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Is there any future for Green Finance in China?

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前言

当前经济模式在建立初期，没有涉及到环境问题：那是一个自然资源丰富而碳排放量有限的时代，因此现在令人担忧的自然资源枯竭被广泛忽略。当前的社会经济体系建立在线性经济的基础之上，即：企业生产产品 （首先提取原材料，然后加工成产品），消费者使用商品，随后处置生产过程产生的废物。这种传统的生产和消费模式依赖无限和廉价的自然资源的以及其持续可用性，这导致不必要的资源损失：如生产链和生命终期的浪费、过渡的能源使用以及生态系统的侵蚀等等。以应对环境挑战为优先目标，将推动建立以使用低碳能源为核心的循环经济，即以可持续生产和消费为基础的经济体系，包括可再生能源使用、材料再利用和土地恢复。

在国际层面上，联合国制定《2030 年可持续发展议程》，将在向可持续经济过渡的过程中提供指导。可持续发展是一种综合概念，其基础是经济、社会和环境三个系统的相互作用。可持续发展意味着允许当代人和后代人在不影响地球系统进程的情况下，拥有所需的资源。在遵循这一全球战略的过程中，各国政府通过执行诸如规章和税收等支持环境保护的政策来发挥主要作用。同样，在不同的层面上，企业也参与全球战斗，其中一些企业率先进行改革（叫做快速行动者），而另一些企业则在改革之前观望等待（叫做快速反应者）。他们利用资本市场的全球趋势，该趋势来源于消费者的日益升级的环保意识、行为以及购买可持续的高价商品的意愿。

在这一过渡过程中，金融业可以发挥主导作用，促进可持续发展。可持续金融着眼于如何与经济、社会和环境问题互动。金融可以帮助在可持续目标之间做出平衡的战略决策，从而促进向低碳经济的过渡。金融和可持续性都重视未来，因此过去几十年来，人们的注意力从获取短期利润转移到创造长期利润（LTVC），从风险转移到机遇，因为可持续性被公认为是一项重要的竞争优势。

从这角度来看，证券交易所为投资方、企业、政策制定者和监管机构之间提供一个互动平台，并以这种方式帮助应对可持续发展的挑战。它们扮演主要的角色，通过各种措施，可促进各方积极采取有助于可持续经营的措施。其中包括与可持续发展报告有关的上市规则要求、自愿倡议、指导文件、对公司和投资者的培训以及关注环境、社会和管治（ESG）问题的指数等可持续投资产品。由于全球范围内证券交易所的丰富多样，审查其可持续举措的实施是一项挑战。交易所拥有的监管权力存在广泛差异，而且促进可持续发展报告倡议的激励因素也不同，因此相互之间不具有较大可比性。第一章将介绍与 ESG 报告相关的投资市场新的上升趋势，重点是 ESG 报告的要求与国际上为符合这些要求所面临的障碍。

从更具体的视角来看，第二章将继续讨论中国在绿色政策方面的贡献：作为世界第二大经济体，过去十几年来，中国快速的经济增长对环境产生了相当大的影响，国际社会对该情况也愈发关注。自改革开放以来，因为从毛泽东时期遗留下来的中国经济情况不良，中国政府看重经济繁荣，而不重视环境问题。那时“先污染后治理”的口号体现政府对目标优先级的划分，这意味着国家只有发展达到一定水平才能够治理环境。空气和水污染以及土壤退化是中国一直面临的主要挑战，而这些都是经济繁荣带来的后果。

多年来，特别是近二十年来，中央政府决心在国内和国际上共同应对全球面临的环境挑战：通过最后三项五年计划和《巴黎气候协定》的签署，中国进入了以环保为重点的新时代。中国政府的积极参与不仅是因为来自国际社会的压力，也是因为中国人民不断的要求。中国人民对可持续发展的意识不断增强，也促使中国企业做出改变以适应新的市场要求。中央政府实行更严格的有关绿色规定与加强现有的执法等措施在金融业也有体现，一个由国家倡导的全国绿色金融体系逐渐兴起，进一步促进中国积极参与国际绿色金融体系的建设。

就此而言，第二章介绍中国大陆证券交易所（上海与深圳）如何引导上市公司采取 ESG 相关实践，并与来自香港交易所的相对贡献进行比较。与大陆交易所相比，香港交易所历来享有更广泛的全球知名度，并在其上市规则中加入了 ESG 信息披露的相关要求，首先这

建立在自愿的基础上，然后自 2016 年开始根据“不遵守就解释”条款进行披露，所以香港交易所逐渐对 ESG 报告采取了更为严格的监管措施。这种新 ESG 信息披露的主要目的是吸引全球更多的投资者，因为这些投资重视参与 ESG 风险管理实践的企业，或者也可以通过它向中国内地的发行人和投资者介绍这种新的实践。近年来，鉴于愈来愈多的 H 股被纳入国际可持续发展指数，香港交易所的承诺已得到国际社会的认可。

