TR
YILDIZ TECHNICAL UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
DEPARTMENT OF ECONOMICS

MASTER OF ARTS PROGRAMME IN ECONOMICS

MASTER'S THESIS

A TAX SYSTEM TO SUPPORT SUSTAINABILITY; IS IT POSSIBLE?

HAZEL KIZILGÜN
12729001

THESIS ADVISOR
Dr. TOLGA AKSOY

ISTANBUL
2019

TR
YILDIZ TECHNICAL UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
DEPARTMENT OF ECONOMICS

MASTER OF ARTS PROGRAMME IN ECONOMICS

MASTER'S THESIS

A TAX SYSTEM TO SUPPORT SUSTAINABILITY; IS IT POSSIBLE?

HAZEL KIZILGÜN
12729001

Submission Date:
Presentation Date:

The thesis has been found successful by unanimous / ~~majority~~ of votes.

	Name Surname	Signature
Thesis Advisor:	Asst. Prof. Dr. Tolga Aksoy	
Jurymen:	Asst. Prof. Dr. Bekir Aşık	
	Asst. Prof. Dr. Özge Kama Masala	

ISTANBUL
2019

ABSTRACT

A TAX SYSTEM TO SUPPORT SUSTAINABILITY; IS IT POSSIBLE?

Hazel Kızılgün
July, 2019

Despite of its globally recognized importance, as it is accepted more widely, the concept of sustainability has continuously suffered from ambiguity. This paper, first, attempts to dissipate clouds even albeit a bit by discussing the concept of sustainable development definition, literature and global performance on achieving it. The global performance is obviously underwhelming even though the governments continuously try to maximize the social welfare with their functions of resource allocation, income distribution and stabilization by using their relevant instruments. And taxation is one of the most important mean used in this road. It should be noted that it is impossible to speak about a perfect tax system which can be beneficial to all of countries and will conclude with sustainable development. Thus, this paper does not aim to show an ideal system but to highlight the importance of a clearer understanding of sustainability and to discuss whether taxation can be a fellow traveller on the road to achieve it. Linking one contentious concept to another can be seen as a fruitless effort, but by restricting the scope of the terms as it only focuses on the sustainability in terms of economic development and taxation from the perspective of progressive income tax, this paper then attempts to question whether to create a tax system to support sustainable development is possible.

A detailed analysis is made with this purpose, in which 136 countries are chosen as a sample. A two sectional study has been made by using indicators and thresholds of Holden, Linneraud and Banister (2014)'s "sustainable development space. First we examine sample countries' status' in terms of their sustainable development process. 18 countries are on Dimension 1(ecological footprint) and Dimension 2(human development index). There are no high-income or low-income countries that meet both of the thresholds and only 10 countries meet the relevant thresholds, namely, should have achieved sustainable development; Albenia, Azerbaijan, Cuba, Georgia, Indonesia, Jordan, Moldova, Philippines and Uzbekhistan. Second, we analyze Gini coefficients, taxation systems (progressivity, distribution of taxes and percentage tax revenue of GDP) and sustainability performance of these 10 countries case by case. All of these 10 countries have recently improved their tax systems and thus last years' tax collection percentages are mostly above the world average for high income countries.

Keywords: Sustainability, Sustainable Development, Income Taxation, Tax System, Progressive taxation

ÖZ

SÜRDÜREBİLİRLİĞİ DESTEKLEYEN BİR VERGİ SİSTEMİ MÜMKÜN MÜ?

Hazel Kızılgün
Temmuz, 2019

Küresel anlamda önemi haylice kabullenilmiş olsa dahi, sürdürebilirlik kavramına ilişkin bir anlam kargaşası sorunu bulunmaktadır. Tezimizde öncelikli olarak, sürdürebilirlik kavram tanımını, literatürü ve bu kavrama ulaşmadaki küresel performansı tartışarak, bir nebze de olsa mevcut anlam kargaşası üzerindeki bulutları dağıtma amacı güdülmüştür. Politika yapıcılar, sosyal refahı, kaynak ayrımı, gelir dağılımı ve istikrar araçları ile sürekli olarak maksimize etmeye çalışıyor olsalar da, bu konudaki küresel performansın iç açıcı olmadığı açıktır. Vergilendirme ise bu konudaki en önemli araçlardan biridir. Belirtilmelidir ki, tüm ülkeler için geçerli olacak ve sürdürebilir kalkınmaya ile sonuçlanacak kusursuz bir vergi sisteminden bahsetmek mümkün değildir. Dolayısıyla, bu çalışma ideal bir vergi sistemi göstermekten ziyade, sürdürebilirliğin öneminin altını çizerek, kavramın daha net anlaşılması sağlamayı ve vergilendirmenin sürdürebilirliğe ulaşma da bir yol arkadaşı olup olmayacağını tartışmayı amaçlar. Bu amaçla 136 ülkeyi örneklem alan detaylı bir analiz yapılmış ve Holden, Linneraud ve Banister'ın (2014) "sürdürebilir kalkınma uzayında" çalıştıkları üç farklı eşiği kullanarak iki bölümlü bir detay analiz yapılmıştır.

Anahtar Kelimeler: Sürdürebilirlik, Sürdürebilir Kalkınma, Gelir Vergisi, Vergi Sistemi, Artan Oranlı Vergileme

CONTENTS

LIST OF TABLES

LIST OF GRAPHS

Page Number

Page Number

ABBREVATIONS

CTA	**:** Capital Theory Approach
HDI	**:** Human Development Index
NFA	**:** National Footprint Account
OECD	**:** Organization for Economic Cooperation and Development
SD	**:** Sustainable Development
SDG	**:** Sustainable Development Goals
UN	**:** United Nations
UNCED	**:** United Nations Conference on Environment and Development
UNECE	**:** The United Nations Economic Commission for Europe
WRF	**:** World Resource Forum
NGOS	**:** Non-governmental Organization

1. INTRODUCTION

In his essay named " The Economics of the Coming Spaceship Earth" , which is regarded as the most celebrated paper to provoke the many questions subsequently to be analyzed in environmental economics[1], Kenneth E. Boulding describes the economy of the past as an "open economy" while he evaluates the future earth with a closed one . It should be noted that openness and closeness terms here are not used in a way that most economists familiar with even they have some similarities; Boulding's open economy which he said he was tempted to call as the "cowboy economy" is an economy of illimitable plains and he uses the cowboy as a symbol of the ravenous behaviors of the actors in it while the latter is a description of a future earth without unlimited reservoirs of anything either for extraction or for pollution[2] which he named accordingly as a "spaceman economy". The important point here is that, the future which is mentioned above is our present when it is considered that the essay was written in 1966 thus one may fairly question if our earth we live in has already became a spaceship or not.

According to the report of the World Resource Forum which took place in 2012, most of the participants mutually agreed on natural resources and the environment as the subjects of common problems that all countries in the world faced with. These problems were accepted as serious challenges for economic development and the participants concluded that scarcity of resources, increasing prices and unsustainable use of resources can fetter economic development, may lead to poverty and social unrest which entail vital risks for global stability[3].

---

[1] Pearce, David. 2002. *An Intellectual History of Environmental Economics.* Annu. Rev. Energy Environ. 27:57–81

[2] Boulding, Kenneth E. 1966. *The Economics of the Coming Spaceship Earth.* Environmental Quality in a Growing Economy. Pp.3-14 Batimore, MD: Resources for the Future. Johns Hopkins University Press

[3] 2012. *World Resource Forum Meeting Report. Beijing, China*

On September 25th 2015, a set of goals were embarked on by various countries in order to end poverty, protect the planet and ensure prosperity for all as part of a new sustainable development agenda where each goal has specific targets to be achieved in the next 15 years[4]. The goals and other developments will be analyzed in detail on the oncoming parts of the paper but , undoubtedly, even these results indicate that we are already confronted with the fact of limited resources matching up with the description of the spaceman economy however our attitude towards consumption, which is defined as the major difference between these two economies by the author, is more violent than ever before.

"..man must find his place in a cyclical ecological system which is capable of continuous reproduction of material form even though it cannot escape having inputs of energy[5]."

Boulding suggests above while defining "the close" economy of the future. Probably it would not be inappropriate to say that the idea of the capability of a continuous reproduction in a limited Earth is directly related to the concept of "sustainability" which characterizes any process or condition that can be maintained indefinitely without interruption, weakening, or loss of valued qualities[6]. Achieving sustainability may be a cure to the problem but the solution comes with its complexity by its very nature. Not only has its long-run structure led to a struggle with the problem of uncertainty, the concept of sustainability has continuously suffered from an ambiguity whose details will be analyzed in the following chapter of this paper.

Some of the pre-mentioned sustainable goals, that many countries have agreed on to do their part in order to reach them, are; to "end poverty", "decent work

[4] "Sustainable Development Goals", United Nations, http://www.un.org/sustainabledevelopment/sustainable-development-goals/

[5] Boulding, Kenneth E. 1966. *The Economics of the Coming Spaceship Earth.* Environmental Quality in a Growing Economy. Pp.3-14 Batimore, MD: Resources for the Future. Johns Hopkins University Press

[6] Daily, Gretchen C. Ehrlich, Paul R. 1996. *Socioeconomic Equity, Sustainability, and Earth's Carrying Capacity.* Ecological Applications, Vol. 6, No. 4, pp. 991-100

and economic growth" and to " reduce the inequalities"[7]. In fact, this thesis is mostly related with these goals than the others as their main curators are the governments even though there is a clear mutual responsibility of many parties. Preventing economic instability or at least taking necessary precautions on time to decrease the relevant problems have become important tasks of today's states. One of the most vital prerequisite of a well-functioning economy is fair distribution of income which is also a building block of sustainable development. Thus, the governments try to maximize the social welfare with their functions of resource allocation, income distribution and stabilization by using the instruments of taxation, spending and borrowing. And the historical records suggest that all good things come to those who tax more[8].

The main goal of a tax system is to generate revenues for governments. A tax system should be congruent with the basic values and principles of a good tax policy such as simplicity, certainty, transparency, convenience of payment, equity (fairness) and neutrality. According to the neutrality principle, tax laws should limitedly affect decision-making processes and the overall effects should be minimal if available. However, policymakers generally ignore the neutrality principle by creating rules that use the tax laws to encourage and discourage certain behaviour[9]. Due to the fact that taxation seems more preferably than some other versions of means for environmental policy implementation, there does not appear to have been much in the way of thinking about or policy advice on taxation per se against the backdrop of interests for sustainability promotion[10]. Of course spending and borrowing are also vital means, but another vast forest which need to be studied separately. This thesis thus attempts to question whether to create a tax system to support sustainable development is possible, by restricting the scope of the perspective; it only focuses on the sustainability in terms of economic development and its relation to income taxation. Personal income taxation plays a vital role in todays' taxation systems since it has been implemented as an

[7] "Sustainable Development Goals", United Nations, http://www.un.org/sustainabledevelopment/development-agenda/

[8] Cathal Long, Mark Miller. *"Taxation and Sustainable Development Goals, Do good things come to those who tax more?",* Overseas Development Institute Briefing Note, April 2017

[9] Annette Nellen, Monika Miles. *"Taxes and Sustainability*", (Journal of Green Building:Vol. 2, No.4, 2007) pp. 57-72.

[10] Common, Mick. *"Taxation and Sustainability"*, Centre for Resource and Environmental Studies, Australian National University

effective tool of fiscal policy. Income tax not only improves the income distribution, as it is personalized due to the characteristics of the tax payer, but also has ability to effect the allocation of resources by letting the authorities to provide various incentives. Additionally, individual income taxation may lead to an auto economic stability in case of the existence of optimum conditions.

Nevertheless, other side of the coin is that critics have also been asserted to point personal income taxes as the reason various fiscal and economic problems, stating that it has paved the way of extravagant spending or increased the vulnerability of revenue collections where some of these critics have called for the unrequited abolishment of income tax while others have suggested that it should be less progressive[11]. The income tax, as it has been for much of its history, under serious challenge for its distortive burden on the economy, for its complexity, for its progressivity and for its lack of progressivity.

Despite of its globally recognized importance, as it is accepted more widely, the concept of sustainability has continuously suffered from ambiguity which I believe that should be brighten first. This is also needed in order to create a healthful linkage between these two concepts, namely personal income taxation and sustainable development and as well as to be able to build the bricks of study area before questioning the possibility of a tax system to support sustainability. For this purpose, the following chapter has been prepared to shed light on the conceptual confusion of sustainability as well as its historical development timeline.

The following chapter attempts to dissipate clouds of the conceptual ambiguity of sustainability, even albeit a bit, as it only focuses on economics as a specific field. In the third section, I discuss the importance of measurement and point to the practical difficulties for defining indicator sets by using examples from current implementation. In the fourth section, I try to define how taxation can be placed in the aim of sustainable development. The fifth chapter of the paper questions whether progressive income tax can be a solution for the sustainable development. For the sake of the above mentioned purposes, the sixth section comprises a deep analysis by focusing on pre-tax and after

[11] Institute on Taxation and Economic Policy, *"The Progressive Income Tax: An Essential Element of Fair and Sustainable State Tax Systems",* July, 2012.

tax Gini coefficient's for sample countries which are chosen based on their national level of income (developed, less-developed, developing etc) and their taxation system (progressive, non-progressive). Comparing the Gini's after tax system changes, I aim to see the effect of progressive taxation on income inequality which is an essential step for sustainable development.

2. SUSTAINABILITY – CONCEPTUAL CONFUSION

"Sustainability in an evolving world can only mean sustainable development."

Hartmut Bossel[12]

Borne from the verb of sustain with the meaning of keeping in existence, sustainability leads to a continuous action but not limited to, as it also refers to an elective dependency on an external factor. Being continuous can be realized without depending on any kind of a will but being sustainable can only be achieved with a preference even if all conditions are met. This dependency can best be observed by the word sustainability's very nature once its stringent necessity for another word is being noted.

Before linking it to a desired system, namely a taxation system whose reality will be questioned as the subject of this paper, a more clear understanding of the term "sustainability" is needed since a conceptual confusion exists. This ambiguity probably arises because of the wide-ranging meaning of sustainability itself as it encloses a process rather than an event which already occurred or will or expected to be happened in a specific point in time. Adding to this complexity of continuity, the concept of sustainability often faces with confusion since it is usually evaluated as a goal desired to be reached in a long period of time. Defining it as a future aim not only struggles with the uncertainty but this inevitable definition also keeps one's place away from sustainability by turning it into such a concept that not needed to be concern now.

The prerequisite of sustainability is to sustain nature's functioning and services for humans over the long term.[13]However long-term is the vital point here by its meaning of the "future" which is as an indicator of the "uncertainty "and the question arises of how to define and operationalize sustainability under uncertainty[14]. Not only

[12] Bossel, Hartmut. *Systems and Models, Complexity Dynamics, Evolution, Sustainability*, Books on Demand GmbH, Norderstedt, Germany, 2007, p.285

[13], [4] Baumgartner, Stefan. Quass, Martin F. *"Ecological-economic Viability As a Criterion of Strong Sustainability Under Uncertainty"*, Revised version of Working Paper No.67, (November 2007), University of Lüneburg Working Paper Series in Economics: 2.

has its long-run structure led to a struggle with the problem of uncertainty, the concept of sustainability has continuously suffered from an ambiguity. Adding to its complexity arise by its very nature, studies that has been made on sustainability appreciably range among the different fields and also studies of the same fields are mostly self-contradictory.

Obscurities on sustainability also comprise its expansive usage on various fields of work including environmental sciences, economics and business operations. However, the concept of sustainability in economics is suffering more than the others in terms of the conceptual complexity. Similar to the confusion of economic development and economic growth, being sustainable is often used as an adjective for both but wrongly evaluated as the same. To develop something refers to an extension or realization on its potential, or to bring something to a mature state. Thus, economic development not the same as economic growth, where the latter referring to an inflation-adjusted increase in the gross domestic product[15].

There is a potential for economic advancement based upon development rather than growth- an economic progress that is not at the expense of the environment, but oppositely tries to force economic activity and human skills into biogeochemical cycles and align the economic system within the context of the total definite global life-supporting environment[16]. Hence, sustainability's role of being a long-term goal and its attached ambiguity mentioned before should be more related to the development rather than growth since the possibility of sustaining an endless growth may be disputable. Or to explain it in a one sentence; Worrying about future generations would be unnecessary if unlimited growth were possible[17].

The relationship between sustainable development and sustainability could also be a matter for some debate. Sustainable development is a disputable and troublesome concept that is difficult to define decently- and even more difficult to

[15] Hackett, Steven C. *Environmental and Natural Resource Economics. Theory, Policy and the Sustainable Society,* 4th Edition (New York: M.E. Sharpe Inc., 2011), 325.
[16] Jansson, AnnMari, Hammer Monica, Folke Carl, Costanza Robert. *Investing in Natural Capital: The Ecological Economics Approach to Sustainability,* (Washington DC, Island Pess, 1994), 7.
[17]Tietenberg, Tom, Lewis Lynee. *Environmental and Natural Resource Economics***,** 4th Edition.(Pearson Addison Wesley, 2009)

practice. Nevertheless, most debates about sustainable development are concentrated at the vital relationship between environment and development.[18] Definitions of SD have matured as a fluxional process of change that searches for the conclusive purpose of sustainability itself. In this context, sustainability is a competence of a human, natural or mixed system to resist or adapt to endogenous or exogenous change indefinitely (DOVERS; HANDMER, 1992), represented as a goal or end point (HOVE, 2009). Therefore, to achieve sustainability, sustainable development is required (PRUG; ASSADOURIAN, 2003).

Sustainability can be divided into two different aspects: weak and strong sustainability. Weak sustainability is mostly related with the improvement in the economic indicators of a country (NEUMAYER, 2003), where consequently the economic capital produced by current generations can compensate for loss of natural capital for prospective generations (FIORINO, 2011). Thus, weak sustainability ensures that natural capital is conserved when the case is related with non-renewable resources. While this concept of sustainability leads to substitution for resources in a way that natural resources are preserved, strong sustainability does not content itself with substitution and claims that the resources cannot damaged or be devoured as the rights of future generation should be protected first. Consequently, the concept of strong sustainability asserts that natural capital should be preserved, with a partial backup if possible, so that their functions remain intact[19].

Sustainability as an only word is a hovering one with a high level perplexity while accompany of another term turning it to an adjective which leads to a detectable level of significance; sustainable environment, sustainable energy, sustainable

[18] SOAS University of London, *"The Challenge of Sustainable Development",* Unit 1, p.501, https://www.soas.ac.uk/cedep-demos/000_P501_USD_K3736-Demo/unit1/index.htm

[19] Simone Sartori, Fernanda Latrônico da Silva, Lucila Maria de Souza *Campos ¨Sustainability and sustainable development: a taxonomy in the field of literature",* Ambient. soc. vol.17 no.1 São Paulo Jan./Mar. 2014.

economics or sustainable development. In this paper sustainability is used as sustainable development in the context of the examination of whether the required will to achieve a sustainable economic and social development of society has been correctly and sufficiently realized.

2.1. Historical background – From Brutland to Today

The term of sustainable development, has initially been suggested as an alternative to the manufacturing process of raw materials to products which is a process that is only based to economic utility posing an obstacle to the social development. The term then generally acknowledged by a series of international meetings at the beginnings of 70s and 80s. Published in 1972, in the Report to The Club of Rome, Donella and Deniss Meadows then draw attention to the exponential trend in population and pollution with industrialization and state that there should be a limit of this growth. "It is possible to alter these growth trends and to establish a condition of ecological and economic stability that is sustainable in the future." Their limitation suggestion was also congruent with the based- on -preference frame of the term of sustainability as they linked it to the world's people decision to strive for limitation rather than being a part of the ravenous trend. The article ends with an emphasis on a need for a world-wide, long term goal which would assist the mankind to shift from growth to global equilibrium.

