the power to influence the productivity of other economic sectors.

Linking the productivity of countries to their biocapacity and the importance given to insuring optimal living conditions for their inhabitants through a fair income, captured via the GINI index, will bring to light a significantly different perspective upon the economic performances that establish the world hierarchies.

METHODOLOGY

In order to assess the level of social fairness of economic productivity we have developed the following equation:

$$\psi = \frac{\text{GNI} \left(\frac{1}{\text{EMP}} + \frac{1}{\text{CAP}} \right)}{\text{GINI}} * (\beta - \text{EF}), \text{ for GINI} > 0$$

Where:

ψ - Social fairness degree of economic productivity

GNI – Gross National Income

EMP – Number of people engaged in labor (employees together with self-employed)

CAP – Capital compensation

β - Biocapacity

EF – Ecological Footprint of consumption

The numerator is an expression of economic productivity calculated as sum of the ratios between the *Gross National Income* and the *Number of people engaged in labor*, respectively *Gross National Income* and *Capital compensation*. *Gross National Income*, as defined by Eurostat, represents total primary income receivable by resident institutional units:

compensation of employees, taxes on production and imports less subsidies, property income (receivable less payable), gross operating surplus and gross mixed income. It is equal to: GDP (Gross Domestic Product) + primary incomes receivable from the rest of the world - primary incomes payable to the rest of the world. Values are seasonally adjusted (SA). The ESA 95 (European System of Accounts) regulation may be referred to for more specific explanations on methodology. The *Number of people engaged in labor* the total number of people that have employment in one country, either as employees or self-employed. *Capital compensation* is derived as value added minus labour compensation (VA-LAB). The denominator is an expression of social fairness captured by GINI.

The sustainability of the economic productivity is captured by the difference between the country's *Biocapacity* and its *Ecological Footprint of consumption*. *Biocapacity* or *biological capacity*, as defined in the Global Footprint Network Glossary, represents the capacity of ecosystems to produce useful biological materials and to absorb waste materials generated by humans, using current management schemes and extraction technologies. "Useful biological materials" are defined as those demanded by the human economy. Hence what is considered "useful" can change from year to year (e.g. use of corn (maize) stover for cellulosic ethanol production would result in corn stover becoming a useful material, and thus increase the biocapacity of maize cropland). The biocapacity of an area is calculated by multiplying the actual physical area by the yield factor and the appropriate equivalence factor. Biocapacity is usually expressed in global hectares. The global hectare (gha) is a productivity weighted area used to report both the biocapacity of the earth, and the demand on biocapacity (the Ecological Footprint). The global hectare is normalized to the area-weighted average productivity of biologically productive land and water in a given year. Because different land types have different productivity, a global hectare of, for example, cropland, would occupy a smaller physical area than the much less biologically productive pasture land, as more pasture would be needed to provide the same biocapacity as one hectare of cropland. Because world bioproductivity varies slightly from year to year, the value of a gha may change slightly from year to year. The *Ecological Footprint of consumption* is defined as the area used to support a defined population's consumption. The consumption Footprint (in gha) includes the area needed to produce the materials consumed and the area needed to absorb the carbon dioxide emissions. The consumption Footprint of a nation is calculated in the National Footprint Accounts as a nation's primary production Footprint plus the Footprint of imports minus the Footprint of exports, and is thus, strictly speaking, a Footprint of apparent consumption. The national average or per capita Consumption Footprint is equal to a country's Consumption Footprint divided by its population (Global Footprint Network Glossary, 2010).