基于这些假设，本文旨在调查中国大陆可持续企业的财务业绩与未来增长预期是否已从在香港上市中受益。从 FTSE4Good 新兴市场的 H 股组成概况开始，本文将继续选择那些可能造成污染的公司，按行业将它们划分为两组，讨论它们如何在 ESG 报告中披露环境的信息。根据是否纳入所考虑的可持续指数，公司将被分为 “更可持续” 与 “较不可持续” 两组，最后通过市场分析进行比较。通过分析接下来三年（2017 年、2018 年、2019 年）的市盈率（简称 P/E ratio）趋势，本文将试图评估与较不可持续的公司相比，市场是否以及在多大程度上认可和赞赏更可持续的公司对 ESG 实践的承诺：与“较不可持续”的公司相比，“更可持续”公司的倍数呈高增长趋势，这可能会意味着市场期待这些公司未来增长更高， 并且也意味着这种积极的动态与公司可持续性之间可能存在相关性。该对比还将包括对样本公司的净收入和收入增长率的分析，以支持之前的分析数据，并评估和比较这些公司的财务业绩。

总体来说，本文将试图评估投资市场对于这些中国大陆企业可持续实践的理解水平，企业在多大程度上受到市场的奖励，并探讨这些分析结果与公司可持续性之间是否存在相关性，以便确立中国相对绿色金融的地位。

Introduction

When our economic models were formed, no environmental concerns were considered: it was a time with abundance of resources and limited carbon emissions, therefore the now-worrying natural resources' depletion was widely ignored. The current socio-economic system is based on a linear economy, in which firms make products (first with the extraction of raw materials, then processed into products) and the consumers use and dispose, producing waste. This traditional production and consumption model assumes the ongoing availability of unlimited and cheap natural resources, which leads to unnecessary resource losses: from production chain and end-of-life waste, excessive energy use to the erosion of ecosystems. The rising urgency in fighting environmental challenges is driving towards a more circular economic system centred on the use of low-carbon power sources, an economy based on sustainable production and consumption, including the use of renewable energy, reuse of materials and land restoration. On an international level, among the different initiatives, the United Nation (UN) has developed "The 2030 Agenda for Sustainable Development", which will serve as a guide during this transition towards a sustainable economy. Sustainable development is an integrated concept, based on the interaction of three systems: economic, social and environmental. Sustainable development means that current and future generations have the resources needed without stressing the Earth system processes. In the pursuit of this global strategy, governments act as main players through the implementation of policies supporting environmental protection such as regulations and taxations. Also companies, on different levels, are involved in the global fight, some of them being in the front row of the transition (fast makers) and some waiting before acting (fast takers), exploiting the global trend arisen in the capital market, boosted by consumers' growing awareness, eco-friendly behaviour and willingness to buy a sustainable product at a premium price. During this transition, finance can play a leading role and contribute to sustainable development. Sustainable finance (SF) looks at how finance (lending and investing) interacts with economic, social and environmental issues. Finance can assist in making strategic decisions on trade-offs between sustainable goals, thus accelerating the transition towards a low-carbon economy. Finance and

sustainability both look at the future, therefore in the last decades, it has been witnessed a gradual shifting of the attention from short-term profit to long-term value creation (LTVC), moving from risk to opportunity, as sustainability is now being acknowledged as a competitive advantage. In this view, Stock exchanges, that provide a central point for the interaction between investors, companies, policymakers and regulators, are also well suited to help with the sustainable development challenge. They are uniquely placed to facilitate action as regards sustainable business, with a variety of measures at their disposal. These include listing requirements related to sustainability reporting, voluntary initiatives, guidance documents and training for both companies and investors, and sustainable investment products such as indexes that focus on Environmental, Social and Governance (ESG) issues. The diversity of stock exchanges around the world makes reviewing their sustainability initiatives a challenge. Comparability is difficult due to broad differences in the regulatory powers that exchanges own but also for the different motivating factors for the promotion of sustainability reporting initiatives. The first chapter will introduce the new rising trend in the investment market related to ESG reporting, focusing on the requirements and the challenges that internationally are being faced against the full adoption of these requirements.

On a closer perspective, the second chapter will proceed with the discussion of China's contribution to green policies: the world's second-largest economy has been put under the spotlight for its engagement in sustainable development as, in the last decades, the country's fast-growing economy has carried considerable implications on the environment, thus increasing the concerns of the international community. Since the reform period of opening up (改革开放 *gaige kaifang*), effective from the early 1980s, China's leadership focused its attention on economic prosperity rather than environmental problems, to improve the inherited economic conditions of Mao's China. The slogan "pollute first, clean up later" (先污染后治理 *xian wuran hou zhili)* embodied government priorities, meaning that with the subsequent increasing richness of the country they would have been able to clean up the environment. Air and water pollution, and soil degradation are some of the main