Second step was on the same year's June in Stockholm where the first UN conference on the subject of environment and human being relation was held with the participation of the representatives coming from 113 countries, ngos and many other institutions. It was not pioneering only for a global conference on environment but also as the first international meeting concentrated on human activities in relationship to the environment, and it enabled environmental action to be adopted at an international level. The participants of the conference mutually agreed on the acceptance of the fact that the purpose of decreasing human impact on the environment would need international cooperation on macro level, since most of the problems affecting the environment are global by their nature.

If one is speaking about the definitions of sustainable development, it is inevitable to mention the definition provided by the World Commission on

Environment and Development in other words the Brutland Commission in 1987. The commission defines sustainable development as follows;

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

By this commission, the term of sustainable development was clearly defined for the first time as the development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Gathering up the threads of the term, commission was aggregated individual's preferences by proposing a one "common future" and common concerns, challenges and endeavors.

Five years later, in 1992, the first international Earth Summit assembled in Rio de Janeiro, Brazil, with the participation of more than 100 state representatives. The summit aimed to remark urgent problems of environmental protection and socio-economic development. As an important outcome, the Convention on Climate Change and the Convention on Biological Diversity was signed by the participant leaders which is a 300 paged plan stating 21st century sustainable development goals.

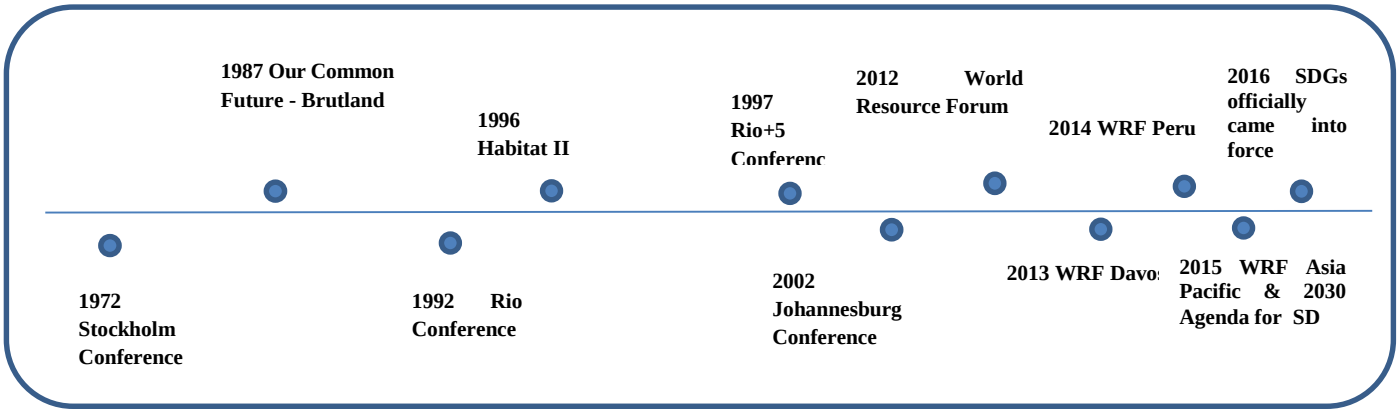
In 1996, United Nations conference on Human Settlements (Habitat II) was held in İstanbul, Turkey. The purpose was to address two different themes with equal global importance; "adequate shelter for all" and "sustainable human settlements development in an urbanizing world.

A year after, the Rio+5 Conference was held as a review of the work for the UNCED's agreed implementations. With purpose of revive and strengthen commitment to sustainable development, the participants also had worked on the failures and reasons behind for the each case, recognize achievements, determine the priorities and problems as an addition to the ones addressed in Rio. The conference concluded that the progress made was relatively little, especially in terms of social justice and poverty, as well as greenhouse gases. The meeting declared two projects: the "Programme of Work of the Commission for 1998-2002" and the "Programme for

the Further Implementation of Agenda 21", which is an action plan for the following five years[20].

More general comparing to Rio conference, another political commitment, which is known as Earth Summit 2002 or Johannesburg Declaration on Sustainable Development, had been realized, where implementation plan of world summit for Sustainable Development was accepted by the participant parties. It was built on previous declarations made at the UN Conference (Stockholm 1972) and the Earth Summit (Rio, 1992)

Calling for more functional global governance for the resources, developing countries and emerging economies had met at the 2012 World Resources Forum in China to design future world resources strategies. The forum recommended an international resource platform establishment and comparing to the current implementation agent, International Energy Agency, it should begin to count in developing and emerging economies from the very beginning of the process.



Graph 1: Timeline of the Global Performance

According to the 2012 World Resources forum Resource and Green Economy meeting report, here is one of the factor which was determined as essential;

[20] Switzerland Federal Office for Spatial Development, ARE https://www.are.admin.ch/are/en/home.html

"A scarcity of resources, increasing prices, and unsustainable use of resources can hinder economic development, lead to poverty and social unrest; these factors pose risks for global stability."

As a reaffirmation of the commitment to 2012 UN Conference, several WRFs were organized where high level politicians attended. WRF 2013 was held in Davos, Switzerland hosted over 400 participants. WRF 2014 was held in Peru and over 1000 participants from various countries were at the organization. WRF Asia-Pacific 2015 was held in Sydney with approximate number of over 250 participants. WRF 2015 was held in Davos with over 600 participants from 108 countries.

With the aim of going to actions from visions, leaders and participants called for a smooth process that unifies dimensions of sustainable development in a poised way and which should have worked towards action plans rather than setting set of goals. However, the leaders of the countries have adopted 17 Sustainable Development Goals in the context of 2030 Agenda for Sustainable Development by an UN global summit.(These goals officially came into force on 1st January 2016.) Although there is no legal sanctions applied for these goals, policy makes are expected to take their own responsibility for the local implementation and ensure local cooperations for the achievement of the SDGs for which the pace of progress is still accepted as insufficient despite the considerable progress has been made over the past decade[21] .

Sustainable development, was again specified as a global objective which should be adopted as the overriding goal with an international cooperation. When one focuses on the fact that this idea, -of course not the idea of sustainability itself but stating it as a global objective- has been asserted 26 years ago, the global performance *(see Graph 1 for the detailed timeline)* until present may be questioned.

Two conclusions can be derived accordingly; first, as it can be seen obviously, sustainable development has not been *really* accepted as a global goal yet. If it is accepted why do we need any detection about the unsustainable use of resources and their negative effects on economic development? Second, we, "as a

[21] "Sustainable Development Goals", United Nations, http://www.un.org/sustainabledevelopment/development-agenda/

future generation" who the Brutland commission stated in 1987, have serious problems about our ability of meeting our own needs; we define scarcity of resources as a factor which pose risks for global stability. Without being so far from the

Table 1: Sustainable Development Goals , Agenda 2030

SDG	Detail
No Poverty	*End poverty in all its forms everywhere*
Zero Hunger	*End hunger, achieve food security and improved nutrition and promote sustainable agriculture*
Good Health and well-being	*Ensure healthy lives and promote well-being for all at all ages*
Quality education	*Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all*
Gender equality	*Achieve gender equality and empower all women and girls*
Clean water and sanitation	*Ensure access to affordable, reliable, sustainable and modern energy for all*
Affordable and clean energy	*Ensure availability and sustainable management of water and sanitation for all*
Decent work and economic growth	*Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all*
Industry, innovation and infrastructure	*Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation*
Sustainable cities and communities	*Make cities and human settlements inclusive, safe, resilient and sustainable*
Reduced inequalities	*Reduce inequality within and among countries*
Responsible consumption and production	*Ensure sustainable consumption and production patterns*
Climate Action	*Take urgent action to combat climate change and its impacts*
Life below water	*Conserve and sustainably use the oceans, seas and marine resources for sustainable development*
Life on Land	*Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss*
Peace, justice and strong institutions	*Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels*
Partnerships for the goals	*Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development*

ambiguity mentioned in the earlier chapter, the reason of failure has been come into being not just because of the global passivity but also because of the abstruse conceptualism of sustainability which is usually understood as an attribute of future development.

Holden, Linneraud and Banister (2017), criticize even the SDGs for being "vague, weak and meaningless". They assert that there should be a distinction between primary and secondary goals as the priorities may differ especially on a country level. The conceptual confusion we mentioned in the above chapter fits well to this point. Sustainability itself is adequately complicated, the road to achieve it should not be. The number of goals can be limited also as too many goals amount to having no goals at all especially without any priorities[22].

[22] Holden, Linneraud and Banister. *"The Imperatives of Sustainable Development",* ISDR Sustainable Development, Volume 25, Issue 3, May-June 2017, p.167-266

3. MEASURING SUSTAINABLE DEVELOPMENT

"Sustainable development has become a widely recognized goal for human society ever since deteriorating environmental conditions in many parts of the world indicate that its sustainability may be at stake. But how do we know for sure? And how can we tell when we are on a path of sustainable development? We need appropriate indicators."

Hartmut Bossel, 1999[23]

After 20 years of Bossel's statement above, we still have the problem of not having appropriate indicators. Sustainable development is a popular and important concept, but one that is difficult to define with precision and, therefore, difficult to measure[24].

Recent year's literature is quite fruitful in terms of of methods and indicators to measure sustainable development. Bossel, for instance, defines sustainable development with a holistic approach, puts emphasis on various constraints to restrict possible development paths and their measurements.[25] (see Graph 2) Many countries and organizations have adopted sustainable development indicator sets to track progress towards a sustainable society. However, the differences between the approaches remain large[26].

---

[23],[25] Bossel Hartmut, *Indicators for Sustainable Devleopment: Theory, Method and Applications*, A Report to the Balaton Group, International Institute for Sustainable Development, Canada, 1999, Background and Overview

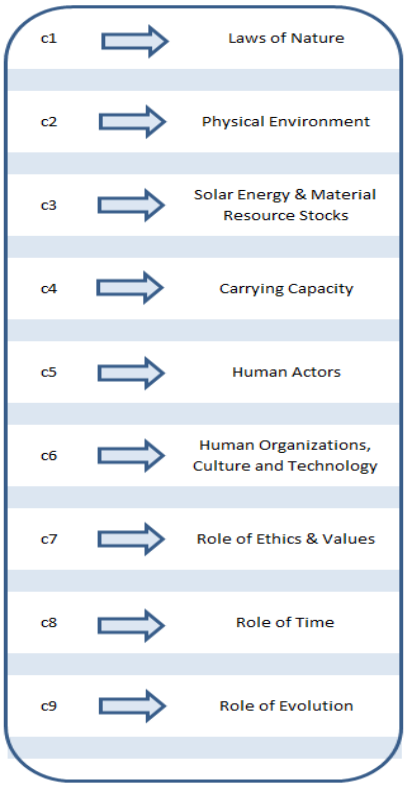
[19],[24],[25], Report of the Joint UNECE/OECD/Eurostat Working Group on Statistics for Sustainable Development, *Measuring Sustainable Development*, (United Nations, New York and Genova , 2009)

3.1. Existing Indicator Sets

While indicators of sustainable development were already on discussion within the context of environmental economics as early as the 1970s, a renovated invitation for such indicators was really formulated in Agenda 21, which is one of the principal documents appeared as a result of the 1992 United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro.[27] It was decided that the gross national product, which had been used as an indicator, was insufficient in terms of providing adequate indication of sustainability. A common need for developing new indicators was underlined by calling international governmental and non-governmental organizations for cooperation in this context.

The call was well-placed with the establishment of United Nations Commission on Sustainable Development whose primer task was to monitor actors' efforts on developing and using indicators. Additionally some European countries developed their own indicator sets.

One of the most important attempts to develop data on this context has been adopt by the joint task force of UNECE/Eurostat/OECD which aims to continue the previous work of Working Group on Statistics for Sustainable Development. This initial work of the group was constituted by the Conference of European Statisticians, known as CES, with the purpose of gathering good experiences and practices. The goal was to help countries on local level and international organizations in global level to model sustainable development indicator sets and to assist official statistics in this context.



Graph 2: Bossel's Constraints for Sustainable Development

Bossel Hartmut, *Indicators for Sustainable Devleopment: Theory, Method and Applications*, A Report to the Balaton Group, International Institute for Sustainable Development, Canada, 1999, Background and Overview

There are three main publications of the group; the first one published in 2009 "Measuring Sustainable Development" was created with the assistance of the Organization for Economic Co-operation and Development and the Statistical Office of the European Communities (Eurostat). The conceptual ambiguity of sustainable development also arises in this study as the report indicates that the working groups opinions were mostly mutual on many important concepts, especially about the relationship between short/long term welfare and sustainable development. According to the one of the works of the group, which belongs to the members of the integrated view, claims that the purpose of sustainable development is to preserve both the welfare of current generations and prospectively of future ones.

The second, labeled the future-oriented view, held that the concern of sustainable development is properly limited to just the latter; that is, sustainable

development is about ensuring the potential for the well-being of future generations.[28] However, as congruent with the many studies on sustainable development, rather than solving this debate, the group has decided to work on the commonalities of the two different views; integrated view and future- oriented view. Namely, the commonalities studied on are for the current local and global indicators of sustainable development where the most of them are located on the integrated view and only few of them are not aligned with the capital approach that but with the future oriented view.

3.2. Capital Approach Theory

Sustainable development is a process of change in an economy that does not violate such a sustainability criterion and based the dominant views are based on the idea of maintaining a capital stock as a prerequisite for it[29].

According to the capital approach, non-declining per capita wealth over time is the main definition of sustainable development and it refers not only the wealth of society but the main source of the concept. By taking the perspective of capital, the challenge of sustainable development is simplified into a question of whether a country's total capital base – or total national wealth – is managed in a way that secures its maintenance over time[30].

Although most of the economists think that the capital theory approach (CTA) is beneficial for uttering sustainability concerns, the presence of many other critics is actual factual. Stern (1997), underlines the difficulties in using and applying the CTA from a point of view that internal to neoclassical economics and the problems with this approach from a viewpoint external to neoclassical economics where the critique includes an analysis of the compatibility of sustainability, as originally conceived in

[28] Report of the Joint UNECE/OECD/Eurostat Working Group on Statistics for Sustainable Development, *Measuring Sustainable Development*, (United Nations, New York and Genova , 2009)
[29], [23] Stern, David I., " The Capital Theory Aprroach to Sustianability: A Critical Appraisal", *Journal of Economic Issues*, Vol. XXX, No.1, (1997) : 145,
[30] Report of the Joint UNECE/OECD/Eurostat Working Group on Statistics for Sustainable Development, *Measuring Sustainable Development*, (United Nations, New York and Genova , 2009)

the Brutland Report and elsewhere, with the institutional approach of instrumental valuation[31].

Measuring Sustainable Development Report (2009) also underlines the limitations of the CTA stating that the theory cannot be built on monetary indicators only; *i.* the capital's contribution to well-being is not easy to identify, *ii.* even it can be identified, it is still not easy to turn their value into currencies or other monetary units of measure, *iii.* degree of sustainability among capital types: non-critical capital and critical capital are not the same and it is not true to act them as if they are.

Measuring Sustainable Development Report, thus suggests an alternative approach by stating that to estimate the contribution of a fair range of capital assets to what might be called the economic component of well-being is possible by using market prices as guide. The Working Group than proposes a "practical" set of sustainable development indicators with the aim of being the basis for international comparisons. It should be noted that this set is still consistent with the capital approach.

3.3. Sustainable Development Indicators – Latest Proposals

Recent year's literature is quite fruitful in terms of of methods and indicators to measure sustainable development. Even though there are several composite indicators that have been proposed in the context of the related literature, many institutes have embarked on different sets of sustainable development indicators (SDI) to observe and measure evolution towards a sustainable society. Due to the fact that the assistance of these kind of initiatives is obvious to conitinously put sustainable development on global and local agenda, the differences between the approaches remain large. [32] Therefore, UNECE jointly with Eurostat and OECD published an updated report which is primarily aimed at statisticians but also be relevant for policymakers. Various studies have been analysed by the working group;

[32] United Nations Economic Comission For Europe, *Conference of European Statisticians Recommandations on Measuring Sustainable Development*, (Newyork and Genova, 2014)

i. Human Development Index (HDI) by UNDP Human Development Report: Education, health and income dimensions included.

ii. The Stiglitz-Sen-Fitoussi Report: Identification of main dimensions of human well-being: material living standards, economic insecurity, social connections and relationships, environmental conditions and political voice and governance.

iii. Layard's Research on well-being (2005): Main determinants of well-being, financial situation, family relations, work, community and friends, health, personal freedom and personal values.

iv. Findings of Eurostat's Expert Group on quality of life indicators: in line with recommendation of the Sponsorship Group on Measuring Progress, Well-being and Sustainable Development

v. The OECD report How's life

The list on the suggested indicators of sustainable development goes on and it is everlasting which is impossible the analyze each within the scope of this paper.

Indeed, this study will proceed within the limits of Holden, Linneraud and Banister (2014)'s "sustainable development space", which is a four dimensional space comprise of four threshold values created in accordance with the literature that develops and assesses sustainable indicators. They argue that, the primary indicators and their threshold values represent equally important targets that must be fulfilled. Their initial four dimensional model is based on;

1- Safe guarding long term ecological sustainability with the indicator "ecological footprint"
2- Satisfying basic human needs with the indicator "human development index"
3- Promoting intragenerational equity with the indicator "Gini coefficient"
4- Promoting intergenerational equity with the indicator "renewable energy"

Their dimensions and relevant thresholds which will also be used in this study are as follows;

3.3.1 Ecological Footprint

Basically, enduring ecological systems which are caused by the interrelation of the living and their surrounding abiotic environment are called ecosystems and they are a part of a bio system. We, as the human race, are also a part of the biosphere not the owner as opposite to the current common idea, but the most vicious users of it. Thus, if one is studying about the sustainability concept, it is inevitable to elaborate the effects of human on biosphere. Ecological footprint can precisely appear as a light of this elaboration which can be used for the assessment of the amount/ratio that the human activities' occupation on biosphere.

Threshold: Needs to be less than 2.3 global hectares for SD.

3.3.2. Human Development Index

Human Development Index was created by UNDP to emphasize that people and their capabilities should be the ultimate criteria for assessing development of a country, not economic growth alone. The index is a summary measure of average achievement in key dimensions of human development; a long and healthy life, being knowledgeable and have a decent standard of living[33]. (calculated with the geometric mean of normalized indices for each three dimensions.)

Threshold: Needs to be more than 0.63 for SD.

3.3.3. Gini Coefficient

Invented by the Italian statistician, Corrado Gini, the Gini coefficient is a measure of deviation of the distribution of income among individuals or households within a country from a perfectly equal distribution. A value of 0 represents absolute equality, a value of 100 or 1 absolute inequality.

An equal distribution income is a vital concept in terms of sustainable economic development and various studies support that inequality has a negative effect

[33] United Nations Development Programme, Human Development Reports, *Human Development Index*, http://hdr.undp.org/en/content/human-development-index-hdi

on growth.[34] As mentioned before, in this thesis, we study the impacts of the development not the growth but the importance of income inequality is obviously valid for both. Income inequality and other reasons among countries in the world resulted in the countries having different levels of development.[35] In order to ensure that the development can be sustainable, local economic and social inequalities should be solved first. Sustainable development should become the matter of all actors in society so that the goals and plans can be useful in practice. However, if some of the members of the society are dealing with the problem of hunger; sustainable development will become not only a complex but also an injudicious concept. Moreover, the efforts of the high income earners on sustainability will be limited. The sustainable development should be adopted by all of us so that it can become a priority not a goal to be achieved in an uncertain level of time.

Obviously, distribution of economic resources in an equal way throughout an economy is essential for an economic development. The impact of income equality on sustainable development leads to a snowball effect: more equal distribution of income in a country, increase in economic development, increase in resources allocated for the sustainable development, positive effect on the way of sustainable development. Thus, we include the Gini coefficient on our analysis to see the effect of income inequality.

Threshold: Needs to be less than 40 for SD.

