RECONSIDERING ECONOMIC PRODUCTIVITY

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Abstract

Economy has changed significantly over the past century, in part due to the scientific discoveries, due to the industrial revolution, to the research, development and innovation, but maybe the most important contributor to the economic development is the human resource. We have witnessed significant changes enhancing the levels of productivity, both labor and capital. This paper analyzes productivity in relation to its social and sustainability dimension. The paper follows a previous study, highlighting the most important findings identified and reinterpreting them on the basis of the most recent research papers produced by the scholars in the field. The analysis is focused on the most unsustainable economies worldwide, respectively, the United Arab Emirates, Qatar, Belgium, Kuwait, Singapore, Netherlands, Republic of Korea, Israel, Saudi Arabia, Macedonia, Japan and the United States of America – selected by considering their per capita ecological deficit. The research uses statistical data provided by the United Nations Development Program, the World Bank and the Global Footprint Network. The research combines economical, development and environmental indexes in our attempt to evaluate productivity and to adjust it so that it considers the ecological deficit of the nations. The research hypothesis that generated the study is: the levels of economic productivity obtained by countries are not limited by their biocapacities. The empirical analysis will verify the research question advocating for the need to consider the limited capacity of the planet, in term of natural resources, when promoting economic and social development.

Cuvinte cheie: *economic productivity, social fairness, biocapacity, sustainability*

Clasificare JEL : *F62, F63*

1. Introduction and literature review

The idea behind the study appeared after a similar research in which we have adjusted productivity by ecological deficit and GINI index, but in a completely different manner (Mihai, 2014b). The findings of the current research are consistent with the findings in the previous study, emphasizing the need for a more rational approach of the economy and its development.

Economic productivity and its continuously growth are seen as imperatives of our modern society, but how reasonable is this growth induced by the steroids of deficit? In this paper we analyze the 12 twelve countries most indebted to the pool of global resources, focusing on their economic performance, but taking into account also their biological capacity, their ecological footprint of consumption and also their ecological deficit (Mihai, 2014a).

In the twentieth century, economists have 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 the rethinking of the notion of productivity. Whereas traditionally, productivity was viewed mainly as a concept of efficiency, it is now seen both as an efficiency and effectiveness concept, effectiveness being how the enterprise meets the dynamic needs and expectations of customers (Durdyeva et al., 2014). Productivity appears to be 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).

Modern economic theories explain the differences in productivity and economic growth across countries by differences in political and economic institutions, and differences in culture, geographical position, policies and law. The success of any of these theories in explaining the gap in productivity between any two countries, depends on the countries in the sample (Razzak, 2006).

The rational perspective is endorsed by the use of the biocapacity concept, the ecological footprint of consumption and the relation between them reflected in the ecological deficit. The biocapacity of a country is a measure of its ability to produce and store what it produces, together with the associated wastes. The area used to support the human activity, the country's consumption and also to absorb, process or store the CO2 emissions and any other greenhouse gases (GHG) is measured through the ecological footprint of consumption index. By deducting the

ecological footprint of consumption from the biocapacity of a country, we obtain its reserve or deficit, depending on the size of the two. For this research, we have selected only countries with ecological deficits in order to prove the lack of sustainability in their productive processes.

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). Further discussions on the theory of productivity or the indexes used to capture it can be found in Olley and Pakes (1996), Griliches and Mairesse (1998), Blundell and Bond (2000), Levinsohn and Petrin (2003), Ackerberg et al. (2007) etc. More complex models that deal with heterogeneous-productivity producers have been developed by Jovanovic (1982), Hopenhayn (1992), Ericson and Pakes (1995), Melitz (2003), Asplund and Nocke (2006), Foster, Haltiwanger and Syverson (2008) etc.

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).

Gaps in productivity can be explained by several theories: those considering the size of a country or of an economy, the openness to the international trade, the optimization of endogenous factors, advances in ICT, economic and fiscal policies etc., but the truth is that economic productivity is one of the most complex simple concept there is. When analyzing productivity one needs to consider all these factors, in addition, the sustainability of the economic processes that generate the respective levels of economic performance. For this scope we have developed a methodology that takes into account not only what a country produces, but also how it produces it and whether it will be able to continue that given trend. The results emphasize the need for raising awareness and for identifying more sustainable alternatives. The biocapacity of a country is given and it cannot be increased significantly, but an area where it can be intervened, is the consumption and its ecological footprint. Our economic performance needs to be captured in a wiser way, a way that incorporates also the ecological perspective and not only the financial one. The short life span of the current economic development trends is emphasized by the already exceeded biocapacity of the world. If a country exceeds its own biocapacity is a problem because that means that it can no longer rely on its own resources for the well being of its people, but it can rely on the resources of the other countries, resources incorporated in the global stock; but when the global stock is already effete, on whose resources can one rely on? (Mihai, 2014)

2. Empirical analysis

As we have mentioned before, we have selected the countries that exploit a biocapacity bigger than their own, more explicitly, we have chosen all the countries with a per capita ecological deficit higher than 4 gha. 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 cumulated ecological deficit of the selected countries is 2.42 billion gha, which represents almost half of the world ecological deficit. Basically, there are 196 countries in the world; twelve of them are responsible for half of the ecological deficit, while the other 184 countries are responsible for the other half.