challenges China has faced and continue to face as consequences of its incredible economic prosperity. Throughout the years, particularly in the last two decades, the central government has shown determination in engaging both domestically and internationally to address the common environmental challenges globally facing: through the last three Five-Years Plans and the signing of the Paris Agreement on climate change, China has marked a new era in which environmental protection was made a priority. The deeper devotion of Chinese leadership was not only driven by the pressuring demand of the international community but also by the increasing demand of the population, whose rising awareness about sustainability benefits has also led Chinese companies to adapt to the new market requests. The imposition of stricter regulations by the central government and the stronger enforcement of existing ones have reflected also on the financial sector, in which the promotion of the establishment of a national green financial system has gradually arisen, further contributing to the country's active commitment to the adoption of an uniform green system at the international level. For this matter, the efforts of mainland Chinese stock exchanges (Shanghai and Shenzhen) in guiding listed companies to the adoption of ESG related practices will be discussed and compared to the relative contribution provided by the Hong Kong Stock Exchange. The Exchange, which has historically enjoyed greater global visibility compared to its neighbours, has gradually adopted a more stringent approach to ESG reporting, after including in its listing rules ESG disclosure requirements at first on a voluntary basis and then upgrading it with "comply or explain" provisions effective in 2016. This adoption could be crucial for attracting more global investors who already value those companies engaging in ESG risk management practices and their transparency in ESG communication, or it could serve as an educational tool to introduce mainland Chinese issuers and investors to the new practice. The Exchange's commitment has already implied major recognition by the international community as throughout the years a growing number of H shares has been included into international sustainability indices.

Based on these assumptions, the paper will aim at investigating whether sustainable mainland Chinese companies' financial performance and growth expectations in the future have benefited from being

listed in Hong Kong. Starting with an overview of the H shares constituents of the FTSE4Good Emerging market, the examination will proceed with the selection of those potentially polluting companies by dividing them into different groups by sector, to discuss their environmental efforts disclosed in their ESG reports. Each sector considered will be then subdivided into two groups of companies, "more sustainable" and "less sustainable" based on their inclusion or not in the sustainability index considered, to be finally compared through a market analysis. In particular, through the analysis of the price-to-earnings ratio trends in three following years (2017, 2018 and 2019), the examination will try to assess whether and to what extent the market acknowledges and appreciates the "more sustainable" companies commitment to ESG practices compared to the "less sustainable": high and increasing trends of the multiple of the "more sustainable" companies compared to the "less sustainable" may imply for them higher expectations of growth in the future from the market and a possible correlation of this positive dynamic with the companies' sustainability. The examination will also include an analysis of the net income and revenue growth rates for the sample of companies and the same period considered to support the data of the previous analysis and evaluate and compare these companies' financial performances. In conclusion, the paper will try to estimate the level of understanding the investment market possesses about mainland Chinese companies' sustainable practices, to what extent they are rewarded by the market, whether exists a correlation between these analysis' results and the companies' sustainable approach, to finally establish the status of China about green finance.

Chapter 1: Sustainable Finance: An overview of the international engagement

1.1 The rising awareness of sustainable issues: The International economic background

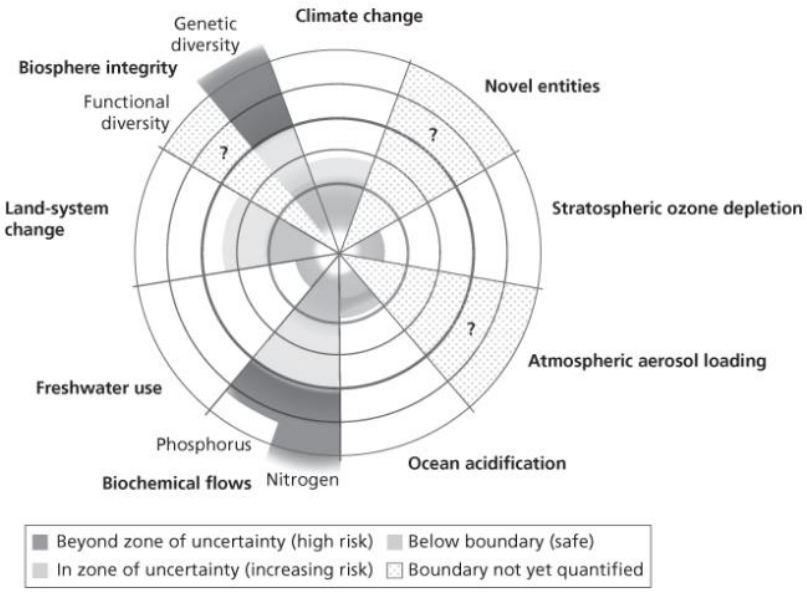
When our current economic models were developed at the beginning of the Industrial Revolution in the 19th century, natural resources were plentiful and freely available while labour and capital were the factors to improve in economic production. From that moment on, our society became mainly reliant on fossil fuels and other non-renewable resources, also because forests as fuel were depleting, thus allowing an extraordinary production of consumer goods, stimulating both economic and population growth and enhancing urbanization that lastly led to further deforestation. The changes brought about by the Industrial Revolution had huge repercussions on our economy, society and global ecosystem but they were not acknowledged until the 1970s when it was stressed by the Club of Rome that at this developing pace the Earth would have not support economic and population growth beyond 2100. According to their report *Limits to Growth*, there are five factors that determine limit growth on the planet: population increase, food production, non-renewable resources depletion, industrial output and pollution generation. They further suggested that society will be able to live on the Earth only if it imposes limits on itself and its production of material goods, so to achieve a state of global equilibrium between population and production. Another similar initiative was undertaken when the Brundtland Commission, formerly known as the World Commission on the Environment and Development, was launched by the UN with the aim of pursuing sustainable development. Sustainable development is an integrated concept which includes three aspects: economic, social and environmental. At the environmental level, factors as climate change and depletion of natural resources are some of the variables that are destabilizing the Earth system. As regards societal challenges, poverty, hunger and insufficient health care are evidence of lack of basic human needs[1]. The 1987 Brundtland Report defined *sustainable development* as "development that meets the needs

[1] Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, Oxford University Press, New York, 2019, p.2-3.

of the present without compromising the ability of future generations to meet their own needs", thus stressing the link between sustainability and the future[2].