It should be noted that, the fourth dimension which is "Renewable energy" will be excluded in this paper in order to stay on course of the study as even I believe that it is a very important indicator to assess sustainable development, my study is more related with the economical part of SD and it's relation with taxation. Excluding this dimension, does not mean that our model also excludes "intergenerational equity" which refers to let the future generations be able to meet their needs. This concept is directly related to the sustainability logic itself and thus been also measured with the

[34] Cingano, F. (2014), "Trends in Income Inequality and its Impact on Economic Growth", OECD Social, Employment and Migration Working Papers, No. 163, OECD Publishing. http://dx.doi.org/10.1787/5jxrjncwxv6j-en

[35] Demirkıran Senem, Onurlubaş Ebru, Turan Cem, "Fight Against Poverty for Local Sustainable Development: Example of Turkey" Akademik Bakis, Vol.49 May-June 2015

other three dimensions' indicators'. Therefore, the analysis on this paper will be a three dimensional one.

Holden, Linneraud and Banister (2014)'s model approaches sustainability as "strong sustainability" and they believe that all indicators used should be globally addressed in order to become really useful. By their work, they mentioned that the policymakers should be sure of all of the four dimensions' thresholds are met and sustainability is achieved without compromising other important principles. All of these perspectives can be accepted as mutual with our work with the exception of their opinion about economic development. Opposite to general three pillar approach, they believe that economic growth should not be one of the primary dimensions of sustainable development. In their other paper (2017), they clearly mention that this does not mean that economic growth's contribution to sustainable development by improving welfare is disclaimed. But they assert that the economic growth may also lead to inequalities so that its contribution may be turned into something undesired. This approach is obviously quite far away from the position of this paper, as the main question is to find out if taxation can serve sustainable development and how. We, by the way, use economic development instead growth, which may prevent itself from the prospective concerns of undesired results of economic improvements.

In the same paper, Holden, Linneraud and Banister (2017), creates a new model for sustainability, with a wider range of thresholds. They add MPI for poverty and EIUDI for ensuring rich participation and also two other bio-ecological indicators. HDI and GINI are still on the model but the initial's threshold increases to 0.70 while the latter's remains the same with 40 points. However, in this paper we will use the first model as mentioned above, since the indicator elections seems to be much congruent with our perspective.

4. TAXATION AS A PART OF SUSTAINABLE DEVELOPMENT

Preventing economic instability or at least taking necessary precautions on time to decrease the relevant problems have become important tasks of today's states. One of the most vital prerequisite of a well-functioning economy is fair distribution of income which is also a building block of sustainable development.

By its nature, functioning type of market economy is generally has a spoiling effect on income equality whereas public economy continuously tries to stabilize it by mean of tax and spending policies. By its main object of maximizing social welfare, it tries to do that with its functions of resource allocation, income distribution and stabilization by using the means of fiscal policy: tax, spending and borrowing.

Resource allocation refers to distribution of resources between public and private market in order to efficiently meet the needs of these markets. It should be noted that resource allocation is one of the most important economic functions of public economy as it is not possible to increase the national income without achieving efficient allocation of private and public resources. This need of efficient resource allocation is of course not limited to the sources of public and private market but also refers to allocate resources in such a way that meets the needs of the present without compromising the ability of future generations to meet their own needs. One can easily note that this is actually the globally agreed definition of sustainable development. Present generations private needs are met by the private economy while the social or public ones are met by the public economy.

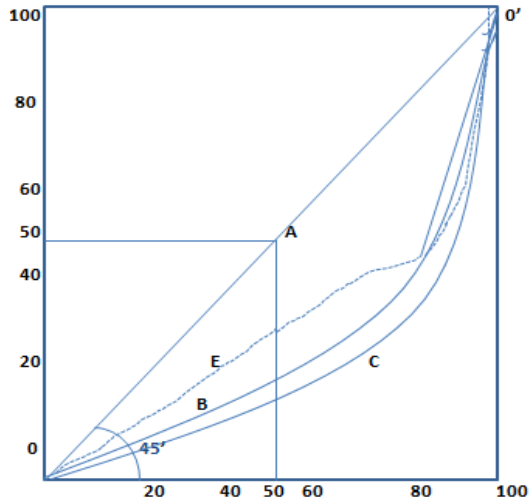
On the other hand, the income distribution function of the public economy can be defined as to distribute the real income and wealth between the populations in a fair way. Income inequality is globally accepted as a world-wide problem that requires global solutions and declared as the 10^{th} goal of UNDP Sustainable Development Goals. Therefore, it is vital to clearly understand the income distribution function of public economy in order to step forward through the ambiguity of sustainable development concept.

According to the estimation of the Sustainable Development Solutions Network, low and lower middle income countries may need to increase public and private expenditure by some $1.4 trillion per year in order to reach SDGs.[36] Therefore, these countries must find out how to increase their overall tax collections to create the resource allocation for the SDG investments. Tax is, in fact, is a vital concept for sustainable development to support some specific goals but more importantly for the budget allocated by the governments to achieve SDGs. The tax collection system adopted by a country can hearten the economic development but also may oppositely work and lead to market failures. A progressive tax system may help to address inequality and promote economic improvements. Thus, especially for the low and lower middle income group countries, the tax system must be designed in a way that fair, sustainable economic development is supported and it should reduce income inequality.

The questions of "how equal and how fair" is of course related to value judgments of society, but in economics the "Lorenz Curve Analysis" also serves this purpose. This analysis refers to a graphical distribution of wealth developed by Max Lorenz (1906), in which the percentage of total income earned by various portions of the population is plotted when the population is ordered by the size of their incomes[37].

[36] KPMG, The Global Responsible Tax Project, *"The Impact of Tax on Delivering the Sustainable Development Goals"*, https://responsibletax.kpmg.com/page/the-impact-of-tax-on-delivering-the-sustainable-development-goals

[37] Gastwirth, Joseph L. "*A General Definition of the Lorenz Curve." Econometrica*, vol. 39, no. 6, 1971, pp. 1037–1039. *JSTOR*, JSTOR, www.jstor.org/stable/1909675.



Graph 3: Lorenz Curve

Prof. Dr. Orhan Şener, *Public Economics*, Beta, 13th Ed., Istanbul, 2016

As it can be seen from the Graph 3, the horizontal axis cumulatively shows the ratio of current number of families lowest income to highest in society / total number of families Based on this, first 20% of total number of families is lowest level of income group while the second 20% is low-middle, third 20% is high-middle and the last 20% is high level of income. Vertical axis, on the other hand, cumulatively shows, again with 20% ratio based, the shares that each income level group takes from the national income, in case of perfect equal share of income. According to the graph;

- 45 degree Line (00'): Spots perfect equality (line of equality)
- (0D0'): perfect inequality
- Line B: Current status in society

Therefore, convergence of Line B to D refers to more inequality while it becomes more equal if approaching to Line (00')

As previously discussed, with its functions of taxation, spending and borrowing, public economy endeavors to improve income equality. This effort can be shown in terms of the above graph, by repositioning of the Lorenz curve after

implemented tax and spending policies. Assuming that the current position of the Lorenz Curve is Line B, it can be approached to Line (00') with implemented tax policies enhancing income inequality or to D vice versa.

The effect of the implemented fiscal policy on income distribution is measured by the "Gini Coefficient" which provides more real comparison of pre-tax and after-tax results. When it is explained on the Graph 2, the Gini coefficient is the ratio of the area of Line B to Line (00') to a right-angled triangle which means Line B(Gini) = (0B0')/0D0').

As it was mentioned in the chapter where sustainable development indicator were explained, A Gini coefficient approaching to 1 leads to an increase in income inequality, the closest one to 0, and the best in terms of fairness on income distribution. However, one should be note that it will not be correct to interpret the result as there will be no change in income distribution if pre-tax Gini and Lorenz Gini are the same. If the tax policy has been militated in favor of high level of income, the changes in both income levels will neutralized themselves and thus Gini coefficients will be the same. Therefore, Gini coefficient comparison should be analyzed considering the fact of which income level group will be benefited from the relevant tax policy. In the following chapters of the paper I use the Gini coefficient to analyze the effect of tax policies in sample countries where progressive taxes are implemented.

Each sustainable development goal may be linked to tax, but when the context of the paper is taken into consideration, some of the goals may become prominent. Goal 10, for instance, "reduce inequality within and among countries" signals to a need for a progressive income tax system for all members of society. Goal 17, "strengthen the mean of implementation and revitalize the Global Partnership for SD" leads to the creation of broad based tax regimes which are supported through international cooperation, transparency, collection mechanism and capacity building.[38] Also increasing the tax collection ratios with high participation of taxpayers is linked to this goal so that tax avoidance can be decreased.

[38] KPMG, The Global Responsible Tax Project, *"The Impact of Tax on Delivering the Sustainable Development Goals"*, https://responsibletax.kpmg.com/page/the-impact-of-tax-on-delivering-the-sustainable-development-goals

As well as being relevant to specific SDGs, tax is obviously essential to raise revenue for the overall development. Making tax laws clearer and easy to understand, increasing transparency, ensuring the tax collection is implemented with a fair process, may encourage investment and trade which can benefit the overall tax revenues.

In this paper the tax systems analysis is limited with the personal income taxation since it can be the most progressive, redistributive form of tax but also sometimes recognized as having a negative effect on growth. This is solely sufficient to work on it but also another reason is that the including all other types of tax will obviously may lead to a chaos within the limited context of the paper.

It should be noted that it is impossible to speak about a perfect tax system which can be beneficial to all of countries and will conclude with sustainable development. Every country has its own dynamics with various aspects and should found out the best for itself. However, as a general point of view, it is clear that how they will create and manage their tax systems will have an essential impact on the realization of SDGs and if not chosen to follow them like a model of Holden, Linneraud and Banister, on the implementation of preferred dimensions for sustainable development. Thus, this paper does not aim to show an ideal system but to highlight the importance of a clearer understanding of sustainably and to discuss whether taxation can be a fellow traveller on the road to achieve it.

In this context, in the Section B part of the analysis (see country data), tax systems of the countries that met the thresholds are studied to see if they are really on the line that is explained in the relevant chapters of this paper as a taxation system, and if there can be any improvements on their sustainable development status if their taxation systems would be different. With this purpose, first their income tax systems are studied and 3 types of taxation data are analyzed to see their overall position in terms of taxation. These data are; the percentage share of tax revenue in their GDP, percentage share of taxes on income, profits and capital gains on revenue and the share of taxes on goods and services again as a percentage share. Tax revenue as % of GDP is important to see the overall tax collection performance which is essential as a wider impact on sustainable development since it will create the budget that the countries may use to invest on SDGs or on the implementation of other preferred dimensions for

sustainable development. The other two data is chosen to see the status of the country's taxation system in terms of the distribution of direct and indirect taxes. The general trend is that the governments are frequently rely less on direct taxes and more on indirect that has recently received considerable attention in politics and academia[39]. The debate goes on whether if a greater reliance on indirect taxes is more efficient and that direct taxes have undesirable redistributive effects or reliance on direct taxes has a positive effect on economic growth. Since there are many studies on academic literature to find out the solution for a better system, we will not check this once again but just try to understand the overall implantation on Section B countries (Albenia, Armenia, Azerbaijan, Cuba, Indonesia, Georgia, Jordan, Moldova, Philippines, Uzbekhistan)

This will also let us know if progressive tax on personal income can be a solution to create a tax system that will support sustainable development. However, it should be noted that the aimed study will be limited because of the availability of taxation data on progressive taxation history of countries. Anyway, first it should be better explained what is really meant by progressivity and why this can be a solution or not which will be the subject of the next section.

4.1. Progressive Tax As a Solution

At the outset, it is once again important to clarify the usage of the term "progressive taxation." The discussion under this chapter is related to the total system and not to any particular tax. Progression in essence concerns the relationship between the distribution of the aggregate burden among taxpayers and the distribution of what might be thought of as their taxable capacity. The relative capacities of taxpayers can plausibly be derived by comparing incomes or expenditures or wealth.

Increasing tax rates directly proportional with income is an old story spans over more than thousand years with a huge literature. The very first beginning of the taxation history in this context stems from Greece with a focus on societal virtue in a collective moral sense and evolved to Utilitarian theories by 18th century mathematicians whose main focus is social welfare maximization.

[39] CESifo Group Dice Report, "*Direct and Indirect Tax Revenues*", 1/2008

When we come today, debates are mostly rhetorical. In today's world, progressivity usually is described and measured against a background of income. For the discussion ahead it is sufficient to label as "progressive" any system that takes in taxes a relatively larger share of income from the affluent than the less affluent. A wide difference of view exists as to the most appropriate concept of income tax and whether progressivity would be a real solution for comparing tax payers.

In his paper Corneo (2000) argues that a progressive income tax may improve the allocation of resources by reducing inefficient overwork. According to his study, a small progressive income tax generates a Pareto improvement whenever a Gini coefficient of the distribution of pre-income tax is lower than a critical level. In the work, it has been shown that implementing undistorted choices of working hours requires a progressive tax schedule and the optimal degree of progressivity decreases with the Gini coefficient of the distribution of pre-tax income.

Duncan and Sabirianova (2012), found that progressivity reduces inequality in observed income but had a significantly smaller impact on actual inequality. They have used several measures of progressivity over 1981-2005 periods for a various sample of countries and empirically showed that the differential effect on observed vs. actual inequality is much larger in countries with weaker legal institutions.

Using historical data in the United States covering the period 1962-2014, Oishi, Kushlev and Schimmack (2018), also found a positive correlation between progressive income tax and inequality as they concluded that the income inequality was substantially smaller in the relevant years when there were more progressive income tax rates.

Tanzi and Zee (2001), on the other hand, remark the importance of the effectiveness of rate progressivity which they believe that is severely undercut by high personal exemptions and the plethora of other exemptions and deductions that benefit those with high incomes. They define tax relief through deductions as vicious since they typically increase in the higher tax brackets. They moot that even if the generally accepted idea is that effective rate progressivity could be improved by reducing the degree of nominal rate progressivity, the number of brackets and reducing exemptions and deductions, a few nominal rate brackets in the personal income tax structure

would be sufficient and the man solution is to replace deductions with tax credits so that the same benefits to taxpayers in all tax brackets could be delivered even if political constraints prevent a meaningful restructuring of rates.

Progressive income tax generally conforms to the reasons such as value judgments of countries in terms of social justice, their efforts on realization of taxation and main functions of public economics and efficient financing of public spending. One may claim that both are really possible; to fulfill these purposes in practice and to enhance income distribution as well by a well implementation of progressive income tax.

In recent years, most of countries have inserted high levels of progressive income with the object of improvement in their income distribution. A personal income taxation system with different levels of rates is one of the most seen implementation in developing countries as they use it to emphasize their commitment to social justice and social justice and hence to gain political support for their policies. Not only developing ones but most of the countries frequently pay attention to implement nominal progressivity in their tax system with many tax brackets and they are reluctant to adopt reforms that will reduce the number of these brackets[40].

Consequently, when one may ask the question of if progressive taxation can be a solution for a tax system to support sustainable development, we can say that may be possible but with the below given circumstances.

- The increase of tax ratios should be lower for the low income level groups and higher for the opposite. Even in a highly socialist economy, where all who work are employed by the government, the shadow price of highly skilled labor should surely be considerably greater than the disposable income actually available to the laborer[41].

[40] Tanzi, Vito, Zee Howell, *Tax Policy for Developing Countries*, International Monetary Fund Publication, (2001)

[41] J.A. Mirrlees. "An Exploration in the Theory of Optimum Income Taxation", *The Review of Economic Studies*, Vo.38, No.2, (Apr., 1971), pp.175-208

- The wideness of income brackets should be determined considering the decreasing tendency of marginal utility of income. Namely, narrow brackets for lower income groups and vice versa.

- Throughout the highest income brackets, the marginal tax rate should be higher than the average tax rate.

It should also be noted that a poor implementation of progressive tax will also lead to a downturn on investment by creating negative effects on savings. In order to prevent such drawbacks, progressive income tax should be implemented with an increase on general revenue and with production of the public goods and services which distributes external economies.

As a consequence, progressive tax may lead to both fairness in tax and income distribution, but it should not be claimed as sufficient alone; taxation should be implemented in such a way that horizontal and vertical equities are achieved.

In general practice, there are three criteria which are used in the establishment of tax policies; horizontal equity, vertical equity and efficiency. Horizontal equity – the command that equals be treated equally- has received increase attention, refinement and application by the economists and has become ever more common in discussions of equity and fairness by others concerned with tax reforms[42].

According to the horizontal equity principle, every tax payer with the same level of income should pay the same amount of tax. However, for a successful implementation of this principle, income should be defined in terms of economics and let the tax base include all the relevant items of the definition. All types of income should be included in the unitary income tax return without disparity between monetary – non-monetary, pecuniary-moral, real- expected.

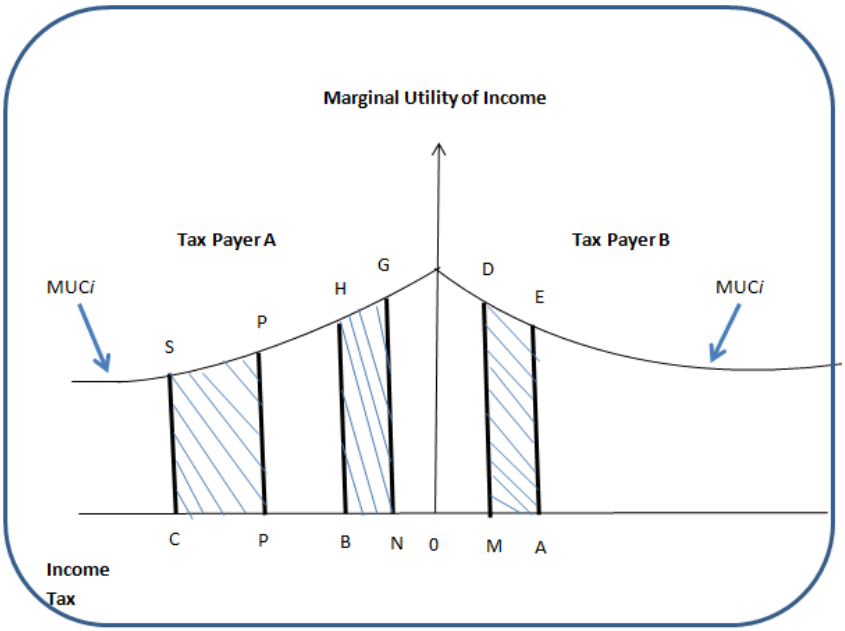
Vertical equity principle, on the other hand, leads to different level of taxes for various tax payers with different income levels. Therefore, a tax payer with a high

[42] Kaplow, Louis. "Horizontal Equity: Measures in Search of a Principle". *No. w1679. National Bureau of Economic Research*, 1985.

level of income should pay higher tax comparing to one with lower level of income. However, because of the tax subsidy implementation, usually high level of income tax payer pay lower tax comparing to the ones with lower level of income.

Despite of the difficulty for the simultaneous implementation of these two principles, precautionary policies are used by the developed countries. In many countries for instance, the imputed income of the officers paying relatively low rents with public housing, farmers consuming the goods they produce, family residing in their owned house are taken into consideration by horizontal and vertical equity.

In order to meet the above mentioned conditions of an efficient progressive tax system to support income equality, it is also important to understand how to implement such progressivity. To realize the taxation suitably for a progressive tax, the elasticity of the line showing that the marginal utility of income is decreasing should be larger than 1 or the tax brackets that will be used for the relevant progressive tax table should comprise the base with MUi larger than 1. Equal absolute sacrifice which means in paying taxes everyone gives up the same amount of utility relative to his initial position[43], would be useful to explain this in detail.



Graph 4: Equal Absolute Sacrifice

[43] Young, H.P. "*Progressive Taxation and the Equal Sacrifice Principle*" , International Institute for Applied Systems Analysis, Austria, June 1986.