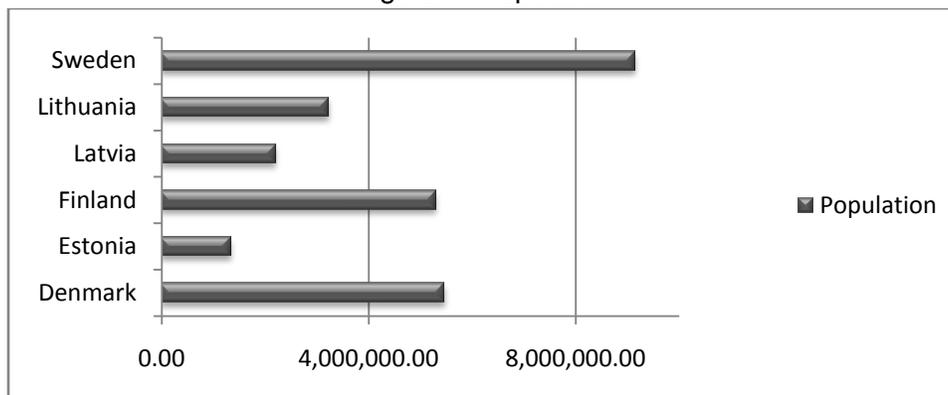
The difference between the *Biocapacity* and the *Ecological Footprint of consumption* can result either in ecological deficit, when the *Ecological Footprint of consumption* exceeds the *Biocapacity*, either in ecological reserve when the *Biocapacity* exceeds the *Ecological Footprint of consumption*. If there is a regional ecological deficit, it means that the region or the country imports biocapacity through trade or liquidating regional ecological assets, or emitting wastes into a global commons such as the atmosphere. In contrast to the national scale, the global ecological deficit cannot be compensated for through trade, and is therefore equal to overshoot by definition.

ANALYSIS

For the empirical analysis we have selected two groups of European countries, different in size, historical background, GNI etc., hoping that we will identify enough overlapping areas to prove the consistency of the model. The groups are the Baltic countries (Estonia, Latvia and Lithuania) and the Nordic countries (Denmark, Finland and Sweden). As far as the groups are concerned, we need to mention that Finland is sometimes considered a Baltic country due to its inclusion in the Ribbentrop-Molotov Pact during the World War II, but for the purpose of this analysis we felt it was more appropriate to include it in the Nordic countries group due to the existing similarities with Denmark and Sweden, much more stronger than those existing between Finland and the other Baltic countries. We also need to justify the exclusion of Norway, a definitely Northern country, due to lack of data.

But first we will present some general information about the selected countries. As we have mentioned before, the countries differ in size. The Figure 1 presents the size of population in each selected country. The largest in size between the three Baltic countries is Lithuania, with a population of 3.231.294 inhabitants, while Sweden is the largest of the Nordic countries, with a population of 9.148.092. Together the population of the three Baltic countries amounts to only two thirds of the population of Sweden.