One of the major challenges society is currently facing is climate change and there is increasing evidence that human activities are a prime cause that affects the basic functioning of the Earth system. William Steffen and colleagues proposed the *planetary boundaries framework* which aims at defining the environmental limits within which society can safely operate. They defined a safe operating space for humanity within the boundaries of nine productive ecological capacities of the planet.

Table 1 – Planetary boundaries framework



Source: Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, 2019

In Table 1, the medium dark zone is the safe operating space, light grey represents the zone of uncertainty (increasing risk), and dark indicates the zone of high risk. The following table (Table 2) indicates the control variables and quantifies the ecological ceilings.

[2] Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, 2019, p.8.

Table 2 – The ecological ceiling and its indicators of overshoot

Earth system pressure	Control variable	Planetary boundary	Current value and trend
Climate change	Atmospheric carbon dioxide concentration; ppm	At most 350 ppm	399 ppm and rising (worsening)
Biosphere loss	Genetic diversity: rate of species extinction per million species per year	At most 10	Around 100–1,000 and rising (worsening)
	Functional diversity: Biodiversity Intactness Index (BII)	Maintain BII at 90%	84% applied to Southern Africa only
Land-system change	Area of forested land as a proportion of forest-covered land prior to human alteration	At least 75%	62% and falling (worsening)
Freshwater use	Blue water consumption; cubic kilometres per year	At most 4,000 km^3	Around 2,600 km^3 and rising (intensifying)
Biochemical flows	Phosphorus applied to land as fertilizer; millions of tons per year	At most 6.2 million tons	Around 14 million tons and rising (worsening)
	Reactive nitrogen applied to land as fertilizer; millions of tons per year	At most 62 million tons	Around 150 million tons and rising (worsening)
Ocean acidification	Average saturation of aragonite (calcium carbonate) at the ocean surface, as a percentage of pre-industrial levels	At least 80%	Around 84% and falling (intensifying)
Air pollution	Aerosol optical depth; much regional variation, no global level yet defined	–	–
Ozone layer depletion	Concentration of ozone in the stratosphere; in Dobson Units (DU)	At least 275 DU	283 DU and rising (improving)
Novel entities (e.g. chemical pollution)	No global control variable yet defined	–	–

Source: Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, 2019

The planetary boundary itself lies at the intersection of the medium dark and light grey zones. Looking at the control variable for climate change, the atmospheric concentration of greenhouse gases (GHGs), we can understand how the framework works: the zone of uncertainty ranges from 350 to 450 parts per million (ppm) of carbon dioxide. We crossed the planetary boundary of 350 ppm in 1995, with a level of 399 ppm in 2015, and are adding at a rate of around 3 ppm every year, and at this pace, it has been estimated that the upper limit of 450 ppm, which lies at the intersection of the light grey and dark zones, will be reached sometime between the late 2020s and the end of 2030s[3]. To make a comparison, at the beginning of the Industrial Revolution 250 years ago, CO_2 levels in the atmosphere were approximately 280 ppm. Since then, human activities have threatened the planet's future

[3] Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, 2019, p. 7-8.

liveability: the rate of growth of human-caused CO_2 emissions has been accelerating[4]. Emissions today are six times higher than they were in 1950 and CO_2 levels now exceed 400 ppm. Consequently, the Earth has warmed 0.85°C since 1900 and this warming has mostly occurred only since 1970[5].

The current *linear production and consumption system* is structured on the so-called "take, make, dispose" economic model, in which, after the extraction of raw materials, goods are first manufactured, then sold, used and lastly discarded as waste[6]. Traditional businesses have been operating following this linear economic model which is based on the assumption that natural resources are unlimited, cheap and constantly available, reaching now a risky stage in which non-renewable resources such as fossil fuels, minerals and metals, are progressively under pressure while renewable resources, such as forests, rivers and prairies are depleting and losing their regenerative capacity. The Earth system is heavily overloaded as natural sink (absorbing pollution) due to the massive use of fossil fuels in the linear production and consumption system, and without mitigation, this would result in global warming in 2100 from 3.7° to 4.8° Celsius compared to the pre-industrial level. Persevering with this linear economic system, we are crossing planetary boundaries beyond which human activities might harm the Earth system. The planetary boundaries of climate change, land-system change (deforestation and land erosion), biodiversity loss (terrestrial and marine), and biochemical flows (nitrogen and phosphorus, mainly because of intensive agricultural practices) have been crossed[7]. Even though some progress has been achieved in improving resource efficiency, consumption-based systems cause significant losses along the value chain compared to a system based on the restorative use of resources[8]. To mitigate these risks and tackle climate change, a timely transition is then required towards a low-carbon and more circular economy, based on sustainable

[4] The main human-caused greenhouse gas is CO_2. (Romm J., *Climate Change: What everyone needs to know*, Oxford University Press, New York, 2018).
[5] Romm J., *Climate Change: What everyone needs to know*, Oxford University Press, New York, 2018.
[6] Ellen McArthur Foundation, *Towards a circular economy: business rationale for an accelerated transition*, Ellen McArthur Foundation, 2015.
[7] Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, 2019, p. 9-10.
[8] Ellen McArthur Foundation, *Towards a circular economy: business rationale for an accelerated transition*, Ellen McArthur Foundation, 2015.

production and consumption, including use of renewable energy, reuse of materials, and land restoration[9].