These twelve countries differ in GDP, GNI, size, cultural background, geographical position etc., but they all have in common the enormous per capita ecological deficit; they all present high and very high levels of development reflected by the HDI; also, except from Macedonia, they all belong to the High Income group of countries.

2.1. Population and economic development levels

US have the largest population, 308.7 million inhabitants and Qatar has the smallest population, only 1.1 million inhabitants. Most of the selected countries are small ones, except from the US, Japan, Korea and Saudi Arabia, which have populations larger than 20 million inhabitants. The population of the group represents approximately 8% of the world population. The levels of the economic development are consistent with the information provided by the size of population. The richest countries are those with the largest population, respectively, the US, Japan and Korea, with the exception that the Netherlands has higher levels o both GNI and GDP than Saudi Arabia, even if it is much smaller than the last one.

2.2. Productivity

The most productive country of the group is Japan, with a 95.84 score, much more productive than any other country in the group. It is seconded by the US and Korea, with 50.33, respectively 49.66 scores. The least productive countries in the group are Israel – with a score of 14.73, Macedonia – with a score of 15.48 and Qatar – with 17.26. While Macedonia doesn't come as a surprise, the results for Qatar reveal a country with a productivity level much smaller than expected.

2.3. The ecological perspective

Further we introduce the ecological perspective. The most important ecological deficit is registered by the United Arab Emirates, 9.8 gha for the per capita deficit and 61.42 millions gha, the total ecological deficit. The deficit of the UAE is caused by its very limited capacity of only 0.8 gha (per capita), its population rather large compared to its deficit, but most importantly by its huge ecological footprint of consumption, of 10.7 gha, the highest in the world. The UAE is seconded by Qatar, another Arab country, whose per capita ecological deficit is 8 gha, while its total deficit is of 9.1 million gha. The global impact of the Qatar deficit is much smaller than the one of UAE because: (i) its population is much smaller, (ii) it has an own biocapacity three times larger and (iii) its per capita ecological footprint is smaller, even if not much smaller – Qatar has the second largest per capita footprint of consumption in the world (Mihai, 2014a).

2.4. Adjusting productivity for sustainability

Up to this point in our analysis we have discussed the economic performance of the selected countries, their productivity and their biological capacity. Further we analyze the economic performance of the selected countries in regard to their biocapacities; we test to what extent would manage these countries to remain productive and keep their current levels of income and domestic product if they had to live within their means. The tests show that there are huge differences between GNI and its value adjusted by the sustainability coefficient. The US is the country that benefits the most of the world openness, 7564.4 billions of its GNI being obtained by valorizing resources and markets other than its own. The second exploiter of the world resources is Japan whose GNI owes 4202.4 billion to the world resources, followed by Korea with 1016.6 billion. Though the value of the difference between the GNI and the adjusted GNI is higher for the US, the difference for Japan is much more important if considered as percentage of GNI – about 87%, compared to 51% in the case of US. (For a complete methodology, please refer to Mihai, 2014a).

As far as productivity is concerned, we observe again very important differences between productivity and adjusted productivity. If in the case of GNI and GDP, the differences were self-explanatory, in the case of productivity we felt the need to calculate also the share represented by the difference between the two variables, in the productivity index. They highlight the dependence of these countries on the world biocapacity more obvious than any other variable before, in the analysis. The most striking difference is in the case of Singapore, whose economic productivity is obtained almost entirely by valorizing a foreign biocapacity. For Kuwait 94% of its productivity is explained by foreign resources, for Korea and Israel, 93% of their productivity is reliant on the world resources. The US appears to be the least dependent country in the list, counting for half of its productivity on its own biocapacity and for the other half on the biological capacity of the rest of the world.

3. Conclusions

In this paper we have measured and analyzed the productivity levels of the most unsustainable countries, on the basis of their ecological deficit, and also how productive would be their economies if, instead of exploiting the resources of the less developed countries, they would resume themselves to exploiting their own biocapacities. In our attempt to prove the research hypothesis, we have showed that the productivity levels of the selected countries are dependent of the global stock of resources. If they would be constrained to valorize solely their biological capacities, they would lose, in part, up to 99% of the current productivity levels. 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 productivity scores of the 12 countries are way beyond reasonable, reflecting a lack of common global initiatives able to protect the common stock of resources and able to protect the smaller national players. The current pattern of economic development is one tailored by the big players for the big players with a complete and utter disregard of the wellbeing of mankind.

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.

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