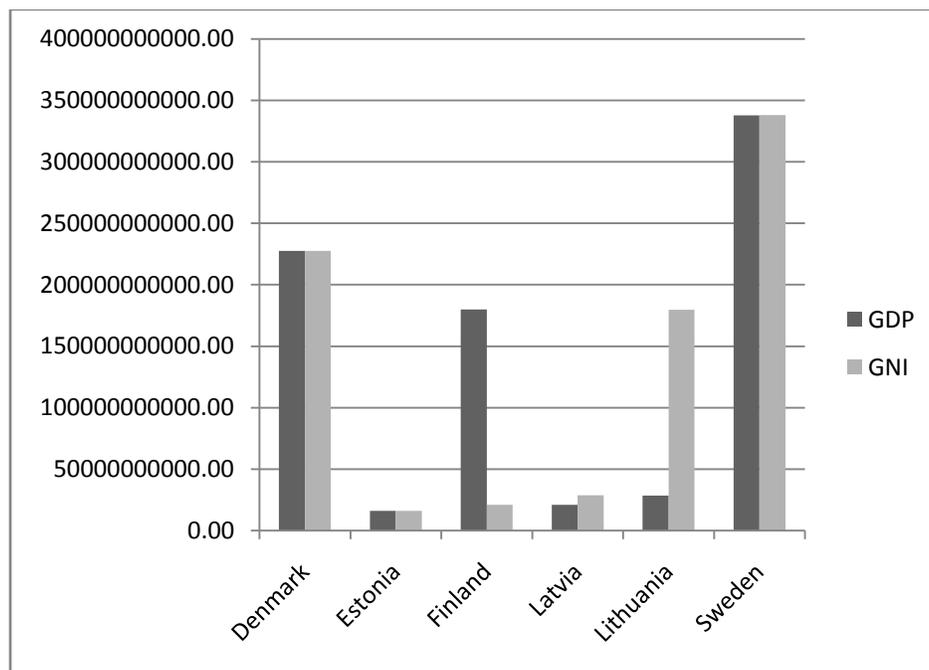
Figure 1. Population



Source: World Bank

We have seen the differences between the countries in regard to population and now we will analyze them from the point of view of their economic activity. The Figure 2 presents the levels of GDP and GNI in the selected countries. As we can see, Sweden dominates the chart regardless if we focus on the GDP or the GNI. All Sweden, Denmark and Estonia have remarkably similar levels for the two indexes, the GDP and GNI almost overlapping perfectly, even if the values differ significantly among the three countries. Finland and Lithuania, on the other hand, present us with a totally different picture, with highly significant differences between the GDP and GNI. Finland has a very high GDP in contrast with its GNI which represents only 11.67% of the GDP. In contrast, Lithuania has a very high GNI compared to the GDP which represents only 15.9% of the GNI. The discrepancy between the two variables for the two countries could be partly explained by globalization, more explicitly by the presence of foreign investors in the country and migration; this would show a great openness of Finland to foreign investors and immigrants, while for Lithuania could express an increased willingness of people to migrate abroad and a lesser contribution of foreign investors to the internal economy, but the question needs further development. As far as their economic results are concerned, four (Denmark, Estonia, Finland and Sweden) of the selected countries correspond to the *high income countries* category of the World Bank, while the other two (Latvia and Lithuania) correspond to the *upper middle income countries* category.

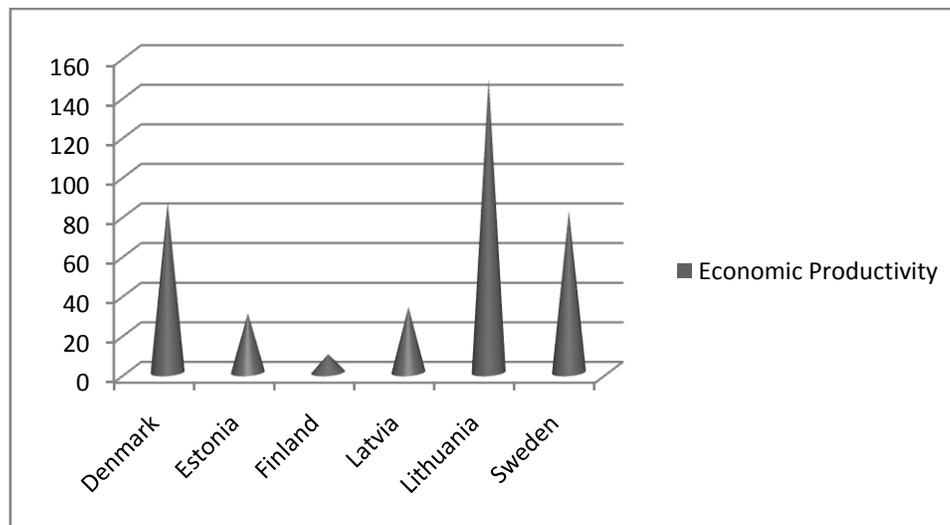
Figure 2. Levels of GDP and GNI



Source: Maddison Project Database for GDP and Eurostat for GNI

We have already seen the primary results of the six economies, but further we want to inquire their levels of productivity. For this we have computed the level of productivity for each country by adding up the labor and capital productivity. The Figure 3 presents the results.

Figure 3. Economic productivity



Source: Eurostat for GNI and EUKLEMS for capital compensation and number of persons engaged in labor

When analyzing the economic productivity, the six countries group splits into three pairs: Sweden and Denmark – with very similar upper middle levels of productivity; Estonia and Latvia -with very lower middle levels of productivity; and Finland and Lithuania with very low, respectively very high levels of productivity.

In order to have a more accurate picture we have tested the existence of correlations between the three variables capturing the economic performance: GDP, GNI and Economic productivity. The results are presented in the table 1.