In this view, many global initiatives have been launched. Starting from the Earth Summit in Rio in 1992, the United Nations Framework Convention on Climate Change (UNFCCC) was adopted, which is an international environmental treaty with the aim of "stabilising greenhouse gas concentrations in the atmosphere at the level that would prevent dangerous anthropogenic interference with the climate system". From 1995, the parties to the convention met annually in Conferences of the Parties (COP) to evaluate if any improvement in dealing with climate change has occurred[10]. The third COP produced an incredibly important outcome, the Kyoto Protocol (adopted in 1997), whose target was to reduce national greenhouse-gas emissions for some developed countries. However, the agreement reached didn't make any appreciable difference to climate change, also considering that there were no binding caps on the USA[11] and both China and India, two countries extremely important in this matter because of their current and future industrialization and populations' doubling by 2050, were not included[12]. Most recently, when countries signed the Paris Agreement on climate change in 2015 (COP21), they reconfirmed the long-term target of keeping the rise in global average temperatures relative to those in pre-industrial level below 2° Celsius, and the intention to pursue efforts to limit the temperature increase even further to 1.5° Celsius. This would ensure that the stock of GHGs does not exceed a certain limit[13]. This engagement being a response to the Intergovernmental Panel on Climate Change (IPCC, 2014) which estimates that the remaining carbon budget[14] amounts to 900 gigatons (Gt) of CO_2 from 2015 onwards. The speed with which the limit is reached depends on the

[9] Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, 2019, p. 10.
[10] Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, 2019, p. 6.
[11] The world's biggest industrial and commercial power.
[12] Helm D., Hepburn C., *The economics and politics of Climate Change*, Oxford University Press, New York, 2009.
[13] Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, 2019, p.6.
[14] **Remaining carbon budget**: Estimated cumulative net global anthropogenic CO2 emissions from a given start date to the time that anthropogenic CO2 emissions reach net zero that would result, at some probability, in limiting global warming to a given level, accounting for the impact of other anthropogenic emissions. (Intergovernmental Panel on Climate Change (IPCC), *Global Warming of 1.5°*, IPCC, Switzerland, 2018.)

emissions pathway. If current global carbon emissions at about 40 Gt a year are not drastically cut, the 2°Celsius limit would be reached in two decades[15].

As stated above, climate risk, land-system change, biodiversity loss, nitrogen and phosphorus flows are the most urgent environmental challenges that impact our society. However, since economic, social and environmental system interact, inevitably environmental and social issues are interconnected; therefore, the most pressuring social challenges such as poverty, food, fresh water and health should be addressed in the view of pursuing sustainable development.

Mass production in a competitive economic system has contributed to threaten essential human rights, leading to long working hours, child labour and underpayment, practices still existing in developing, low-income countries. Human rights norms aim at guaranteeing minimum social standards and providing essential social foundation[16], allowing people to conduct their lives with dignity and opportunity. While these social foundations only assure the minimum of every person's requests, sustainable development foresees people prospering beyond this, leading lives of creativity and gratification[17]. Sustainable development further combines the concept of planetary boundaries with the complementary concept of social foundations: this means that current and future generations have the resources needed, such as food, water, health care, and energy, without pressuring the Earth system. To take a well-known example of what is called cross-system interaction, we may consider the linear production of consumption goods at the lowest cost, which enables the "economic growth" while consuming natural resources, using child labour, and producing carbon emissions and other waste. This example shows us how our economic system, organized through business firms, and its

[15] Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, 2019, p.6.

[16] Raworth (2017) defines social foundations as the 12 top social priorities, grouped into three clusters, focused on enabling people to be: (i) well: through food security, adequate income, improved water and sanitation, housing, and health care; (ii) productive: through education, decent work, and modern energy services; and (iii) empowered: through networks, gender equality, social equity, having a political voice, and peace and justice. (Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, 2019, p.10).

[17] Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, 2019, p. 10.

challenges are interlinked with environmental and social ones; therefore, these externalities[18] cannot be neglected when making production decisions[19].