According to the Graph 4, Tax Payer A and Tax Payer B have same level of income which has been shown as (OA), (OB) on horizontal axis. In order to achieve horizontal equity between these two tax payers, their welfare loss should also be the same. With the assumption of the slopes of the line showing diminishing marginal utility of income for both tax payers are the same, (AEDM) which is the welfare loss of tax payer A and (BHGN) as welfare loss of B or the sacrifices let's say, would only be equal if both of them pay same amount of tax. Therefore, in order to achieve fairness in taxation, same amount of incomes should be taxed with same tax rates. Thus, equal absolute sacrifice would be realized if A pays (MA) amount of tax and if B pays (NB) equal amount of tax.

In addition to above, equal absolute sacrifice theory necessitates different tax rates for different levels of income. On the graph, if we assume that tax payer A's income level is (OA) and there is third type of tax payer who is C with level of income (OC) then equal absolute sacrifies requires (AEDM) and (CSRP) to be also equal indicating the welfare loss of these payers. And in the case of equal welfare loss for both, A would pay (MA) and C would pay (CP) amount of tax and high level of income (C), would pay (CP/CO) rate of tax while low level of income (A) would pay less with the rate of (MA/AO).

The question of how tax burden can be distributed among actors in a fair way has always been an essential issue for policy makers. Not only the politicians but also the academic literature has worked on this by developing various models for optimal tax theory to find out a solution for optimal tax progressivity. Models in optimal tax theory typically posit that the tax system should maximize a social welfare function subject to a government budget constraint and taking into account that individuals respond to taxes and transfers. The dilemma is that social welfare improves with equal distribution of resources but redistributive taxes may have a negative effect on work incentives, save and earn income. As a classical trade-off between equity and

efficiency, which is a touchstone for the optimal tax problem, this dilemma seems to stay disputable[44].

Consequently, in order to have horizontal and vertical equity in taxation, the ones with high level of income should be taxed with higher rates and vice versa for the lower. Therefore, keeping in the mind above mentioned points, progressive taxation seems to be still mostly the effective taxation system for having fairness in income distribution which is vital for sustainable economic development, say the least of its relation to social justice and reducing poverty. However, it is still an ocean to discover whether sustainable development's econometric correlation is positive with progressivity. The following chapter thus attempts to take a step in this direction.

5. DATA SETS AND THE COUNTRY PROFILES

The analysis will be divided into two parts; first, by using pre-mentioned indicators and thresholds of Holden, Linneraud and Banister (2014)'s "sustainable development space", sample countries' status' will be analyzed in terms of their process on sustainable development. In the second part, the Gini coefficients of sample countries will be analyzed to see the effect of tax policies where progressive taxes are increased. By studying pre-tax and after-tax frames, I aim to analyze well if

[44] Peter Diamond, Emmanuel Saez, *The Case for a Progressive Tax: From Basic Research to Policy Recommendations*, p.1

progressive tax on personal income can be a solution to create a tax system that will support sustainable development. Therefore, the first part will let us see the overall performance of sample countries on the road of sustainable development and the latter will show if progressive taxation can be a fellow traveller.

The sample consists of 136 countries over the 2000-2017 period which are chosen based on the following traits;

1- **Income group:** World Bank's rank is used for the following groups: Low-income, Lower-middle-income, upper-middle-income, high-income economies. I tried to show attention towards choosing at least one country from each level not to dip back into one specific perspective.

2- **Data quality:** As the scope of the topic, the sustainability concept is ambiguous enough on its own so I tried to use relatively high quality of data for the indicators so that we can at least be on the safer side while trying to interpret the results. For that purpose, the sample countries have data quality rank 3A. (see below for data quality scores definitions)

3- **Tax System:** Personal income tax rates of the sample countries are been paid attention to see if their taxation system is progressive or not. If yes, historical data has been studied to see if there has been a change in the progressivity rates to see its possible effect on income distribution by means of Gini coefficients. Additionally, three types of taxation data are analyzed to see their overall position in terms of taxation. These data are; the percentage share of tax revenue in their GDP, percentage share of taxes on income, profits and capital gains on revenue and the share of taxes on goods and services again as a percentage share. Tax revenue as % of GDP is important to see the overall tax collection performance which is essential as a wider impact on sustainable development since it will create the budget that the countries may use to invest on SDGs or on the implementation of other preferred dimensions for sustainable development. The other two data

is chosen to see the status of the country's taxation system in terms of the distribution of direct and indirect taxes.

Ecological footprint data has been produced from the report NFA 2018 Public Data package which is a public data package shared with viewers upon special request. The source of the report is Global Footprint Network website. (http://www.footprintnetwork.org/licenses/) NFA 2018 package covers 242 countries and territories and the world, for all years between 1961 and 2014. Therefore the latest ecological footprint data is for the year 2014 and based on total consumption per capita.

For the sake of data quality, each country is given a quality score comprised of two elements, time series (1-3) and latest year score (A-D). 3A states that no component of BC or EF is unreliable or unlikely for any year. 3B means, no component of BC or EF is unreliable or unlikely for the latest data year. Some individual components of the EF or BC are unlikely in the latest data year. The total EF and BC time series results are not significantly affected by unlikely data. 3C refers that there is no component of BC or EF that is unreliable or unlikely for the years prior to the latest data year. Some individual components of the EF or BC are unlikely in the latest year. Total EF and BC values are unlikely or unreliable in the most recent data year, but the ability to ascribe creditor/debtor status is unaffected in latest year. And finally a quality score of 3D states that no component of BC or EF is unreliable or unlikely for the years prior to the latest data year. Some components of the EF or BC are very unlikely in the latest year. EF and BC results in the latest year are significantly impacted by the unlikely or unreliable values, making them unusable.

Gini Coefficient data is not available for all sample countries for the year 2013. Therefore, for the missing ones available data for the closest year has been used instead. However, still for some countries there is no current available Gini coefficient data calculated. The substitute years can be found below of the tables shown with relevant asterisks.

5.1. Country Data

Table 2. Group A - SD Countries

Country/region	Data Quality	Income Group	Ecological Footprint	HDI	Gini 2014
Albania	3A	UM	2,3	0,76	29*
Armenia	3A	LM	2,1	0,74	31,5
Azerbaijan	3A	UM	2,2	0,76	16,6*
Cuba	3A	UM	1,9	0,77	-
Georgia	3A	LM	1,9	0,77	37,3
Indonesia	3A	LM	1,6	0,69	39,5
Jordan	3A	UM	2,1	0,74	33,7*
Moldova	3A	LM	1,9	0,70	26,8
Philippines	3A	LM	1,1	0,68	-
Uzbekistan	3A	LM	2,2	0,70	35,3*

As shown in Table 2., there are 10 countries that met the relevant thresholds, namely, should have achieved sustainable development. Since the result differ from Holden, Linneraud and Banister (2014)'s study in which no countries met the thresholds and thus they concluded that achieving sustainable development is overwhelming, further we continue with a further analysis in the following part to see the source of discrepancy.

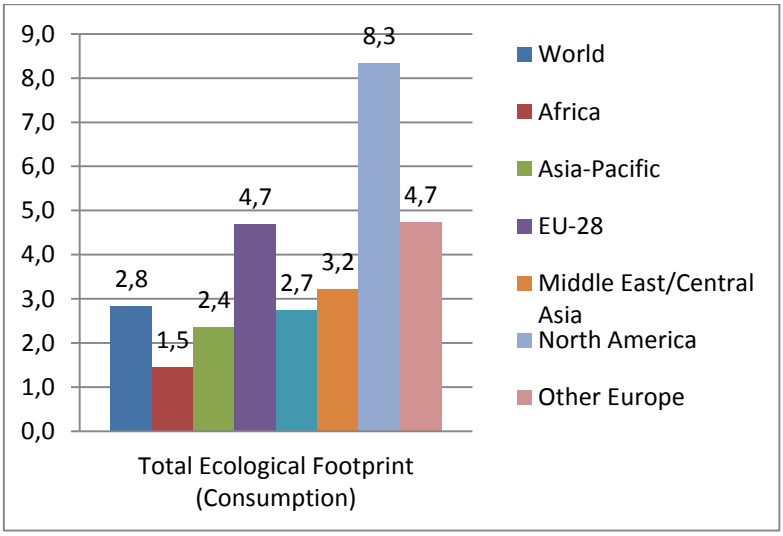
Table 3. Group B: Dimension 1 and 2 Countries

Country/region	Data Quality	Income Group	Ecological Footprint	HDI	Gini 2014
Albania	3A	UM	2,1	0,76	29*
Armenia	3A	LM	2,0	0,74	31,5
Azerbaijan	3A	UM	2,2	0,76	16,6*
Colombia	3A	UM	1,9	0,72	52,8
Cuba	3A	UM	1,9	0,77	NO DATA
Dominican Republic	3A	UM	1,6	0,72	44,1
El Salvador	3A	LM	2,0	0,68	41,6
Georgia	3A	LM	1,9	0,77	37,3

Indonesia	3A	LM	1,6	0,69	39,5*
Jordan	3A	UM	2,1	0,74	33,7*
Moldova	3A	LM	1,9	0,70	26,8
Nicaragua	3A	LM	1,5	0,64	46,2
Philippines	3A	LM	1,1	0,68	NO DATA
Saint Lucia	3A	UM	2,1	0,74	NO DATA
Sri Lanka	3A	LM	1,5	0,76	39,8*
Tunisia	3A	UM	2,2	0,72	35,8
Uzbekistan	3A	LM	2,2	0,70	35,3*
Viet Nam	3A	LM	1,7	0,68	NO DATA

As Table 3 depicts, there are 18 countries on Dimension 1(ecological footprint) and Dimension 2(human development index). However, there are no high-income or low-income countries that meet both of the thresholds.

Considering the maximum threshold value for ecological footprint of 2.3 global hectares, no high income and low income country currently meets this threshold and the average is 6.1 global hectares for the first and 1,1 global hectares for the latter.

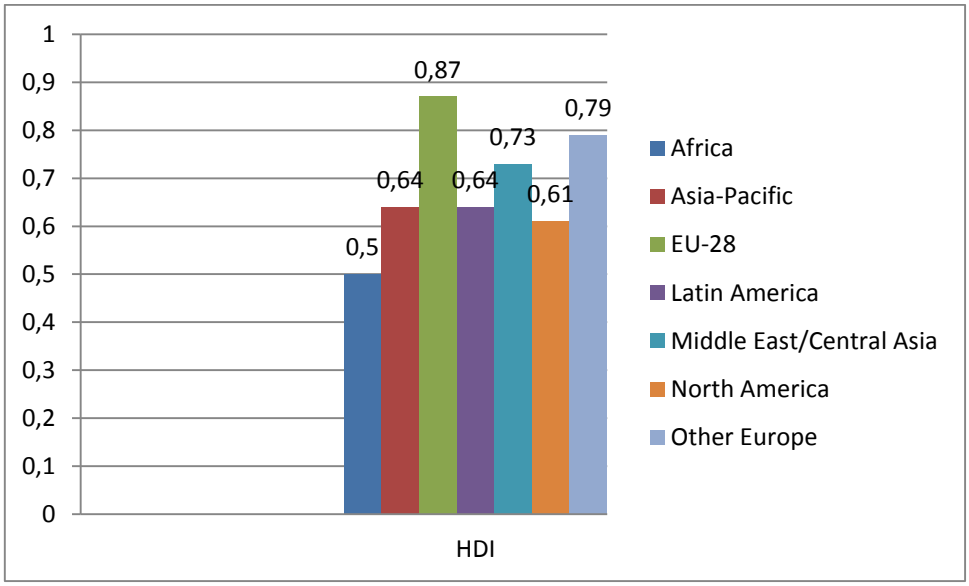


Graph 5. World EF Results

Global Footprint Network , NFA 2018 Public Data package

The leading countries on UNDP's HDI list for 2018, namely Norway, Switzerland, Australia, Ireland and Germany have ecological footprint on average 5,5 global hectares. Thus these countries should decrease their EF by 3.2 on average. The world average is 2,8 and EU28 Countries, Middle East/Central Asia and remaining European countries are all above the threshold. (see Graph 5.)

As shown in Graph 6., Considering the minimum threshold value of 0.630 value for human development index, African and North American countries are below the threshold while Latin America and Asia Pacific countries pull through it with a .0.1 point only. The lowest HDI scores are from the countries; Niger, the Central African Republic, South Sudan, Chad and Brundi have a HDI on average 0,42. If the pace of human development index continues, the average HDI for the world's least developed countries will be above the threshold value within 20 years[45].



Graph 6: World HDI Results

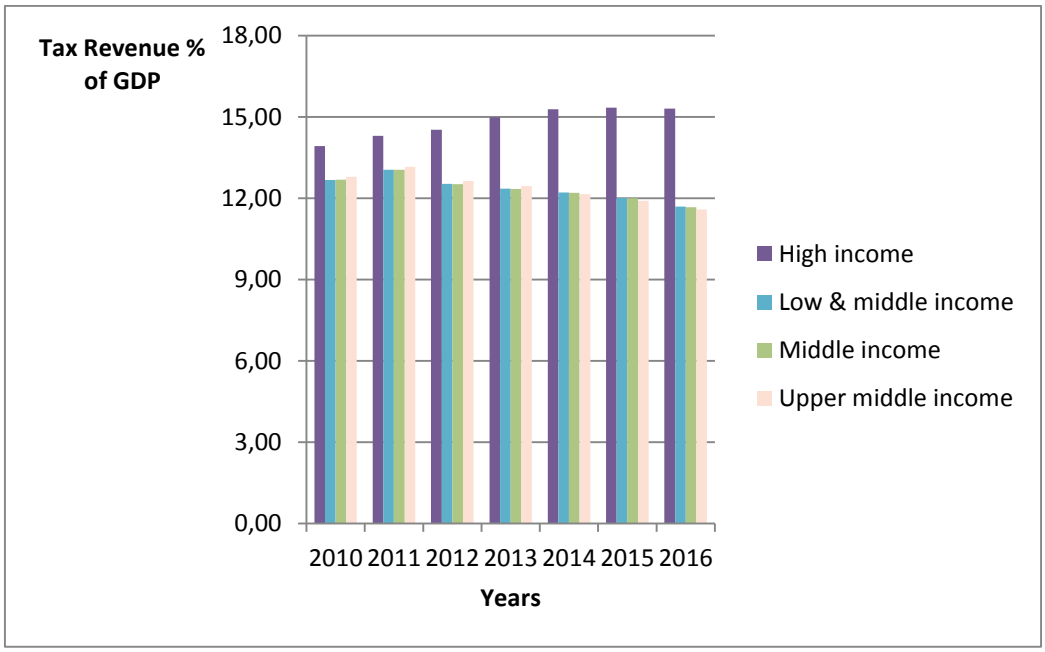
UNDP Reports

5.2. Country Data – Case Studies

[45] Holden, Linneraud and Banister. *"Sustainable Development: Our Common Future Revisited"* Global Environmental Change, Volume 26, May 2014, p.130-139

As mentioned before, in this section, my purpose is to study the relation between progressive income tax and sustainable development. In order to see that, the 10 countries', that met all the three thresholds and thus can be accepted as they achieved sustainable development (under conditions and assumptions mentioned on previous section), tax systems and individual performance on sustainable development will further analyzed case by case. It should be noted that our analysis is limited by the availability of relevant data and can be prospectively revisited with the improvement of data quality.

Adding to country profiles in terms of progressivity**,** the percentage share of tax revenue in their GDP, percentage share of taxes on income, profits and capital gains on revenue and the share of taxes on goods and services (again as a percentage share) will be studied. The global performance on tax collection over the period 2010-2016 is around 12,30% on average for low&middle income, middle income and upper middle income countries. (see Graph 7.) There is no data information for low income countries. For the high income group and for the same period, the average is 14,80% and its above %15 line for the last three years with an increasing trend.



Graph 7: World Tax Revenue of GDP

International Monetary Fund, Government Finance Statistics Yearbook and data files, and World Bank and OECD GDP estimates.

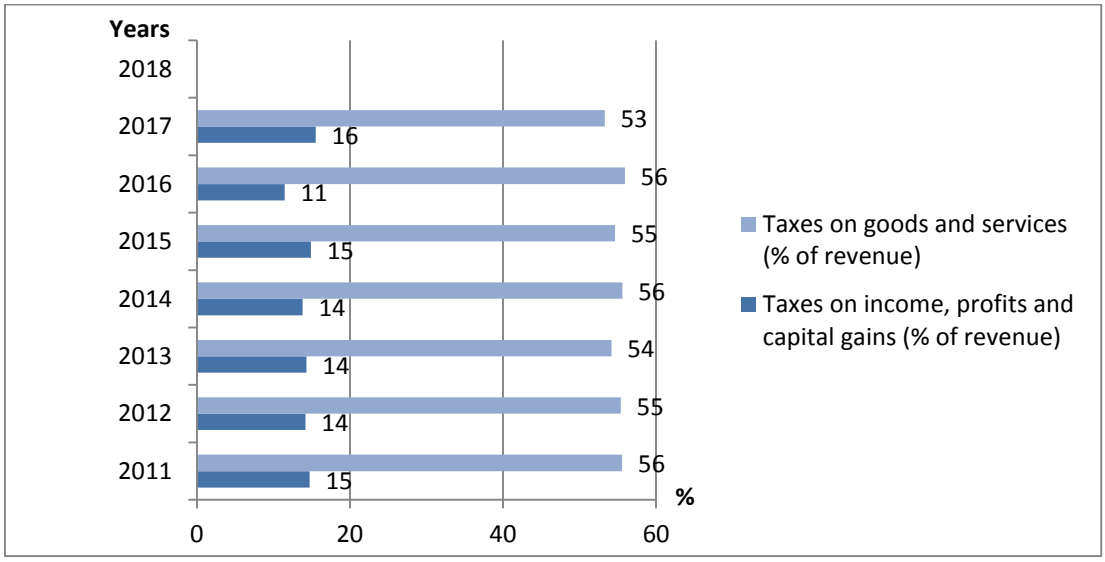
5.2.1. The case of Albania

Table 4: Albenia Gini Coefficients

Year	Gini
1996	27
2002	31,7
2005	30,6
2008	30
2012	29

World Bank Gini Index Database

With a 2.1 global hectares of EF and 0.76 HDI, Albania is a country that meets all necessary thresholds. In fact, Albania would be a great case to begin with as it has experienced several tax system changes in recent years. In January 2008, five income levels progressive taxation had been replaced with a single rate taxation (10%) which else known as "the flat tax". [46] In 2014, the Albanian Government announced that to revive the economy, it will apply a progressive tax policy over the taxable income[47].

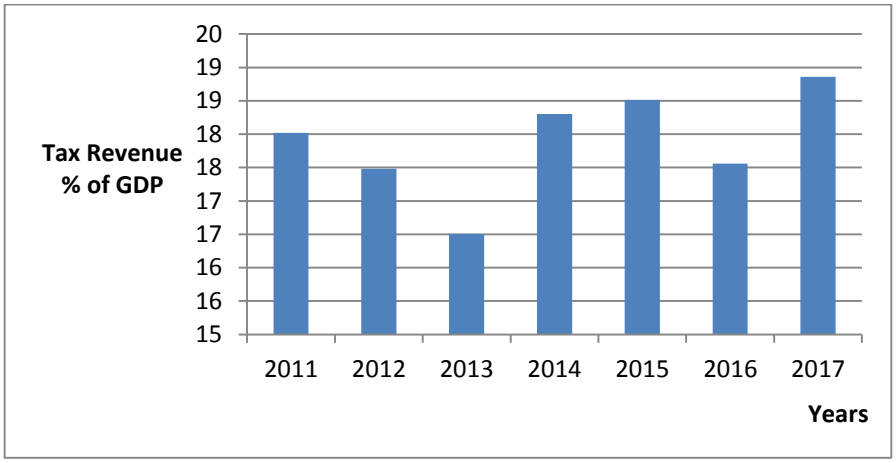


Graph 8: Albania Distribution of Taxes

[46] International Journal of Economics and Financial Issues Vol. 3, No. 1, 2013, pp.42-49 ISSN: 2146-4138 www.econjournals.com, Binaj

[47] Ervin Latifi, Epoka Student Journal, Albanian Finance, Vol.1, No.1,2015

International Monetary Fund, Government Finance Statistics Yearbook and data files., Worldbank database



Graph 9: Albania Tax Revenue of GDP

World Bank

In order to understand if there is a relation between sustainable development and progressive taxation, Albania's Gini coefficients, see (Table 4.) for the respective taxation system change years can be analyzed. Unfortunately, one should note that the Gini data is not sufficient for the country. First, until the year 2008, when the progressive tax rates was firstly introduced, there are only 4 year data with an average of 29.8 Gini which is higher than the only available data for the flat tax period, 29.