Table 1. Correlations between GDP, GNI and Economic productivity

		GDP	GNI	W
GDP	Pearson Correlation	1	.733	.051
	Sig. (2-tailed)		.097	.923
	N	6	6	6
GNI	Pearson Correlation	.733	1	.670
	Sig. (2-tailed)	.097		.145
	N	6	6	6
W	Pearson Correlation	.051	.670	1
	Sig. (2-tailed)	.923	.145	
	N	6	6	6

The data in the table 1 reflect a surprising total lack of correlation between the economic productivity and the GDP, which made us wonder whether the size of the country is relevant for its productivity. For this purpose we repeated the correlation testing by adding the population. Between population and economic productivity Pearson's r retrieved a value equal to 0.183 with an even worse significance (0.729). So, even if population correlates strongly with the other two variables (GDP: $r=0.969$, sig. 0.001; GNI: $r=0.793$, sig. 0.060), it doesn't seem to have any influence upon productivity. So far, this represents an important finding for the paper.

Further, we will analyze the sustainability of the economic results obtained by the 6 countries. Table 2 below presents the Ecological Footprint of Consumption, the Total Biocapacity and the Ecological Deficit or Reserve of each country.

Table 2. Ecological Footprint of Consumption, Total Biocapacity and Ecological Deficit or Reserve of the selected countries

Country	Ecological Footprint of Consumption	Total Biocapacity	Ecological Deficit or Reserve
Denmark	8.3	4.9	-3.4
Estonia	7.9	9.0	1.1
Finland	6.2	12.5	6.3
Latvia	5.6	7.1	1.4
Lithuania	4.7	4.4	-0.3
Sweden	5.9	9.7	3.9

Finland has the greatest biocapacity and an average consumption footprint (the average of the group being 6.4), this resulting into an important ecological reserve of 6.3 gha. Denmark has the biggest consumption footprint associated with a rather small biocapacity which places it in the back of the hierarchy with a 3.4 ecological deficit. For this group of countries we have a positive picture as far as sustainability is concerned, almost all of them manage to be self-sufficient in the sense that they don't need to rely on the biocapacity of other countries to satisfy their own needs (this self-sufficiency needs not to be read as lack of international trade), the only exceptions being Denmark and Lithuania (much smaller deficit). Given the fact that the 6 countries share the same region, we can conclude that the Northern part of Europe is a rather sustainable one.

Further, we will test how do economy and sustainability relate. Table 3 presents the results for Pearson's r and the significance of the relations. We were not interested in the correlations between the three ecological variables that's why here we have retrieved only the cross relations, between the two groups of variables.

Table 3. Correlations between GDP, GNI, Economic productivity, Ecological Footprint of Consumption, Total Biocapacity and Ecological Deficit or Reserve

		Ecological Footprint of Consumption	Total Biocapacity	Ecological (Deficit) or Reserve
GDP	Pearson	.163	.309	.218
	Correlation			
	Sig. (2-tailed)	.758	.551	.678
	N	6	6	6
GNI	Pearson	-.085	-.300	-.242
	Correlation			
	Sig. (2-tailed)	.874	.563	.644
	N	6	6	6
W	Pearson	-.363	-.752	-.544
	Correlation			
	Sig. (2-tailed)	.479	.085	.264
	N	6	6	6

The first thing we notice is the poor values of the significance, the only relevant result being the correlation between the total biocapacity and economic productivity, but, surprisingly, a negative one. This would read that the higher the biocapacity of a country, the lower its economic productivity. This is a second important finding of the paper. Most of the results have negative values, but due to the poor significance, there is no sense in further analyzing them.

The next step in our analysis is to see how does the GINI influence the economic performance so that we can reach the final stage of our analysis and compute the selected variables so that we can find out how socially fair and sustainable is the economic productivity. Table 4 presents the values of the GINI coefficient for the six countries. We see that it varies between 0.234 and 0.338. Even if the GINI coefficient is widely known, we feel the need to remind that for GINI 0 means perfect equality, while 1 means total lack of equality.

Table 4. GINI values of the selected countries

Denmark	Estonia	Finland	Latvia	Lithuania	Sweden
0.252	0.334	0.354	0.338	0.262	0.234

Source: Eurostat

Most of the selected countries are situated in the second quarter, which shows a positive tendency towards equality and also a balanced distribution of income between the social classes within the selected countries. But how does this affect the economic productivity? The table 5 presents the results:

Table 5. Correlations between GDP, GNI, Economic productivity and GINI

		GDP	GNI	W	GINI
GINI	Pearson Correlation	-.566	-.967**	-.807	1
	Sig. (2-tailed)	.242	.002	.052	
	N	6	6	6	6

** . Correlation is significant at the 0.01 level (2-tailed).

As expected, all the results are negative, which means the lower the GINI, the higher the values of the other variables. The correlation between GINI and the GDP is the poorest, both as value of Pearson's r (-0.566) and significance (0.242). GINI correlates strongly with the GNI and the economic productivity.