1.1.1 What is Sustainable Development? United Nations' Sustainable Development Goals

As stated before, sustainable development is a concept that embodies three aspects that are interdependent: economic, social and environmental system. When starting to work on potential solutions to their relative challenges, it is then appropriate to adopt an integrated social-ecological system perspective. Scholars Gladwin, Kennelly, and Krause have delineated five principles of sustainable development: 1. Comprehensiveness: the concept of sustainable development is holistic in terms of space, time, and component parts. Sustainability includes both environmental and human systems, both nearby and faraway, in both the present and the future. 2. Connectivity: sustainability requires the world's challenges to be understood as systemically interconnected and interdependent. 3. Equity: resources and property rights distributed both within and between current and future generations. 4. Prudence: keeping ecosystems and interconnected socioeconomic systems resilient, preventing the impact of human activities from overcoming regenerative and carrying capacities. 5. Security: sustainable development's objective is to ensure current and future generations a safe, healthy, high quality of life. Hence, pursuing sustainable development requires a transition towards a sustainable and more inclusive economy, and to guide this process, the UN has developed the 2030 Agenda for Sustainable Development[20]. The 2030 Agenda includes 17 SDGs which aim at encouraging action over the 2015–30 period in sectors of critical importance for humanity and the planet. These 17 high-level goals are specified in 169 targets and are interrelated[21]: an example is the move to sustainable consumption and production (economic goal

[18] An externality is an economic term referring to a cost or benefit incurred or received by a third party. However, the third party has no control over the creation of that cost or benefit (https://www.investopedia.com/terms/e/externality.asp).
[19] Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, 2019, p. 16.
[20] Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, 2019, p. 11.
[21] Following Rockström and Sukhdev (2016), the SDGs can be classified according to the levels of the economy, the society, and the environment. (Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, 2019, p. 11).

12) and sustainable cities (societal goal 11), which are instrumental to combat climate change (environmental goal 13). The 17 UN SDGs are as follows:

- Goal 1. End poverty in all its forms everywhere.
- Goal 2. End hunger achieve food security and improved nutrition, and promote sustainable agriculture.
- Goal 3. Ensure healthy lives and promote well-being for all at all ages.
- Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
- Goal 5. Achieve gender equality and empower all women and girls.
- Goal 6. Ensure availability and sustainable management of water and sanitation for all.
- Goal 7. Ensure access to affordable, reliable, sustainable, and modern energy for all.
- Goal 8. Promote sustained, inclusive, and sustainable economic growth, full and productive employment and decent work for all.
- Goal 9. Build resilient infrastructure, promote inclusive, and sustainable industrialization and foster innovation.
- Goal 10. Reduce inequality within and among countries.
- Goal 11. Make cities and human settlements inclusive, safe, resilient, and sustainable.
- Goal 12. Ensure sustainable consumption and production patterns.
- Goal 13. Take urgent action to combat climate change and its impacts.

- Goal 14. Conserve and sustainably use the oceans, seas, and marine resources for sustainable development.

- Goal 15. Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss.

- Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions at all levels.

- Goal 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development.

As the Goal 17 stresses, the 2030 Agenda requires an intensive global engagement to assure the implementation of all the Goals and targets, therefore demanding Governments, international organizations, the business sector and individuals to mobilize all available resources, thus contributing to the transition towards sustainable consumption and production patterns. The UN SDGs then are the global strategy that governments need to adopt in order to ensure the planet's future liveability: the UN SDGs provide direction towards (future) government policies, such as regulation and taxation of environmental and social challenges. Technological change is encouraged in the view of pursuing this global strategy (e.g. the development of solar and wind energy and electric cars at decreasing cost), which also reinforces government policies (e.g. carbon pricing). Furthermore, companies are called to action but while some of them are preparing for this transition ("future makers") and are part of the solution, others (the so-called "future takers") are waiting for the transition to begin before acting[22]. The problem is that it exists a category of companies that is still unaware of this transition, therefore continues business as usual[23]. It is then important to examine the

[22] Mercer, *Investing in a time of climate change*, New York, 2015.
[23] Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, 2019, p. 11-14.

role that the main sustainability players assume in pursuing this global strategy, the efforts they are making devoted to the cause and the opportunity and the risks they may encounter.

1.2 The main sustainability players: Their roles in internalization of externalities

The social and environmental factors introduced, which the UN SDGs Agenda set a timeline for to be addressed by 2030, are externalities affecting parties without these effects being reflected in market prices[24] and, since neoclassical economic models use market prices as relevant elements for decision-making (e.g. investment, production, or consumption decisions), these externalities are not included, interfering with sustainable development targets. Ignoring these externalities leads to serious consequences for the environmental and social system: production's overuse of under-priced (as only the cost of extraction and mining concessions are counted) and insufficient natural resources continues; there is lack of investments in technologies and infrastructure that depend more on the use of renewable energy; practices as underpayment, discrimination and child labour may continue, this all resulting in slowing down the transition. Several methods can be used to internalize social and environmental externalities: government intervention through regulation or taxation, for example, with the implementation of carbon taxes, in some countries more effective than others, or by eliminating fossil fuels subsidies which hinder the adoption of renewable energy. However, even if this seems to be the first best solution, it is difficult to implement as the international coordination fails to address global challenges. Moreover, companies can play an important role in the internalization of externalities by incorporating the costs of externalities into business practices across the value chain of production, however there is still inconsistent collective effort. Finally, consumers, with their rising awareness and increasing demand, can buy sustainable products and services, driving progress towards sustainable consumption[25]. These are some of the main sustainability players whose

[24] Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, 2019, p. 39.
[25] Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, 2019, p. 43-45.

role in guiding change will be further analysed in detail and, as the examination continues, it will mainly focus on the internalization of environmental externalities.