Of course, only with this limited information it would not be correct to make any comments about the correlation between variables. Therefore, other two dimensions can be tried to be studied for the possibility of reaching further reliable data.

Tax revenue as a percentage of GDP is relatively high with an average of %18 for the period 2012-2017 which above the world high income countries level. The distribution of direct and indirect taxes is for the benefit of latter, with a very high average of over %50.

Human Development Index data for the respective years is satisfying. However, there is again no positive correlation between variables. For the period 1994-2008 the average HDI value is 0.66, 2008-2014 0.74 and after 2014 when the

progressive tax system was revisited it is 0.76. Thus, there is an ascending trend of HDI and the tax system changes have no effect on it.

Ecological footprint data, on the other hand, is quite interesting. For the period 1994- 2008 the average EF value is 1.61, 2008-2014 2.25 and after 2014 when the progressive tax system was revisited it is 2.14. Recalling the necessary threshold which is 2.3, even all of the averages are less than 2.3, the flat tax rate period is liminal and the progressive tax rate periods are obviously lower.

Table 5: Alignment of SDG Targets - Albania

ALIGNMENT OF SDG TARGETS WITH ALBANIA'S NATIONAL PRIORITIES			
Very Good (>75%)	**%**	**Good (50 - 75%)**	**%**
Goal3: Good Health and Well-Being		Goal1: No Poverty	
Goal7: Affordable and Clean Energy	90	Goal2: Zero Hunger	65
Goal8: Decent Work and Economic Growth	**79**	Goal4: Quality Education	
Goal9: Industry, Innovation and Infrastructure	77	Goal5: Gender Equality	59
		Goal6: Clean Water and Sanitation	55
		Goal10: Reduced Inequalities	**50**
		Goal11: Sustainable Cities and Communities	59
		Goal13: Climate Action	
		Goal16: Peace, Justice and Strong Institutions	70
		Goal17: Partnerships for the Goals	59
Partial (25-50%)	**%**	**Limited(<25%)**	**%**
Goal 12: Responsible Consumption and Production		Goal 14: Life Below Water	

Goal 15: Life on Land	

United Nations, Sustainable Development Voluntary Review Report of Albenia

When it comes to its sustainable development performance, even if it seems that it has achieved it, obviously there is a whole lot more work to be done. However, one may say that the data analysis we made is congruent with the positive atmosphere of the country's Voluntary National Review on Sustainable Development report, established in June 2018. As Table 5. depicts, most of the SDGs are aligned with Albania's national priorities.

5.2.3. The case of Armenia

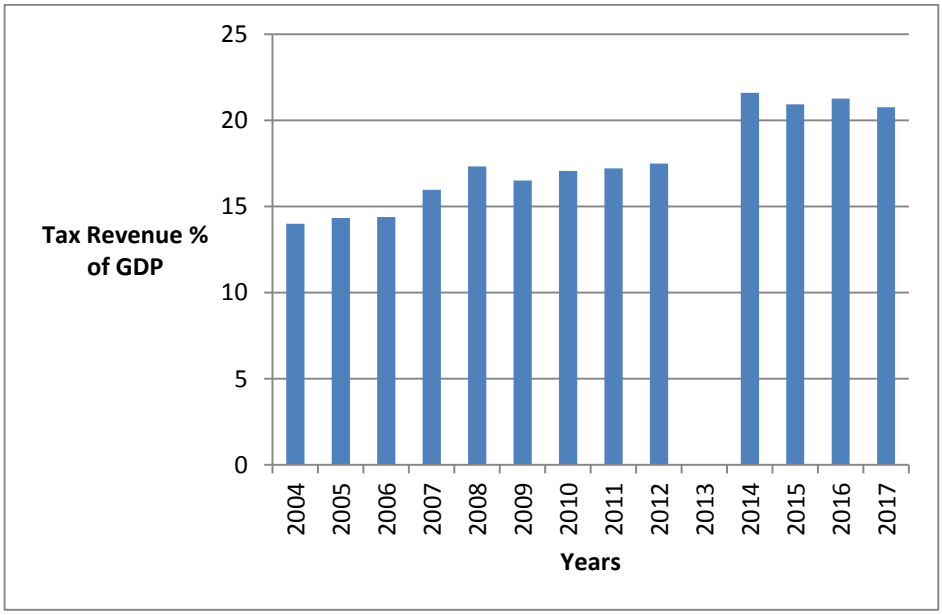
Table 6: Armenia Gini Coefficients

Year	Gini
2008	30,7
2009	29,6
2010	31,1
2011	31,3
2012	30,5
2013	31,5
2014	31,5
2015	32,4

World Bank Gini Index Database

Armenian case is another story as in September 17, the Armenian Prime Minister introduced the idea of implementing a flat scaled taxation system which will probably first introduced as %23 and then will be reduced to %20 in the following 5

years. The current system is progressive with the rates %23 to %36. There is lack of information about past changes on rates however it is obvious that the tax system again does not works well since the government seeks a solution with changing system to progressive to flat. The problem seems to be the poor administration which also has received comments from IMF. The negative outlook has been tried to be improved with the new tax code enacted in 2016 which led to an significant increase in targeted tax revenue. Flat or progressive tax and which one is better is a disputed enclave on its own which has also been previously discussed in this paper under 6. Section. If the introduced change will come into force as its promised, The Armenian case can contribute to this popular debate, with the prospective analysis can be made on pre and after tax system change after 5 years period. Thus, one should note that this case must be revisited after 5 years to see two aspects. First if its sustainability score will be effected with this tax system change, in other words if progressive tax has a positive effect on sustainability. Secondly what will be the case for flat tax and its effects on sustainability?



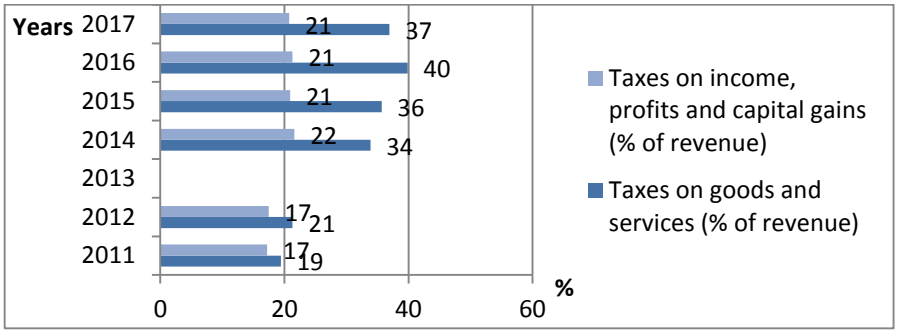
Graph 10: Armania Tax Revenue of GDP

Worldbank

When we come back to the current situation, one may easily see that the Gini coefficients are on a linear trend with changes no more than 1 point, with the exception

of year 2010, in which we observe an 1,5 point improvement relative to previous year.(Table 6.) This may be explained without a surprise, as the effect of global crisis experienced in 2009 led to sharp decreases on various economic indicators, obviously without any relation to tax progression. As we once again face a hopeless case on Gini, harness to other two indicators seems like a remedy.

The Armenian tax rates have faced two major changes on the respective years. First, in 2015, the income tax rate increased to %36 from %25. Secondly, increased to %25 from %20 in 2012. We cannot see any effect of these movements on indicators but it is acceptable since our aim is to see if progressive tax on personal income can be a solution by studying pre-tax and after-tax frames, where taxes here refer to systems (progressive or flat) not rates. Therefore, the Armenian case gives no clues for the past years as there is no major system changes but highly important because of the above mentioned prospective benefit with the expected change to flat scale. However, about tax collection performance, the results are much more pleasant, since Armenia has significantly improved its revenue collection performance by year 2013 and the tax revenue / GDP ratio is well above the world (Graph 10). In 2016, with 21.3% score, it is even higher than the world average (high income) which was 15%. The distribution of direct and indirect taxes (Graph 11) is again in favor of latter but the percentage shares are closer to each other, relative to the previous case. However, there is an ascending trend by years as the percentage share of taxes on goods and services on overall revenue has obviously increased.



Graph 11: Armenia Distribution of Taxes

International Monetary Fund, Government Finance Statistics Yearbook and data files., Worldbank database

In terms of achieving sustainable development, the implementation results are mixed as sufficient and insufficient. Thus, it is not possible to speak about reaching sustainability. Yet, the only point that we may see our data results on practice, namely not the achievement itself but the positive framework, is the fact that Armenia also has a remarkable step on SDG implementation. With a unique model, the Armenian government and UN established a SDG Innovation Lab, to support SDG implementation on country level. This innovation platform that has been established in 2018 is the one of a kind on global level. However, different than the previous case, the country's well SDG implementations are very limited - only the general goals such as hunger or education etc.

5.2.4. The case of Azerbaijan

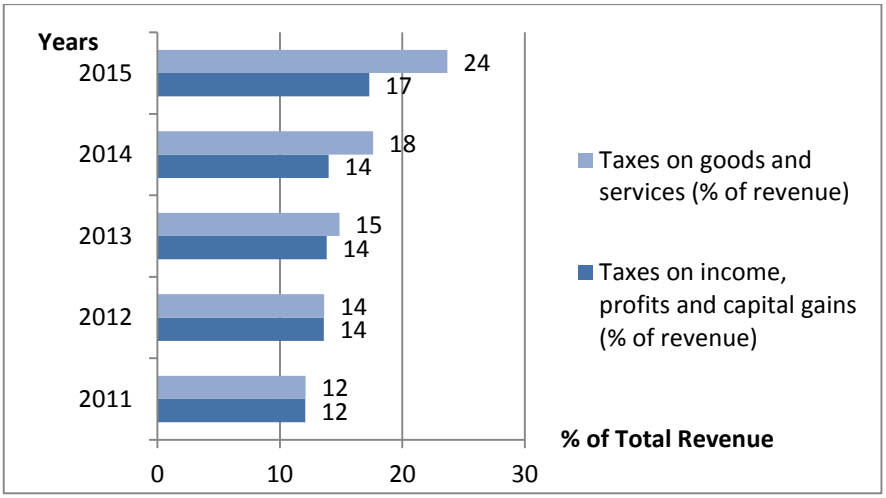
Table 7: Azerbaijan Gini Coefficients

Year	Gini
2001	36,5
2002	17,4
2003	18,8
2004	16,2
2005	16,6

World Bank Gini Index Database

As it can be seen from Table 7., the latest data available for the Gini coefficient is 2005 but at least the five year results are mostly favorable with again a clear picture of 2001 global crisis, with a sharp decrease on the relevant year. However, the year 2001 is also vital for some other reasons as until that year, the tax system of Azerbaijan and its structure were aligned to the principles of market economy but from 2001, its various tax laws were merged into a single tax code and remarkable improvements

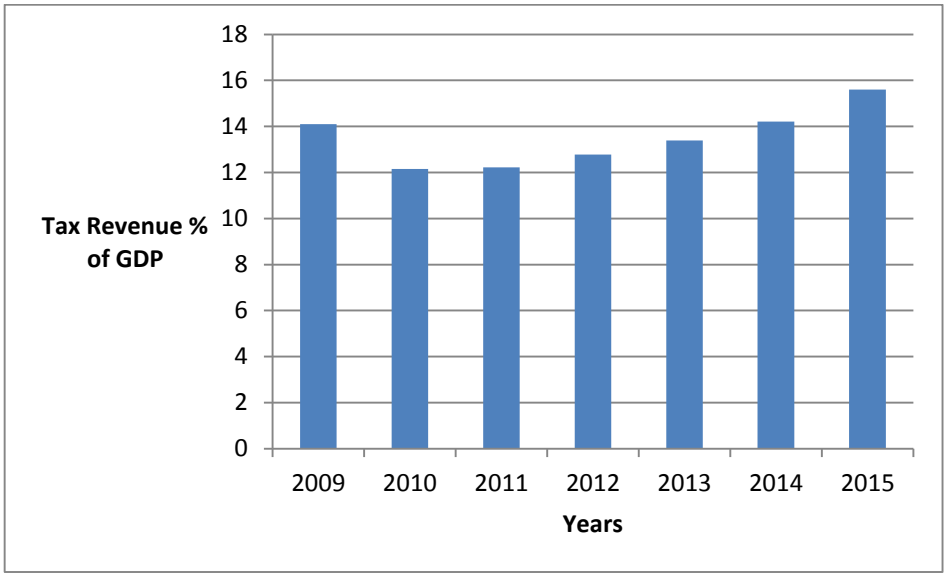
were realized. A voluntary tax compliance system was developed with the aim of protecting taxpayer rights. The tax administration system was improved by building a modern computer information system and developing a better management system of tax bodies[48].



Graph 12: Azerbaijan Distribution of Taxes

International Monetary Fund, Government Finance Statistics Yearbook and data files., Worldbank database

[48] European Commission, Europe Aid Documents, Azerbaijan ENPI AAP, 2008



Graph 13: Azerbaijan Tax Revenue of GDP

The amendments to the Tax Code and efforts on modernizing the tax administration led to the share of tax revenues in economy to reach 16% in 2015. The system change, however, had no effect on rates on personal income taxation and it still ranges from 12% to 35%. Distributions of direct and indirect taxes (Graph 12) are much more different than the previous cases. In year 2011, the shares were same with a percentage of %12. Following two years, even if the shares are not anymore equal, they are very close to each other. However, by 2014, the general trend on increasing the share of indirect taxes can also be observed for the case of Azerbaijan. In year 2015, the percentage of share of goods and services on tax revenue reaches to %24. It would be more beneficial to check this tax data results with their relation to Gini coefficients to see if there is an increase on the share of indirect taxes have any effect on economic inequality but unfortunately this is not possible because of the problem of lack of data.

Azerbaijan's sustainability performance on practice, on the other hand, is not easy to observe. According to their voluntary report, Azerbaijan explains the reason behind this is that the political instability they faced in recent years, especially because of the military aggression of Armenia against Azerbaijan. This situation is accepted as the major compelling reason for slow progression on achieving sustainable

development. Azerbaijan case is important with this aspect, as it becomes clearer that even we set global goals or create brilliant models to measure it with indicators, the dynamics of countries differ in various ways and one of the most important one is a local peace environment. If a country is on war, how we can speak about progress on sustainable development or revenue creation to achieve it? Global partnership on sustainability, thus, should also be aware of this need and urgently include its importance on its agenda.

5.2.5. The case of Cuba

Unfortunately, there is no data information for Cuba in terms of Gini coefficents and taxation system details. Most Cubans have not paid taxes for half a century, but it had changed with a new code established on 2012 which constitutes the first comprehensive taxation in Cuba since the 1959 revolution abolished just about all taxes.[49] Today, the rate of the progressive individual income tax varies from 10% (income bracket inferior to 6 000 USD) to 50% (income bracket superior to 60 000 USD).[50]

Since Cuba's data availability is despondent, we will exclude this country.

5.2.6. The case of Georgia

Table 8: Georgia Gini Coefficients

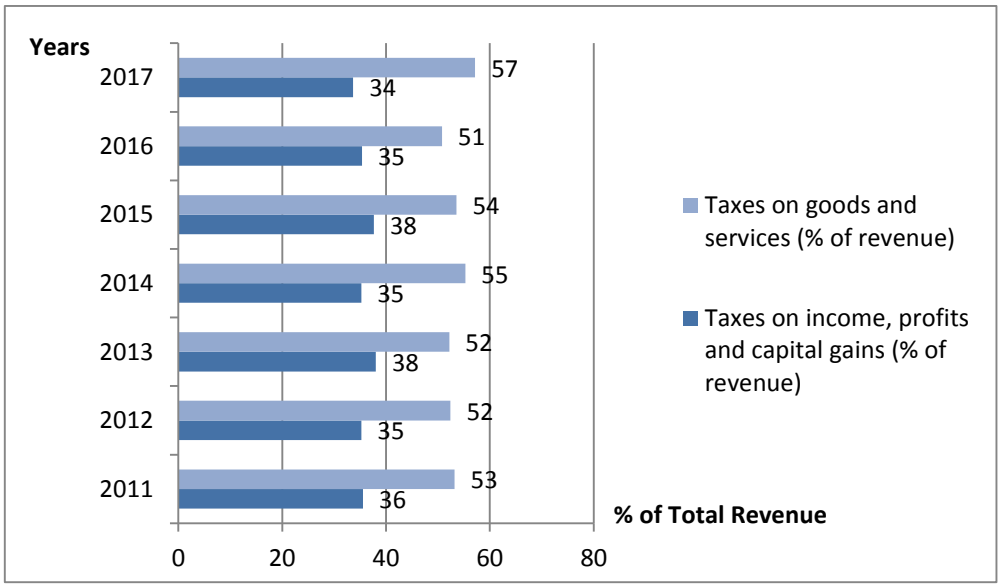
Year	Gini
2012	38,8
2013	38,4
2014	37,3
2015	36,4
2016	36,5

World Bank Gini Index Database

[49] Reuters, Frank Marc, "In communist Cuba, the tax man cometh" https://www.reuters.com/article/us-cuba-reform-taxes/in-communist-cuba-the-tax-man-cometh-idUSBRE8AR05F20121128

[50] The Federation of International Trade Associations, http://www.fita.org/countries/cuba.html?ma_rubrique=fiscalite

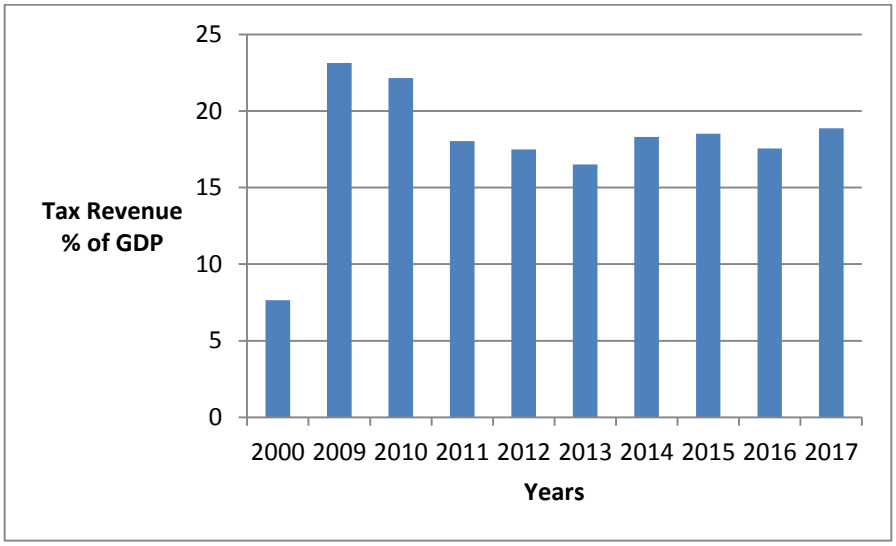
One of the most fruitful country in terms of data availability, Georgia's Gini coefficients have always been on a trend very close to the threshold but tend to decrease year by year. (Table 8) The high Gini coefficients are not surprise when country's recent economic history is taken into consideration; a very challenging picture with experiences on bad governance, corruption and even an economic collapse. However, the country presents also a very rare example that has been accomplished to survive out of this vicious cycle[51].



Graph 14:Georgia Distribution of Taxes

International Monetary Fund, Government Finance Statistics Yearbook and data files., Worldbank database

[51] United Nations, Sustainable Development Voluntary Review Report of Georgia



Graph 15: Georgia Tax Revenue of GDP

It's tax system is also quite interesting as it has relatively simple system with probably the lowest rates ranging from %1 to %6. Georgia's income tax brackets were last changed nine years ago for tax year 2009, and the tax rates have not been changed since at least 2001[52].