So far we have found out that the economic productivity is independent of the size of the country, regardless if we consider the size of the population or of the economy. We have also found out that there is a strong reversed relationship between the economic productivity and the biocapacity, but a less significant relationship between the ecological footprint of consumption or the ecological deficit or reserve. Even if these results would indicate the need to give up the ecological variables, we will keep them because even if they do not affect directly the current levels of the economic productivity, we are aware that future productivity depends on existing resources and we consider that sustainability needs to be reflected in our equation measuring the social fairness and sustainability of economic productivity:

$$\psi = \frac{\text{GNI} \left(\frac{1}{\text{EMP}} + \frac{1}{\text{CAP}} \right)}{\text{GINI}} * (\beta - \text{EF})$$

We have used the equation to measure the level of social fairness and sustainability of the economic productivity in the selected countries and obtained the following values:

Table 6. Values for the level of social fairness and sustainability of the economic productivity of the selected countries

Denmark	Estonia	Finland	Latvia	Lithuania	Sweden
-1163.84	96.22	162.40	140.04	-173.88	1347.49

The data taken per se doesn't seem to tell much. But we notice that Denmark and Lithuania have negative values due to the ecological deficit which the countries register. This tells us that even if the values of economic productivity are high, they won't be able to countervail the small biocapacity of the countries associated with bigger ecological footprints of consumption.

Sweden presents us with a very productive, socially fair and sustainable economy, a result that confirms the already known high standards of life that the Swedish people have.

Further, we consider relevant so see whether ψ correlates with any of the economical or ecological variables used so far. Table 7 presents the results:

Table 7. Correlations between GDP, GNI, Economic productivity, GINI, Ecological Footprint of Consumption, Total Biocapacity and Ecological Deficit or Reserve

		GDP	GNI	W	GINI	Ecological Footprint of Consumption	Total Biocapacity	Ecological (Deficit) or Reserve	ψ
ψ	Pearson Correlation	.304	.210	-.219	-.035	-.463	.593	.738	1
	Sig. (2-tailed)	.558	.690	.676	.947	.355	.214	.094	
	N	6	6	6	6	6	6	6	6

First we look at the significance of the results and we notice that they don't have the needed values that would support the relevance of the values of Pearson's r . The only significant relation (sig. 0.094) is between ψ and the Ecological deficit or reserve ($r=0.738$). Given the poor significance there is no point in further analyzing the other relations.

CONCLUSION & DISCUSSIONS

The concept of productivity is crucial in capturing how efficient an economic process is. However there is no scientific consensus regarding the way in which productivity should be measured, other than the ratio between the outputs and inputs. The question of economic productivity becomes even more complicated when the purpose is to measure its efficiency from a social or sustainable perspective.

In this paper we tried to identify a suitable, yet simple means to capture the social fairness together with the sustainability of the economic productivity. We began our analysis by selecting 6 countries to serve as object of our empirical analysis. We have chosen two significantly different groups, each one comprising three countries, the Baltic countries (Estonia, Latvia and Lithuania) and the Nordic countries (Denmark, Finland and Sweden). Initially we wanted to perform a time series analysis, but due to the lack of data we reconsidered, and redesigned the research methodology so that it captured only the reality of 2007. The fact that the data is seven years old doesn't affect the quality of research, its purpose being to test the model and not necessarily to capture current realities.