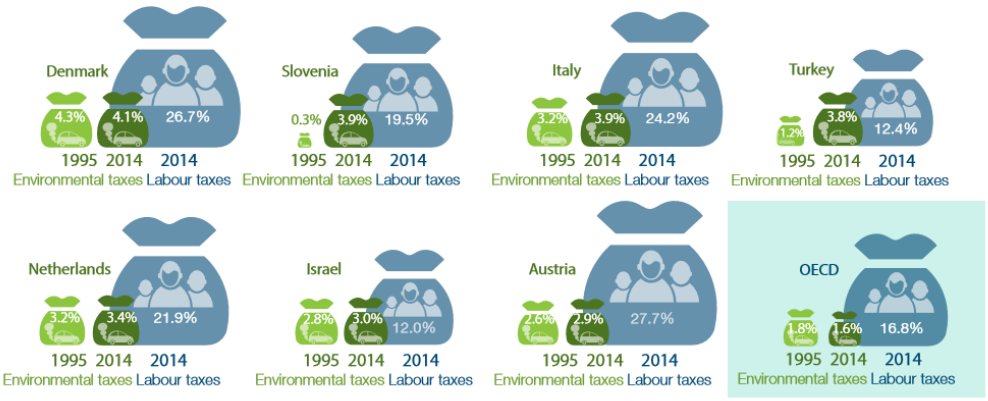
1.2.1 Governments' intervention in fostering green growth

As the OECD[26] Deputy Secretary-General Rintaro Tamaki stated, green growth means fostering growth and development, while making sure that the resources and environmental services society's welfare depends on are still provided by natural assets. Governments pursuing policies with the aim of promoting green growth need to guide towards investment and innovation that support new economic opportunities[27] and, to achieve environmental goals, such as tackling climate change or protecting biodiversity, several mechanisms can be both effective and cost-efficient: taxes, subsidies, and other economic instruments present important market signals that can affect producers' and consumers' behaviour as well as regulations. Environmental costs and benefits can be included into the budgets of businesses and households, by increasing (or decreasing) a product's or service's price, in this way helping firms or households internalise the use of natural resources or the emission of pollutants into their decisions. For this purpose, the PINE database, introduced by the OECD in 1996, offers information on six types of policy instruments essential for the environment and natural resources management in 80 countries: taxes, fees or charges, tradable permits, deposit-refund schemes, environmentally motivated subsidies and voluntary approaches[28], but in the internalisation of externalities' process, taxation is deemed to be the best market-based instrument in supporting the transition towards green growth. As a matter of fact, compared to regulatory instruments, such as emission limits or rigid technology standards, environmentally related taxes not only encourage lowest-cost reduction across polluters, but they also guarantee incentives for abatement at each unit

[26] The Organisation for Economic Co-operation and Development (OECD) is an international organisation that works to build better policies for better lives. Their goal is to shape policies that foster prosperity, equality, opportunity and well-being for all (https://www.oecd.org/about/).
[27] The Organisation for Economic Co-operation and Development (OECD), *Green Growth Indicators 2017*, OECD Green Growth Studies, OECD Publishing, Paris, 2017, https://doi.org/10.1787/9789264268586-en.
[28] The Organisation for Economic Co-operation and Development (OECD), *Policy Instruments for the Environment* (PINE), Database Brochure, 2017.

of pollution. Governments, which impose taxes to raise revenue or to discourage certain behaviour, historically introduced most environmentally related taxes mainly to raise revenue. However, they now provide relevant market signals: with the aim of triggering producers' and consumers' response, they promote a transition towards less greenhouse gas-intensive ways of production by adapting relative prices of low-carbon substitute goods[29]. Moreover, the revenues derived from such taxes can be used to support fiscal consolidation or to reduce other taxes (e.g. taxes on labour and capital that misrepresent labour supply and saving decisions): shifting taxes' burden away from labour and capital and towards environmental harmful activities and phasing out harmful subsidies are essential mechanisms in countries' transition towards a greener economy.

Table 3 – Environmental taxes compared to labour taxes



Source: OECD, *Green Growth Indicators 2017*, OECD Green Growth Studies

Table 3 offers a comparison between environmentally related tax revenues in 1995 and those in 2014 as % of GDP in the top 7 countries raking, showing an increase in revenues in this period of time, but these results are an evidence of the fact that environmental taxes remain limited, particularly when compared to labour taxes revenues raised in 2014[30]. In general, the use of environmentally related taxation is broadening in both OECD and non-OECD countries. Carbon taxes and other greenhouse gases related taxation have become more and more popular; nonetheless, in most countries, taxes on

[29] OECD, *Green Growth Indicators 2017*, OECD Green Growth Studies, 2017.
[30] *Ibid.*