In terms of tax collection, Georgia has the highest statistics in Group A countries. It's last 8 years average is 18,95% which is obviously above the world level. In 2000, the percentage share of tax revenue on GDP decreases even to 8% (Graph 15) but this is a clear effect of the Asian Financial crisis. During the period 1998-2000 the country's economic growth rate decrease to %2.5. When it comes to the distribution of taxes, the indirect taxes are clearly dominant with the second highest average among Group A countries, with the rate of %53.

The country is obviously zealous in terms of sustainable development, but oppositely to threshold analysis, we cannot say that it has succeeded it. Georgia has created technical working groups with experts from various relevant ministries and its local statistical office, for the facilitation of Sustainable Development Goals on country level and to discuss the current status as well as determination of further steps. The goals are adjusted with the current conditions of the country and important actions

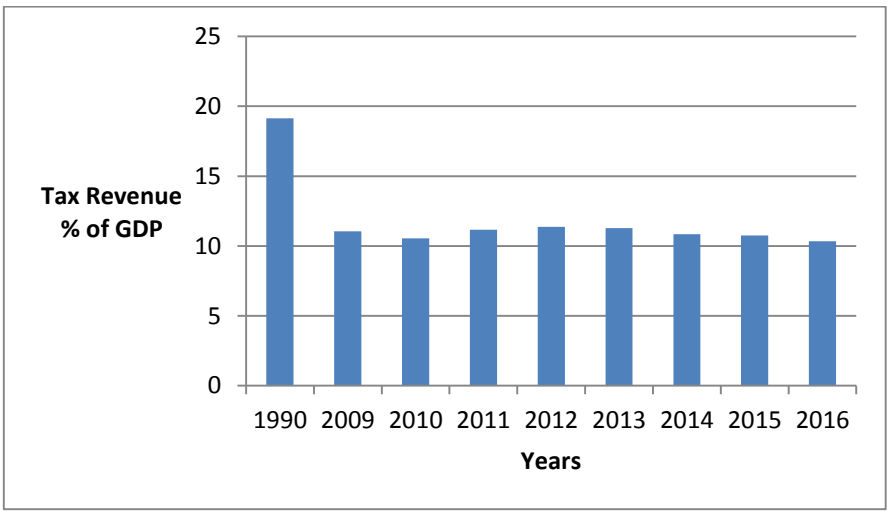
[52] Tax brackets, Georgia https://www.tax-brackets.org/georgiataxtable

are taken in terms of implementation. However, it is obvious that much remains to be done.

5.2.7. The case of Indonesia

Even though Indonesia is in Group A and should have achieved sustainable development under pre-mentioned conditions, a deeper analysis is needed as the Gini coefficient of only one year, 2013, may be misleading and even with a quite high point; 39,5. Only 0,5 points lower than the threshold.

For a 15 years period beginning with 90s, Asian economies grew approximately 6% in a year, which was a great period in terms of poverty. However, oppositely to the case of so called "Asian tigers" (Hong Kong, Singapore, South Korea and Taiwan) which are highly developed economies who has accomplished to grow with equity, Indonesia has experienced peak rises in its income inequality while growing. Indonesia also experienced a rapidly widening gap between the rich and the poor, with growth in consumption of the top 10 percent outpacing that of the bottom 40 percent by more than three times between 2003 and 2010.[53]

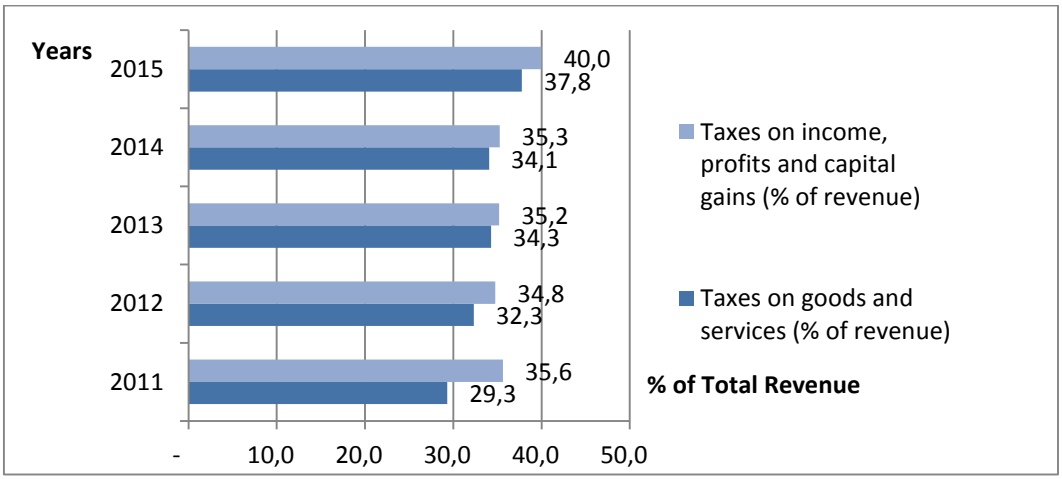


Graph 16: Indonesia Tax Revenue of GDP

[53] United Nations Economic and Social Commission for Asia and the Pacific, *"Prospects for Progressive Tax Reform in Asia and the Pacific"*

Worldbank

The country's income tax system is progressive with the rates 5% to 30%. In terms of tax revenues, various attempts are made by the government through the implementation of Law no.16 year 2016 on Tax Amnesty[54]. Tax collection statistic results of Indonesia are the worst among Group A countries with an average of %11 (Graph 16). The distribution of taxes, however, maybe the most interesting one, as different than the previous cases, direct taxes are more than the indirect ones. (Graph 17) It seems that we can see the theory of "tax avoidance is less likely with indirect taxes " in practice with these results.



Graph 17: Indonesia Distribution of Taxes

Worldbank

Again with a willing and determined work but obviously very far away from a good performance on sustainable development, Indonesia has integrated sustainable development goals and post global agenda on its national development plans.

5.2.8. The case of Jordan

Table 8: Jordan Gini Coefficients

[54] United Nations, Sustainable Development Voluntary Review Report of Indonesia

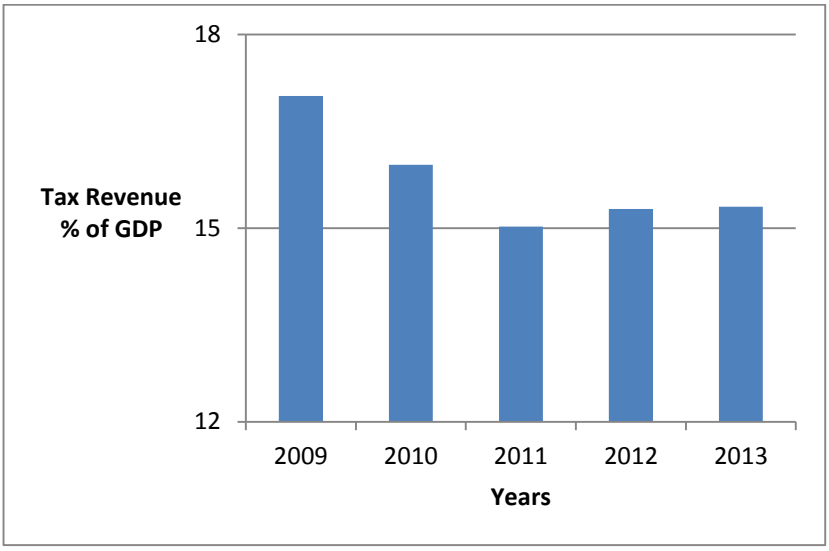
Year	Gini
2002	37
2006	33,9
2008	32,6
2010	33,7

World Bank Gini Index Database

With a 2.1 global hectares of EF and 0.74 HDI, Jordan is a country that meets all necessary thresholds.

Jordan's GDP growth from 2000 to 2009 averaged 6.5 percent annually. However, a combination of the global financial crisis in 2008, Arab Spring disruptions in 2011, the closure of borders with Iraq and Syria (a vital source of Jordan's exports), a large absorption of refugees, and a decline in remittances led to Amman's economic woes. Gini data, thus, is much more stable than its economy, even if it is not so far from the threshold (Table 8).

Given the above economic circumstances, one may presume that country's tax collection performance is not so heartwarming. However, it is not one of the worst among Group A countries. Even, the country average is slightly above the world high income group level. Tax distribution data shows that indirect taxes are mostly dominant relatively to the percentage share of taxes on income, profits and capital gains (Table 9). However, this status may change in near future, since it is expected to have a huge tax law change included raising the threshold of taxable income for households by JD1,000 that should be covered by bills for health, education, loan interests, murabaha (an Islamic finance and investment instrument), and residential rent in 2020.



Graph 18: Jordan Tax Revenue of GDP

International Monetary Fund, Government Finance Statistics Yearbook and data files, and World Bank and OECD GDP estimates.

Table 9: Jordan Distribution of Taxes

Explanation	2011	2012	2013
Taxes on goods and services (% of revenue)	30	34	42
Taxes on income, profits and capital gains (% of revenue)	9	10	11

International Monetary Fund, Government Finance Statistics Yearbook and data files., Worldbank database

5.2.9. The case of Moldova

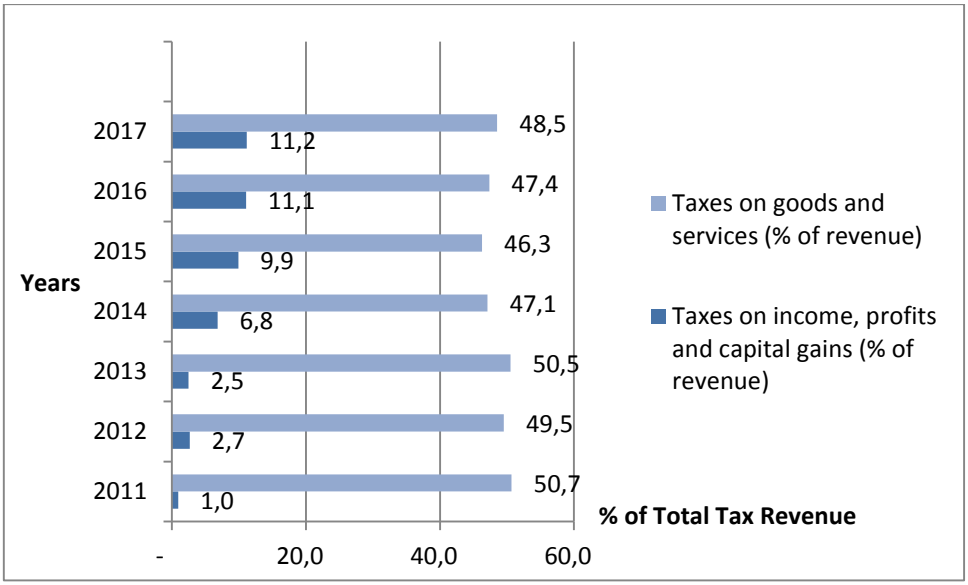
Table 10: Moldova Gini Coefficients

Year	Gini
2012	29,2
2013	28,5
2014	26,8
2015	27

2016	26,3

World Bank Gini Index Database

With a 1.9 global hectares of EF and 0.70 HDI, Moldova is another country that meets all necessary thresholds. According to the 14-15 GCI Report, Moldova's development is indicated as transition period. However, Gini coefficients are relatively low comparing to other countries (Table 10). Tax collection performance is also well with average of 18%, also again a supportive result to dominant indirect taxes may lead less likely to tax evasion (Graph 19).



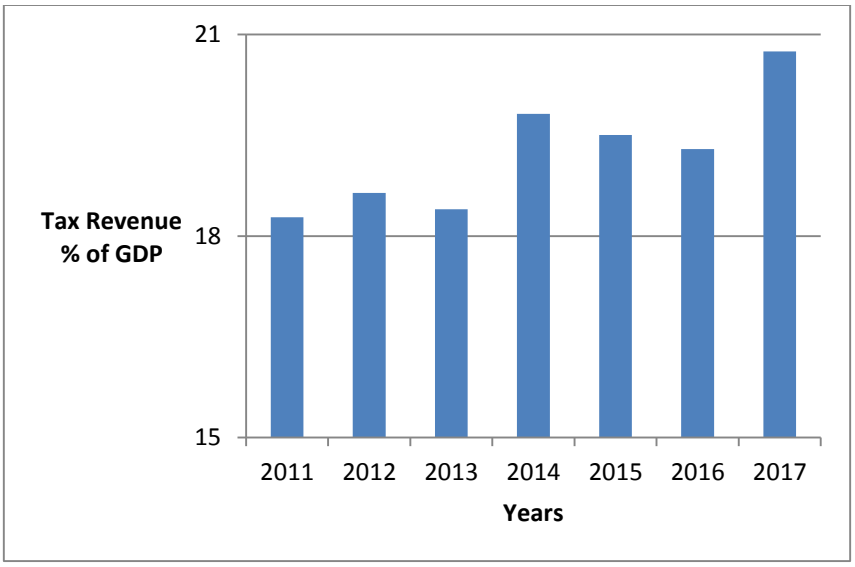
Graph 19:Moldova Distribution of Taxes

International Monetary Fund, Government Finance Statistics Yearbook and data files., Worldbank database

Table 11: GCR The most problematic factors for doing business

Moldova	Percentageof Responses
Tax Rates	4,50
Tax Regulations	7,70

The Moldovan government has announced a number of proposed amendments including the replacement of the current two-rate system for individual income tax (7% and 18%) with a single flat tax rate of 12%, along with a set individual exemption equal to MDL 24,000, up from MDL 11,280. If this will be the case, one should note that this case must be revisited just like the case of Armenia, to see if its sustainability score will be effected with this tax system change, in other words if progressive tax has a positive effect on sustainability.

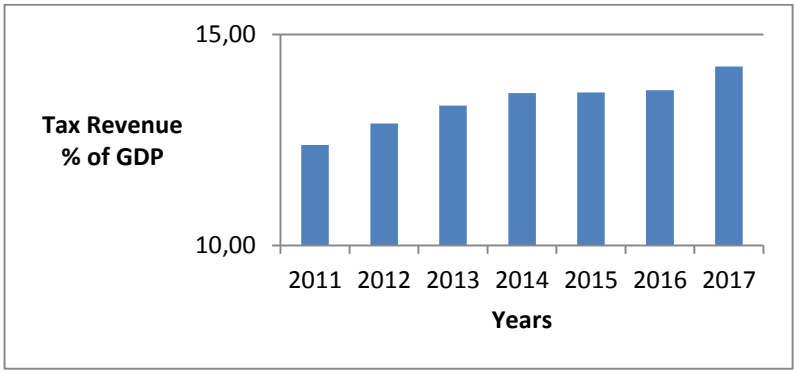


Graph 20: Moldova Tax Revenue of GDP

International Monetary Fund, Government Finance Statistics Yearbook and data files, and World Bank and OECD GDP estimates.

When it comes to the sustainable development progress, resources on the country profile is quite limited. However, according to UNDP country profile, Moldova's national policy agenda is now aligned with more than 106 of the SDG targets and its selected 226 statistical indicators to assess progress towards these global goals. Based on the sustainability adjusted GCI report for the year 14-15, Moldova is ranked 61 among 113 countries.

5.2.10. The case of Philippines

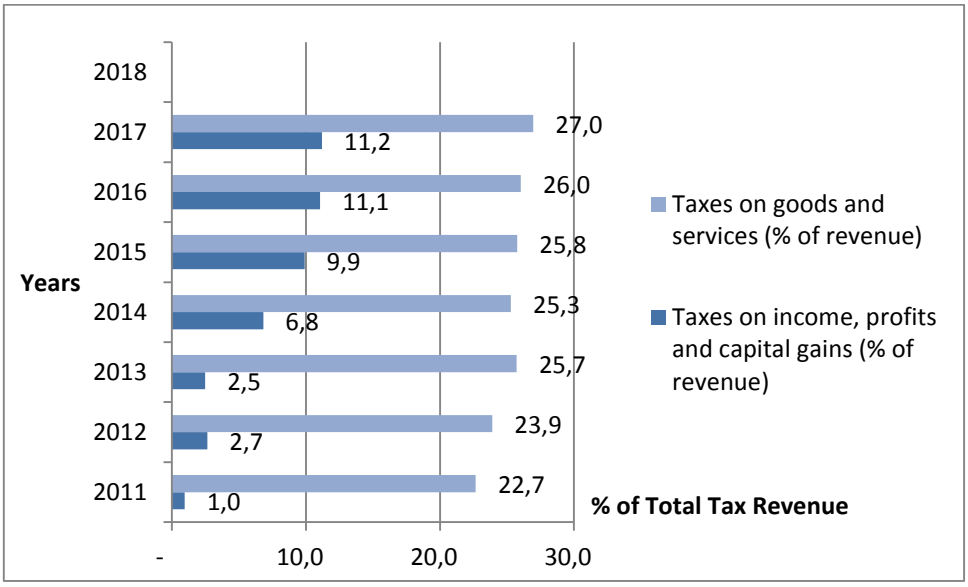


Graph 21: Philippines Tax Revenue of GDP

International Monetary Fund, Government Finance Statistics Yearbook and data files, and World Bank and OECD GDP estimates.

Unfortunately, there is no data information for Philippines in terms of Gini coefficients. However, according to GCI 14-15 Report, the country is on an upward trend and continuously upping places. The report underlines that the country has gained 33 places since 2010 and it is the largest over the period among all countries studied. The report links this success to the reforms which should have bolstered country's economic fundamentals. Also the report, suggest that this positive performance bearded fruits of country's work against corruption. However, when the respondents asked to give points to the most problematic factors for doing business, corruption is still on the first place. %13.3 of the respondents answered the same question as tax regulations, whereas the percentage for the tax rates is %9.7.

Income of residents in Philippines is taxed progressively up to 32% from%5. The country had a tax reform by 2017 with a several changes in the income tax rates. (See Appendix B for details).Tax revenue collection results are congruent with the results of the report since the tax revenue % share of GDP is very low with average of 13%, low from the world average for all years (Graph 21)



Graph 22: Philippines Distribution of Taxes

International Monetary Fund, Government Finance Statistics Yearbook and data files., Worldbank database

In terms of sustainability, the country is on the second position, on the sustainability adjusted GCI among Group A countries, with a global ranking of 49th following the 46th ranking of Indonesia.