As we have shown, even if the countries share the same region, Northern Europe, they differ in size, GDP, GNI and GINI. The first aspect that we have identified was the different picture that the countries paint in regard to GDP and GNI. Sweden, Denmark and Estonia

presented us with remarkably similar levels for the two indexes, the GDP and GNI almost overlapping perfectly, even if the values differ significantly among the three countries. Finland and Lithuania, on the other hand, presented us with a totally different picture, with highly significant differences between the GDP and GNI. Finland has a very high GDP in contrast with its GNI which represents only 11.67% of the GDP. In contrast, Lithuania has a very high GNI compared to the GDP which represents only 15.9% of the GNI. The discrepancy between the two variables for the two countries could be partly explained by globalization, more explicitly by the presence of foreign investors in the country and migration; this would show a great openness of Finland to foreign investors and immigrants, while for Lithuania could express an increased willingness of people to migrate abroad and a lesser contribution of foreign investors to the internal economy, but the question needs further development.

Next in our analysis we have computed the values for the economic productivity of the six countries, index that has split the group into three pairs: Sweden and Denmark – with very similar upper middle levels of productivity; Estonia and Latvia - with very lower middle levels of productivity; and Finland and Lithuania with very low, respectively very high levels of productivity. A further step we took was to test the existence of any correlations between the economic productivity and GDP, respectively GNI. Both correlations proved to be irrelevant, fact that determined us to test the existence of correlations between population and productivity. Between population and economic productivity, Pearson's r retrieved a value equal to 0.183 with a very poor significance (0.729). This has lead us to the first conclusion: size doesn't matter, the productivity is independent both of the size of the economy and the size of population. Further in our analysis we have found out that productivity is independent also of the biocapacity, in fact the correlation between the economic productivity and biocapacity is a strong negative one - this would read that the higher the biocapacity of a country, the lower its economic productivity.

In regard to the social aspect of the analysis, we gathered the values for GINI, which vary between 0.234 and 0.338. Most of the selected countries are situated in the second quarter, which shows a positive tendency towards equality and also a balanced distribution of income between the social classes within the selected countries. As expected, GINI correlated strongly, but negatively, to the economical variables.

Contrary to our expectations, we have not found significant correlations between the two classes of variables, economical and ecological, but this can be explained by lags: even if a country manages to obtain impressive economic performances, these cannot be sustainable in the long run, unless they are linked to the biocapacity of the country. The hypothesis was confirmed by the values of ψ . The model retrieved very good results for Sweden which proved to be the most productive, when productivity was adjusted for social fairness and sustainability.

Denmark, on the other hand, even if it presents high levels of productivity, is not sustainable, due to the already exceeded biocapacity.

As we have seen there are important differences between the socially and sustainability adjusted economic productivity and non-adjusted economic productivity. Table 8 presents the values for the two concepts.

Table 8. Socially and sustainability adjusted economic productivity and non-adjusted economic productivity

Country	Denmark	Estonia	Finland	Latvia	Lithuania	Sweden
ψ	-1163,84	96,22	162,4	140,04	-173,88	1347,49
W	86,02104	29,85904	9,117616	33,10679	148,3002	81,63014

The results prove that even if an economy is apparently productive, when analyzed from a more comprehensive perspective, we might find out a very different story. The values of the socially and sustainability adjusted economic productivity are higher than those of the non-adjusted productivity, due to its multiplication with the reversed GINI and ecological reserve or deficit. This is an aspect which still needs consideration in order to establish either correction factors, either interval limits for various classes of productivity (e.g. low, middle, high).

In this paper we have tried to capture the influence of the social fairness captured by GINI and that of the sustainability in the form of biocapacity minus the ecological footprint of consumption, upon the economic productivity. The results brought to light several important findings, but most importantly it proved the validity of the ψ equation developed with the purpose of testing the social fairness and sustainability of the economic productivity. During the past five decades there has been a continuous debate on the international agenda in order to identify the most suitable ways in which to make the world we live in less toxic for the people and for the environment. A first step in this direction is to identify and quantify correctly the problems that we face, only then we can hope to identify the proper means to solve them.

SCOPE FOR FUTURE RESEARCH

Future works will extend the pool of countries selected for the empirical analysis in order to identify the differences in productivity intensity for the bulk of cross-country variations. Furthermore, we hope to identify some thresholds to divide the countries in categories according to their level of productivity (high, medium or low) and their responsibility (social and environmental). Both inter- and intra- categories analyses are required in order to ensure the robustness of the partitioning. Moreover, we want to identify alternative measurements for labor and capital compensation to make possible the analysis over a longer period of time, to identify trends and to be able to predict future developments.

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