5.2.11. The case of Uzbekhistan

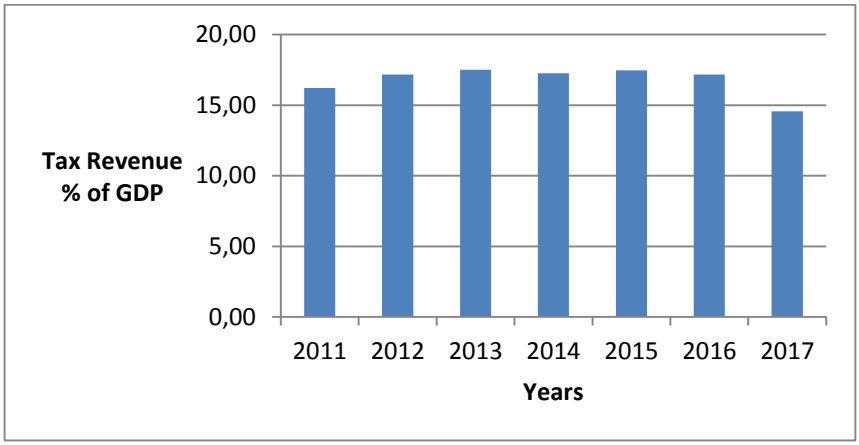
Table 12: Uzbekhistan Gini Coefficients

Year	Gini
2000	36,1
2002	33,0
2003	35,3

World Bank Gini Index Database

With a 2.2 global hectares of EF and 0.70 HDI, Uzbekhistan is the last country that meets all necessary thresholds Gini coefficients are relatively high comparing to other countries (Table 12). Tax collection performance is also well with average of

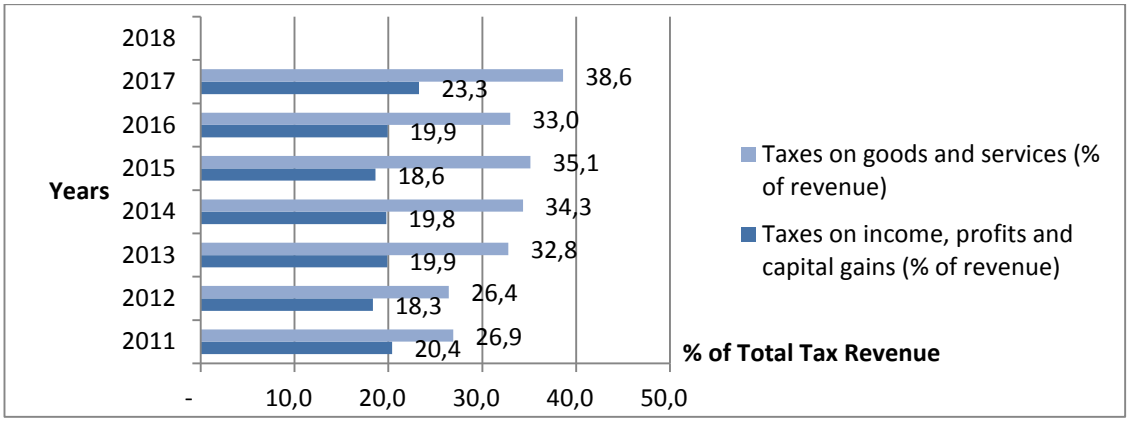
18%, also again a supportive result to dominant indirect taxes may lead less likely to tax evasion. (Graph 23 &24)



Graph 23: Uzbekhistan Tax Revenue of GDP

International Monetary Fund, Government Finance Statistics Yearbook and data files, and World Bank and OECD GDP estimates.

The Personal Income Tax Rate in Uzbekistan stands at 23 percent. Personal Income Tax Rate in Uzbekistan averaged 23.31 percent from 2006 until 2018, reaching an all-time high of 29 percent in 2006 and a record low of 22 percent in 2009. Personal income tax (PIT) rates are reduced from 17% to 16.5% and from 23% to 22.5%, respectively.

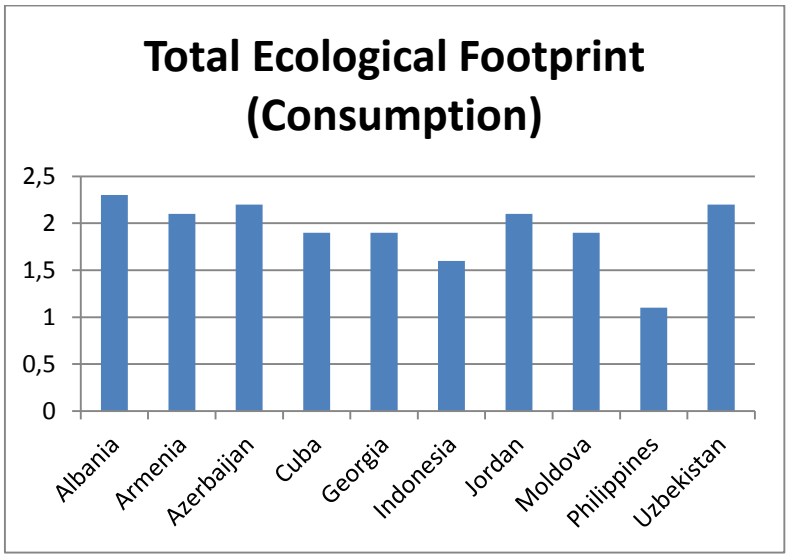


Graph 24: Uzbekhistan Distribution of Taxes

International Monetary Fund, Government Finance Statistics Yearbook and data files., Worldbank database

Consequently, under section A: 136 number of sample countries for the period 2000-2017 are chosen based on their income groups, data quality ranking and tax systems. According to the analysis, 18 countries are on Dimension 1(ecological footprint) and Dimension 2(human development index). However, there are no high-income or low-income countries that meet both of the thresholds.

There are 10 countries that met both of the thresholds. However 2 of the Section B countries are eliminated due to lack of Gini coefficient data; Cuba and Philippines. One may also speak about another elimination, namely Indonesia, as the Gini coefficient of only one year, 2013, may be misleading and also it is a quite high point; 39,5. This elimination is quite clear as we think about the economic development conditions of this Asian country, which is so far away from being sustainable.



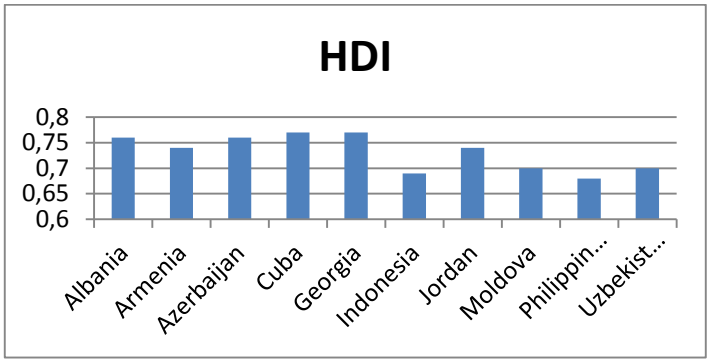
Graph 25. Group A Countries EF

Global Footprint Network , NFA 2018 Public Data package

All of the countries have improvements on their tax systems in recent years and most of the tax revenues as a percentage of GDP are above the world average which %15 for high income countries.

Gini coefficients for the Group A countries are above the threshold but most of them scraped through. This may lead to a questioning on the redetermination of threshold. If we reduce it by 2 points, let's say, automatically two of the countries will

be eliminated. In terms of the distribution of taxes, the general trend is that the indirect taxes dominate the systems.



Graph 26: Group A Countries HDI

UNDP Reports

6. CONCLUSION

Not only has its long-run structure led to a struggle with the problem of uncertainty, the concept of sustainability has continuously suffered from an ambiguity. By restricting the scope, gathering various literatures with different aspects together and making clear definitions, we try to dissipate the clouds albeit a bit. Every academic work on sustainability comprises the Brutland Report by its very nature, but in this thesis we try to show also other phases of global performance by creating an up-to-date timeline.

Before linking it to another complex concept, we define the terms that we use in the scope of our work. Sustainability is used as "sustainable development" in the context of the examination of whether the required will achieve a sustainable economic and social development of society has been correctly and sufficiently realized. According to our perspective, sustainability's role of being a long-term goal and its attached ambiguity mentioned before, should be more related to the economic development rather than economic growth, since the possibility of sustaining an endless growth may be disputable. Additionally, sustainable development may have two different direct aspects; socio-economic and environmental. But in order to be on a clear path, we focus on economics as the leading field and social as the secondary, just because it is inevitable.

Defining sustainability may be a sea to swim but measuring it is also another one. The last two decades have seen a proliferation of methods and indicators to measure sustainable development. Many countries and organizations have adopted sustainable development indicator sets to track progress towards a sustainable society. However, the differences between the approaches remain large. There are a lot of practical difficulties for defining indicator sets and several examples have been showed in this thesis. However, our study adopts Holden, Linneraud and Banister (2014)'s "sustainable development space", which is a four dimensional space comprise of four threshold values created in accordance with the literature that develops and assesses sustainable indicators. In the context of this model, we use EF, HDI and GINI to measure sustainability. The fourth dimension of the original model is excluded in this thesis.

According to the first part of our analysis, there are only 10 countries that met the relevant thresholds, namely, should have achieved sustainable development. The result differ from Holden, Linneraud and Banister (2014)'s study as their study concludes that there are no countries met the thresholds and that achieving sustainable development is overwhelming. One may claim that the source of discrepancy stems from the excluded fourth indicator, however there is another very important fact that make two works dissimilar; their opinion about economic development. Opposite to general three pillar approach, they believe that economic growth should not be one of the primary dimensions of sustainable development which is obviously quite far away from the position of this thesis, as the main question is to find out if taxation can serve sustainable development and how. Let us underline once again that we use economic development instead of growth, which may prevent itself from the prospective concerns of undesired results of economic improvements.

As the second step of our analysis, tax systems and individual performance on sustainable development of these 10 countries have been analyzed case by case. The main compelling circumstance of the analysis is the availability of data which has even led to the exclusion of some countries from the model. We believe that it will be beneficial for academic literature to revisit our work within following years because of two reasons. First, we hope that data availability may be improved. Secondly, some

of the countries of Group A, are planning to change their tax systems but the legacy is still on a draft. Armenia will be a great example for this.

Due to lack of data it may seem that checking correlations is very limited but the second part of our analysis have showed very essential facts about sustainability performance, taxation type and progressivity and the relation between them. Before summarizing those, it should be noted that our aim was not to speak about a perfect tax system which can be beneficial to all of countries and will conclude with sustainable development. Every country has its own dynamics with various aspects and should find the best for itself. However, as a general point of view, it is clear that how they will create and manage their tax systems will have an essential impact on the realization of SDGs and if not chosen to follow them like a model of Holden, Linneraud and Banister, on the implementation of preferred dimensions for sustainable development. Thus, this thesis does not aim to show an ideal system but to highlight the importance of a clearer understanding of sustainably and to discuss whether taxation can be a fellow traveller on the road to achieve it.

According to our analysis, there are no high-income or low-income countries that meet both of the thresholds. The high income countries have high HDI results but high EF too. By contrast, low income countries are not good at HDI but their EFs are relatively low. We believe that even this fact can be a proof for the importance of economic aspect for sustainability. .

The most common characteristic of the Group A countries that, all of the countries has recently improved their tax systems and thus last years' tax collection percentages are mostly above the world average for high income countries. In terms of the distribution of taxes, the general trend is that the indirect taxes dominate the system which is a supportive result to the general theory that dominant indirect taxes may lead less likely to tax evasion.

The overall conclusion on the effect of taxation on sustainable development is that, according to our analysis, since all of the Group A countries have improvement on their taxation systems, and most of them are progressive, there should be a correlation between these two. In fact, the main logic is that the primary purpose of a

tax system is to raise revenues for government operations. Countries need budgets to invest on sustainable development goals, or alternatively on whatever indicator they adopted. A tax system should follow principles of good tax policy such as simplicity, certainty, transparency, convenience of payment, equity (fairness) and neutrality. These are such concepts that if accomplished, many other elements needed for sustainable development may be improved.

One may question that if Group A countries have achieved sustainable development on practice. The answer is not yet but they are doing well and must be paid attention in coming years to observe their improvement. Measuring sustainable development is difficult but even you have a good model with brilliant indicators, to double check the real progress of countries on sustainable development is still challenging. Based on our research there is only two sources for this; UN Voluntary National Reviews Database and the Global Competitiveness Reports. First one is an online review platform, where each country shares their experiences, including successes, challenges and lessons learned, with a view to accelerating the implementation of UN 2030 Sustainability Agenda. It is a high-level political report source and may be beneficial to see how countries locally look at the globally determined SDGs. In this study, we mainly focus on the SDGs; "ending poverty", "decent work and economic growth" and " reduce the inequalities" since their main curator is the government even though there is a clear mutual responsibility of many parties. However, current SDGs have become a highly controversial topic. With agreement to Holden, Linneraud and Banister (2017), we believe that there should be a distinction between goals in terms of their priorities and the number of them can be reduced. Additionally, nation level priorities are also vital because, as mentioned in the case of Azerbaijan, if a country is not politically and economically stable, if there is conditions of war for instance, no one can speak about sustainability. Under such conditions, sustaining as a noun would be interrupted, cannot even image the adjective form. Thus, when setting the goals on global level, it should be noted that the dynamics of a country is unique and they should be supported with their local challenges.

The second source used in this thesis to see the local progress of countries in terms of sustainable development is the Global Competitiveness Reports relevant

chapters which assesses the sustainable competitiveness of nations. It should be noted that the ranking results are also congruent with our work as Group A countries progress has been mentioned also in the report.

One of the most vital prerequisite of a well-functioning economy is fair distribution of income which is also a building block of sustainable development. Governments try to maximize the social welfare with their functions of resource allocation, income distribution and stabilization by using the instruments of taxation, spending and borrowing. . Linking one contentious concept to another can be seen as a fruitless effort, but by restricting the scope of the terms as we focused on the sustainability in terms of economic development and taxation from the perspective of progressive income tax, this thesis then attempts to contribute the literature with a modest effort and very open to prospective improvements in this context.

REFERENCES

Annette Nellen, Monika Miles. *Taxes and Sustainability,*. (Journal of Green Building:Vol. 2, No.4, 2007)

Anthony N, Mahon. "*Kazakhstan: Accounting and Taxation Overview*", (World Finance Review, September 2014)

Baumgartner, Stefan, Quass, Martin F. "Ecological-economic Viability As a Criterion of Strong Sustainability Under Uncertainty", *Revised version of Working Paper No.67, (November 2007),* University of Lüneburg Working Paper Series in Economics

BBC Website, "*Who, What, Why : What is the Gini coefficient?* "http://www.bbc.com/news/blogs-magazine-monitor-31847943 [10.03.2018]

Bossel, Hartmut. *Indicators for Sustainable Devleopment: Theory, Method and Applications*, A Report to the Balaton Group, International Institute for Sustainable Development, Canada, 1999, Background and Overview

_____. *Systems and Models, Complexity Dynamics, Evolution, Sustainability*, Books on Demand GmbH, Norderstedt, Germany, 2007, p.285

Boulding, Kenneth E. 1966. *The Economics of the Coming Spaceship Earth.* Environmental Quality in a Growing Economy. Pp.3-14 Batimore, MD: Resources for the Future. Johns Hopkins University Press

Buss, Rose, *United Nations Conference on the Human Environment (UNCHE), Stockholm, Sweden* (Retrieved from http://www.eoearth.org/view/article/156774, 2007) [02.05.2019]

Cathal Long, Mark Miller, *"Taxation and Sustainable Development Goals, Do good things come to those who tax more?",* Overseas Development Institute Briefing Note, April 2017

CESifo Group Dice Report, "*Direct and Indirect Tax Revenues*", 1/2008

Charlotte Crane, *The Income Tax and the Burden Perfection,* Vol.100, No.1 (USA: Northwestern University School of Law, 2006

Cingano, F. (2014), "*Trends in Income Inequality and its Impact on Economic Growth*", OECD Social, Employment and Migration Working Papers, No. 163, OECD Publishing. http://dx.doi.org/10.1787/5jxrjncwxv6j-en [02.05.2019]

Common, Mick, "*Taxation and Sustainability*", Centre for Resource and Environmental Studies, Australian National University,

Daily, Gretchen C. Ehrlich, Paul R. 1996. *Socioeconomic Equity, Sustainability, and Earth's Carrying Capacity.* Ecological Applications, Vol. 6, No. 4, pp. 991-100

Demirkıran Senem, Onurlubaş Ebru, Turan Cem, "Fight Against Poverty for Local Sustainable Development: Example of Turkey" Akademik Bakis, Vol.49 May-June 2015

Deloitte, "*Czech Republic Highlights*", https://dits.deloitte.com/#TaxGuides, [02.07.2015]

_____. "*Thailand Highlights"*

_____., *"Kosovo Highlights"*

_____., *"Kyrgyzstan Highlights"*

_____., *"Taxation and Investment in Argentina 2015: Reach, Relevance and Reliability",*

_____., *"Panama Highlights"*

_____., *"Peru Highlights"*

_____., *"Ukraine Highlights"*

_____., *"Uruguay Highlights"*

Donella H. Meadows, Dennis l. Meadows, Jorgen Randers, William W. Behrens III, *The Limits to Growth: A Report to The Club of Rome's Project on the Predicament of Mankind*, (USA, Universe Books, 1972),

Dovers, Stephen & Handmer, John. (1992). Uncertainty, Sustainability and Change. Global Environmental Change. 2. 262–276. 10.1016/0959-3780(92)90044-8.

Eurofast, *"Albania Tax Card 2015"*, January 2015

_____., "*Bulgaria Tax Card 2014*", February 2014,

_____., "*Romania Tax Card 2015*", January 2015,

European Commission, *Europe Aid Documents*, Azerbaijan ENPI AAP, 2008

Ernst and Young, *"2015-2016 Worldwide Personal Tax Guide: Guinea"* http://www.ey.com/GL/en/Services/Tax/Worldwide-Personal-Tax-Guide---XMLQS?preview&XmlUrl=/ec1mages/taxguides/TGE-2014/TGE-GN.xml [03.04.2019]

_____., *"2015-2016 Worldwide Personal Tax Guide: Honduras"* http://www.ey.com/GL/en/Services/Tax/Worldwide-Personal-Tax-Guide---XMLQS?preview&XmlUrl=/ec1mages/taxguides/TGE-2014/TGE-HN.xml [03.05.2019]

Ervin Latifi, Epoka Student Journal, Albanian Finance, Vol.1, No.1,2015

Facundo Alvaredo, Anthony B. Atkinson, Thomas Piketty, Emmanuel Saez, "The Top 1 Percent in International and Historical Perspective", *Journal of Economic Perspectives , Vol.27, N.3, Summer 2013, p.3-20,*

Fiorino, D.J. Explaining national environmental performance: Approaches, evidence, and implications. *Policy Sciences*, v.44, n.4, p.367-389, 2011.

Georgia Department of Revenue, https://dor.georgia.gov/documents/2018-georgia-income-tax-tables [02.05.2019]

Gordon B. Dahl, Michael R. Ransom, "The 10% Flat Tax: Tithing and The Definition of Income", *Economic Inquiry Vol.40, No.1, January 2002, 120-137*

Hackett, Steven C., *Environmental and Natural Resource Economics. Theory, Policy and the Sustainable Society,* 4th Edition (New York: M.E. Sharpe Inc., 2011)

Hartmut Bossel, *"Indicators for Sustainable Development: Theory, Method, Applications"*, (International Institute for Sustainable Development, 1999)

Holden, Linneraud and Banister, *"The Imperatives of Sustainable Development",* ISDR Sustainable Development, Volume 25, Issue 3, May-June 2017, p.167-266

Hove, H. Critiquing Sustainable Development: A Meaningful Way of Mediating the Development Impasse? *Undercurrent*, v.1, n.1, 2004

IMF Country Report No.13/91 "Haiti", (Washington D.C.: March 2013), p..9

International Journal of Economics and Financial Issues Vol. 3, No. 1, 2013, pp.42-49 ISSN: 2146-4138 www.econjournals.com, Binaj

Institute on Taxation and Economic Policy, *"The Progressive Income Tax: An Essential Element of Fair and Sustainable State Tax Systems",* July, 2012.

Jansson, AnnMari, Hammer Monica, Folke Carl, Costanza Robert, *Investing in Natural Capital: The Ecological Economics Approach to Sustainability,* (Washington DC, Island Pess, 1994)

J.A. Mirrlees, "An Exploration in the Theory of Optimum Income Taxation", *The Review of Economic Studies*, Vo.38, No.2, (Apr., 1971), pp.175-208

Joseph L. "*A General Definition of the Lorenz Curve." Econometrica*, vol. 39, no. 6, 1971, pp. 1037–1039. *JSTOR*, JSTOR, www.jstor.org/stable/1909675. [02.05.2019]

Kaplow, Louis, "Horizontal Equity: Measures in Search of a Principle". *No. w1679. National Bureau of Economic Research*, 1985.

KPMG, *"Cambodia Tax Profile"* August 2013,

_____, *"Tax Card 2014: Montenengro"* 2014,

_____, *"Moldova Income Tax Profile"* https://home.kpmg/xx/en/home/insights/2017/03/moldova-income-tax.html

_____, *"Tax Card 2015: With Effect from 1 January 2*15 Lithuania"* 2015

_____, The Global Responsible Tax Project, *"The Impact of Tax on Delivering the Sustainable Development Goals"*, https://responsibletax.kpmg.com/page/the-impact-of-tax-on-delivering-the-sustainable-development-goals [03.05.2019]

_____, *"Thinking Beyond Borders: Management of Extended Business Travelers: Armenia"* (November 2012), n. 121073

_____, *"Thinking Beyond Borders: Management of Extended Business Travelers: Costa Rica"* 2011,

_____, *"Sri Lanka Tax Profile*" September 2014

_____, "*VietnamTax Profile"* June 2015,

Ministry of Finance Royal Government of Bhutan, *"Income Tax Act of the Kingdom of Bhutan"*

Neumayer, E. The determinants of aid allocation by regional multilateral development banks and united nations agencies. *International Studies Quarterly*, v.47, n.1, p.101-122, 2003.

OECD iLibrary, http://www.oecd-ilibrary.org/taxation/data/oecd-tax-statistics_tax-data-en

Osberg, Lars., *What's Fair? The Problem of Equity in Taxation,* Head JG et al., Fairness in Taxation 1993.

Orta., Fevzi Rıfat, "Vergilendirilebilir Gelir Kavramı, Geliri Belirleyen Teoriler ve Türk Gelir Vergisinde Yer Alan Gelir Tanımlaması"*, G.Ü. İ.İ.B.F Dergisi,* 2/99, 105-115

Pearce, David. 2002. *An Intellectual History of Environmental Economics.* Annu. Rev. Energy Environ. 27:57–81

Peter Diamond, Emmanuel Saez, *The Case for a Progressive Tax: From Basic Research to Policy Recommendations*

Prugh, T.; Assadourian, E. What is sustainability, anyway? *World Watch*, v.16, n.5, p.10-21, 2003.

PKF, "El Salvador Tax Guide 2013"

PKF, "Latvia Tax Guide 2013"

PwC, "Belarus: Individual – Taxes on Income", http://taxsummaries.pwc.com/uk/taxsummaries/wwts.nsf/ID/Belarus-Individual-Taxes-on-personal-income, [03.04.2019]

_____., "Bolivia: Individual – Taxes on Income", http://taxsummaries.pwc.com/uk/taxsummaries/wwts.nsf/ID/Bolivia-Individual-Taxes-on-personal-income [03.04.2019]

_____., "Brazil: Individual – Taxes on Income", http://taxsummaries.pwc.com/uk/taxsummaries/wwts.nsf/ID/Brazil-Individual-Taxes-on-personal-income [03.04.2019]

_____. Indonesian Pocket Tax Book 2018

PwC, "Navigating new territory Internationally Mobile Employees: International Assignment Services: Taxation of International Assignees Country – Ecuador" (2014) ,

PwC, *"Navigating new territory Internationally Country– Uganda"*

_____, *"Paraguay: Individual – Taxes on Income",* http://taxsummaries.pwc.com/uk/taxsummaries/wwts.nsf/ID/Paraguay-Individual-Taxes-on-personal-income [03.05.2019]

_____ Tax summaries 2018 Country Profiles https://www.pwc.com/gx/en/services/tax/worldwide-tax- summaries.html [03.05.2018]

Report of the Joint UNECE/OECD/Eurostat Working Group on Statistics for Sustainable Development, *Measuring Sustainable Development*, (United Nations, New York and Genova , 2008,2009)

Reuters, Frank Marc, "In communist Cuba, the tax man cometh" https://www.reuters.com/article/us-cuba-reform-taxes/in-communist-cuba-the-tax-man-cometh-idUSBRE8AR05F20121128 [03.04.2019]

Richard A. Westin, "The Historical Origins of Progressive Taxation", The Journal Jurisprudence, 2014

Tanzi, Vito, Zee Howell, *Tax Policy for Developing Countries*, International Monetary Fund Publication, 2001

Tietenberg, Tom, Lewis Lynee, *Environmental and Natural Resource Economics*, 4th Edition.(Pearson Addison Wesley, 2009)

Simone Sartori, Fernanda Latrônico da Silva, Lucila Maria de Souza *Campos "Sustainability and sustainable development: a taxonomy in the field of literature",* Ambient. soc. vol.17 no.1 São Paulo Jan./Mar. 2014.

SOAS University of London, *"The Challenge of Sustainable Development",* Unit 1, p.501, https://www.soas.ac.uk/cedep-demos/000_P501_USD_K3736-Demo/unit1/index.htm [03.05.2019]

Stern, David I., " The Capital Theory Aprroach to Sustianability: A Critical Appraisal", *Journal of Economic Issues*, Vol. XXX, No.1, (1997) : 145,

"Sustainable Development Goals", United Nations, http://www.un.org/sustainabledevelopment/sustainable-development-goals/ [03.05.2019]

"_____. http://www.un.org/sustainabledevelopment/development-agenda/ [03.05.2019]

Switzerland Federal Office for Spatial Development, ARE https://www.are.admin.ch/are/en/home.html

Tanzi, Vito, Zee Howell, Tax Policy for Developing Countries, International Monetary Fund Publication, 2001

Tax brackets, Georgia https://www.tax-brackets.org/georgiataxtable [03.04.2019]

Tax Foundation, "The Fact's on Georgia's Tax Climate", http://taxfoundation.org/state-tax-climate/georgia [05.04.2019]

The Federation of International Trade Associations, http://www.fita.org/countries/cuba.html?ma_rubrique=fiscalite [05.04.2019]

Thomas Piketty, Emanuel Saez , Stefanie Stantcheva, “Optimal Taxation of Top Labor Incomes: a Tale of Three Elasticities” , NBER Working Paper Series, Working Paper 17616, 2011

Thomas Piketty, Emanuel Saez, “Income Inequality in the United States 1913-1998”, The Quarterly Journal of Economics Vol.CXVIII, February 2003

Tietenberg, Tom, Lewis Lynee, Environmental and Natural Resource Economics, 4th Edition.(Pearson Addison Wesley, 2009),

United Nations Development Programme, Human Development Reports, *Human Development Index,* http://hdr.undp.org/en/content/human-development-index-hdi

United Nations Economic Comission For Europe, *Conference of European Statisticians Recommandations on Measuring Sustainable Development*, (Newyork and Genova, 2014)

United Nations, Sustainable Development Voluntary Review Report of Georgia, https://sustainabledevelopment.un.org/vnrs/ [02.03.2019]

_____. Indonesia

_____. Azerbaijan

_____. Armenia

_____. Albenia

Walter J. Blum, "The Uneasy Case for Progressive Taxation in 1976" , University of Chicago Law Occasional Paper No. 11, 1976

Weisbach David A. “Line Drawing, Doctrine and Efficiency in the Tax Law”, John M. Olin Law & Economics Working Paper No.62 (2nd Series),

Vidar Christiansen “A Brief Introduction to Tax Distortions and Optimum Tax Theory” Lecture Notes, 22.08.06

Velez, Juliana Londono. “War and Progressive Income Taxation in the 20th Century”, BEHL Working Paper Series WP2014-03, Berkley Economic History Laboratory , September 2014,

Young, H.P. “*Progressive Taxation and the Equal Sacrifice Principle*” , International Institute for Applied Systems Analysis, Austria, June 1986.

2012. *World Resource Forum Meeting Report. Beijing, China*

APPENDIX

Appendix A: SAMPLE COUNTRIES

Country/region	Data Quality	HDI	Income Group	Ecological Footprint	Gini 2014
Afghanistan	3A	0,48	LI	0,77	NO DATA
Albania	3A	0,76	UM	2,14	NO DATA
Angola	3A	0,53	LM	1,56	NO DATA
Argentina	3A	0,83	UM	3,69	41,4
Armenia	3A	0,74	LM	2,02	31,5
Australia	3A	0,94	HI	6,89	NO DATA
Austria	3A	0,89	HI	5,88	30,5
Azerbaijan	3A	0,76	UM	2,17	NO DATA
Bahamas	3A	0,79	HI	4,82	NO DATA
Bahrain	3A	0,82	HI	8,71	NO DATA
Bangladesh	3A	0,58	LI	0,79	NO DATA
Barbados	3A	0,79	HI	3,55	NO DATA
Belarus	3A	0,80	UM	4,69	27,2
Belgium	3A	0,90	HI	6,71	28,1
Benin	3A	0,48	LI	1,36	NO DATA
Bhutan	3A	0,60	LM	4,64	NO DATA
Bolivia	3A	0,67	LM	3,07	47,8

Country/region	Data Quality	HDI	Income Group	Ecological Footprint	Gini 2014
Bosnia and Herzegovina	3A	0,75	UM	3,29	NO DATA
Brazil	3A	0,75	UM	3,08	51,5
Brunei Darussalam	3A	0,86	HI	5,55	NO DATA
Burkina Faso	3A	0,40	LI	1,31	35,3
Burundi	3A	0,41	LI	0,60	NO DATA
Cameroon	3A	0,51	LM	1,27	46,6
Canada	3A	0,92	HI	8,05	NO DATA
Central African Republic	3A	0,35	LI	1,12	NO DATA
Chad	3A	0,39	LI	1,64	NO DATA
Chile	3A	0,85	UM	4,03	NO DATA
China	3A	0,73	UM	3,71	NO DATA
Colombia	3A	0,72	UM	1,91	52,8
Congo	3A	0,59	LM	1,21	NO DATA
Congo, Democratic Republic of	3A	0,43	LI	0,76	NO DATA
Costa Rica	3A	0,78	UM	2,51	48,6
Côte d'Ivoire	3A	0,47	LM	1,30	NO DATA
Croatia	3A	0,82	HI	3,63	32,1
Cuba	3A	0,77	UM	1,91	NO DATA
Czech Republic	3A	0,88	HI	5,60	25,9
Denmark	3A	0,92	HI	7,13	28,4
Dominican Republic	3A	0,72	UM	1,59	44,1
El Salvador	3A	0,68	LM	2,00	41,6
Equatorial Guinea	3A	0,58	LI	3,02	NO DATA
Eritrea	3A	0,42	LI	0,50	NO DATA
Estonia	3A	0,86	HI	6,97	34,6
Ethiopia	3A	0,44	LI	1,09	NO DATA
Fiji	3A	0,73	UM	3,90	NO DATA
France	3A	0,89	HI	4,70	32,3
Gambia	3A	0,45	LI	0,96	NO DATA
Georgia	3A	0,77	LM	1,90	37,3
Germany	3A	0,92	HI	5,05	NO DATA
Ghana	3A	0,58	LM	1,96	NO DATA
Greece	3A	0,87	HI	4,29	35,8
Guadeloupe	3A			4,15	NO DATA
Guinea	3A	0,41	LI	1,46	NO DATA
Guinea-Bissau	3A	0,42	LI	1,28	NO DATA
Guyana	3A	0,64	LM	2,87	NO DATA
Haiti	3A	0,49	LI	0,67	NO DATA
India	3A	0,62	LM	1,12	NO DATA

Country/region	Data Quality	HDI	Income Group	Ecological Footprint	Gini 2014
Indonesia	3A	0,69	LM	1,61	NO DATA
Ireland	3A	0,92	HI	4,71	31,9
Israel	3A	0,90	HI	4,68	NO DATA
Italy	3A	0,88	HI	4,29	34,7
Japan	3A	0,90	HI	4,74	NO DATA
Jordan	3A	0,74	UM	2,14	NO DATA
Kazakhstan	3A	0,79		5,81	27
Kenya	3A	0,55	LI	1,04	NO DATA
Korea, Democratic People's Republic of	3A		LI	2,87	NO DATA
Korea, Republic of	3A	0,90	HI	5,82	NO DATA
Kuwait	3A	0,80	LI	7,65	NO DATA
Lao People's Democratic Republic	3A	0,58	LM	1,78	NO DATA
Latvia	3A	0,83	HI	5,63	35,1
Lebanon	3A	0,76	UM	3,35	NO DATA
Lesotho	3A	0,50		1,46	NO DATA
Liberia	3A	0,43		1,20	33,2
Libyan Arab Jamahiriya	3A	0,72		4,33	NO DATA
Lithuania	3A	0,85	UM	5,80	37,7
Luxembourg	3A	0,90	HI	12,28	31,2
Macedonia TFYR	3A	0,75	UM	3,08	NO DATA
Madagascar	3A	0,51	LI	0,98	NO DATA
Malawi	3A	0,47	LI	0,82	NO DATA
Malaysia	3A	0,79	UM	4,42	NO DATA
Mali	3A	0,44	LI	1,54	NO DATA
Malta	3A	0,85		4,89	29
Mexico	3A	0,76	UM	2,55	45,8
Moldova	3A	0,70	LM	1,93	26,8
Montenegro	3A	0,80	UM	3,42	31,9
Mozambique	3A	0,41	LI	0,87	54
Myanmar	3A	0,55	LI	1,55	NO DATA
Nepal	3A	0,56	LI	1,03	NO DATA
Netherlands	3A	0,92	HI	5,92	28,6
New Zealand*	3D	0,91	HI	5,13	NO DATA
Nicaragua	3A	0,64	LM	1,48	46,2
Niger	3A	0,35	LI	1,76	34,3
Nigeria	3A	0,53	LM	1,12	NO DATA
Norway	3A	0,95	HI	6,03	26,8
Oman	3A	0,80		6,32	NO DATA
Pakistan	3A	0,55	LM	0,79	NO DATA

Country/region	Data Quality	HDI	Income Group	Ecological Footprint	Gini 2014
Panama	3A	0,79	UM	2,32	50,6
Paraguay	3A	0,69	LM	3,68	50,7
Peru	3A	0,74	UM	2,29	43,4
Philippines	3A	0,68	LM	1,10	NO DATA
Poland	3A	0,85	HI	4,44	NO DATA
Portugal	3A	0,84	HI	3,69	35,6
Qatar	3A	0,86		15,65	NO DATA
Romania	3A	0,80	UM	2,80	36
Russian Federation	3A	0,81	HI	5,57	39,9
Rwanda	3A	0,49	LI	0,78	NO DATA
Saint Lucia	3A	0,74	UM	2,05	NO DATA
Serbia	3A	0,78	UM	2,92	NO DATA
Sierra Leone	3A	0,43	LI	1,23	NO DATA
Singapore	3A	0,92	HI	5,86	NO DATA
Slovakia	3A	0,84	HI	4,20	NO DATA
Slovenia	3A	0,89	HI	4,68	25,7
Somalia	3A		LI	1,21	NO DATA
South Sudan	3A	0,42	LM	1,54	NO DATA
Spain	3A	0,88	HI	3,81	36,1
Sri Lanka	3A	0,76	LM	1,53	NO DATA
Sudan	3A	0,49	LM	1,22	NO DATA
Suriname	3A	0,72		3,64	NO DATA
Sweden	3A	0,91	HI	6,59	28,4
Switzerland	3A	0,94	HI	4,85	32,5
Syrian Arab Republic	3A	0,55	LM	1,46	NO DATA
Tanzania, United Republic of	3A	0,52	LI	1,47	NO DATA
Thailand	3A	0,74	UM	2,49	37
Togo	3A	0,48	LI	1,11	NO DATA
Tunisia	3A	0,72	UM	2,17	NO DATA
Turkey	3A	0,76	UM	3,21	41,2
Uganda	3A	0,49	LI	1,19	NO DATA
United Arab Emirates	3A	0,84		9,75	NO DATA
United Kingdom	3A	0,91	HI	4,80	34
United States of America	3A	0,92	HI	8,37	NO DATA
Uzbekistan	3A	0,70	LM	2,17	NO DATA
Venezuela, Bolivarian Republic of	3A	0,77	UM	3,27	NO DATA
Viet Nam	3A	0,68	LM	1,73	NO DATA

Country/region	Data Quality	HDI	Income Group	Ecological Footprint	Gini 2014
Yemen	3A	0,50	LM	1,01	NO DATA
Zambia	3A	0,58	LM	0,95	NO DATA
Zimbabwe	3A	0,51	LI	1,09	NO DATA

Appendix B: PERSONAL INCOME TAX RATES BY COUNTRY – DETAILS

A.1. ALBENIA*

Taxable Income (ALL)		Tax rates
Income from salaries and other compensations deriving from labour agreements	0-30.000	0%
	30.001-150.000	13% on the amount exceeding 30.000 AL
	> 150.000	13.000 ALL + 23% on the amount exceeding 150.000 ALL
Other kind of incomes		15%

*Pwc Tax summaries 2018

A.2 ARMENIA*

Taxable Base (AMD)		Tax rates %
Over	Not Over	
0	150.000	23
150.001	2.000.000	AMD 34,500 + 28% of the amount in excess of AMD 150,000
2.000.001		AMD 552,500 + 36% of the amount in excess of AMD 2,000,000

*Pwc Tax summaries 2018

A.3 AZERBAIJAN*

Taxable annual income (AZN)		Tax on column 1 (AZN)	Tax on excess (%)
Over(Column1)	Not Over		
0	2.076	-	0
2.076	30.000	-	14
30.000		4.200	25

*Pwc Tax summaries 2018

A.4 GEORGIA*

Taxable Income (ALL)	Tax rates (%)
$0+	1
$750+	2
$2250+	3
$3750+	4
$5250+	5
$7000+	6

*Georgia Department of Revenue, https://dor.georgia.gov/documents/2018-georgia-income-tax-tables

A.5 INDONESIA*

Taxable Income (ALL)	Tax rates (%)
Up to Rp 50,000,000	5
Above Rp 50,000,000 up to Rp 250,000,000	15
Above Rp 250,000,000 up to Rp 500,000,000	25

Above Rp 500,000,000	30

*Pwc Indonesian Pocket Tax Book 2018

A.6 MOLDOVA*

Taxable Income Bracket		Tax Rate on Income Bracket (%)
From MDL	To MDL	
0	33.000	7
33.000	Over	18

*KPMG https://home.kpmg/xx/en/home/insights/2017/03/moldova-income-tax.html

A.7 PHILIPPINES*

Old Individual Tax Rates	New Individual Tax Rates under Republic Act No. 10963				
	1 January 2018 – 31 December 2022		*1 January 2023 onwards*		
Tax Rate	If taxable income is:	Tax Rate	If taxable income is:	Tax Rate	If taxable income is:
5%	PHP 0 to PHP 10,000	0%	PHP 0 to PHP 250,000	0%	PHP 0 to PHP 250,000
10%	PHP 10,001 to PHP 30,000	20%	PHP 250, 001 to PHP 400,000	15%	PHP 250,001 to PHP 400,000

15%	PHP 30,001 to PHP 70,000	25%	PHP 400,001 to PHP 800,000	20%	PHP 400,001 to PHP 800,000
20%	PHP 70,001 to PHP 140,000	30%	PHP 800,001 to PHP 2,000,000	25%	PHP 800,001 to PHP 2,000,000
25%	PHP 140,001 to PHP 250,000	32%	PHP 2,000,001 to PHP 8,000,000	30%	PHP 2,000,001 to PHP 8,000,000
30%	PHP 250,001 to PHP 500,000	35%	PHP 8,000,001 or more	35%	PHP 8,000,001 or more
32%	PHP 500,001 or more				

*****R.G. Manabat & Co.

A.8 UZBEKHISTAN*

Taxable Income (ALL)	Tax rates (%)
Up to 1 time the minimum annual wage	0
From 1 to 5 times the minimum annual wage	7.5
From 5 to 10 times the minimum annual wage	16.5
More than 10 times the minimum annual wage	22.5

*Pwc Tax summaries 2018

Curriculum Vitae

Name Surname	: Hazel Ketenci
Place of Birth / Date	: Istanbul / 1990
Bachelor Degree	: Kadir Has University Economics ve Tourism Management Double Degree (OSYM Scholarship)
Post Graduate Degree	: Yıldız Technical University Economics
E-mail	: hazelkizilgun@gmail.com
Post Address	: Acıbadem Mah. Bakkal Sok. Ortaç Apt. No.9 D.7 Kadıköy, Istanbul
Publications	: *"A Pandemonium: Sustainability Under Uncertainty from a Perspective of Environmental Economics",* International Journal of Science and Research (IJSR) ISSN: 2319-7064