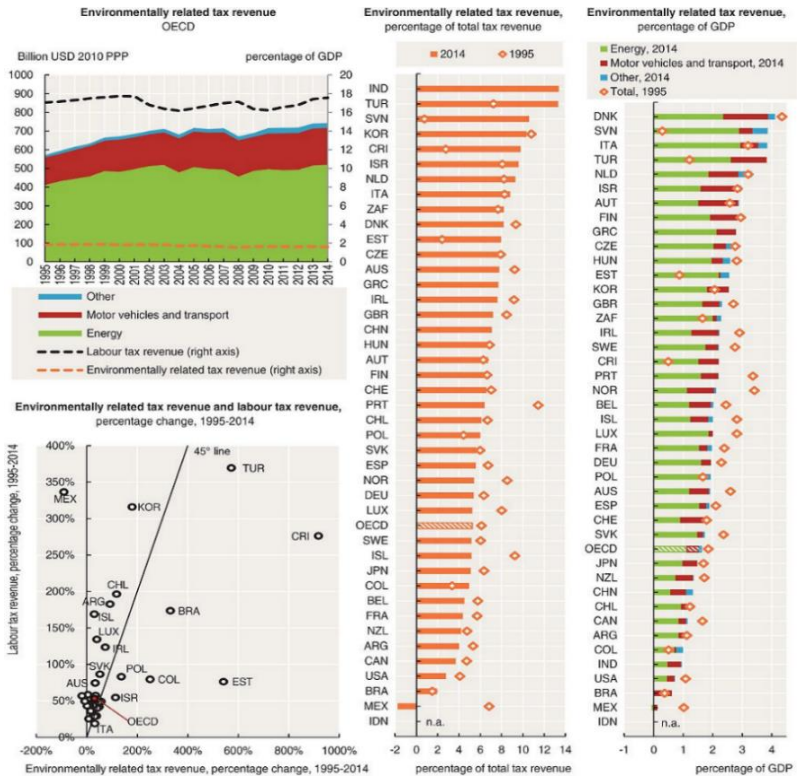
energy products still play a greater role since they generate most of the revenue among environmentally related taxes, as shown in Table 4[31].

Looking closer at the latest trends and main development, as we stated above, even though environmentally related taxes are growing in numbers, their use is still limited: the revenue obtained from these taxes are about 5,2% of all tax revenue in the OECD area, which is equivalent to 1.6% of GDP. However, some countries such as Slovenia, Costa Rica, Turkey and Estonia have tripled their share of tax revenue since 1995 (Table 4), and during this period the final consumption of oil products has witnessed a slowdown in growth compared to environmentally related taxes' revenue. Over the past 15 years, some countries have imposed new environmentally related taxes for fiscal consolidation, e.g. taxes on nuclear fuel and air travel. Nevertheless, in most countries revenue from labour taxes have increased in comparison with that of the environment[32].

[31] Besides energy products (including vehicle fuels), the tax bases covered include: motor vehicles and transport services and others which comprehend: measured or estimated emissions to air and water, ozone depleting substances, certain non-point sources of water pollution, waste management and noise; management of water, land, soil, forests, biodiversity, wildlife and fish stocks. (OECD, *Policy Instruments for the Environment* (PINE), Database Brochure, 2017.)

[32] OECD, *Green Growth Indicators 2017*, OECD Green Growth Studies, 2017.

Table 4 – Overview of the environmentally related tax revenue in OECD and BRIICS countries

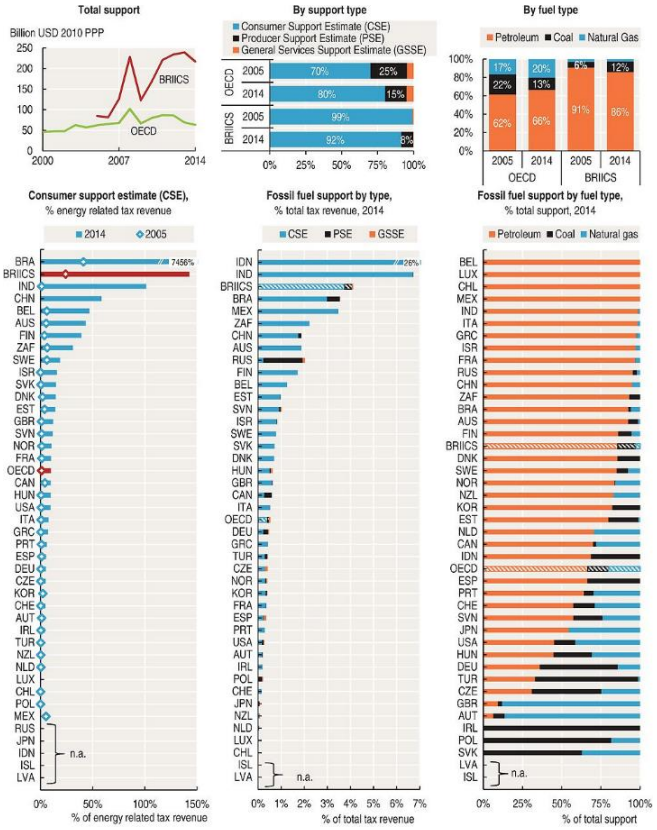


Source: OECD, *Green Growth Indicators 2017*, OECD Green Growth Studies

Moreover, as it emerges from recent development, governments in BRIICS economies, which play a crucial role in supporting energy production, have shifted their support to environmentally harmful products: between 2005 and 2014, while the composition of support in the OECD countries shifted away from coal (from 21% to 13%), in BRIICS, it shifted to coal (from 6% to 12%). For a further comparison, in BRIICS countries, the aggregated estimated value produced by these mechanisms increased from USD 85 billion in 2005 to USD 217 billion in 2014 and the 92% of support is now directed at consumers and the 8% at producers, while in OECD the value decreased from USD 84 billion to USD 63 billion in 3 years (2011- 2014) and 80% support is directed at consumers, 15% at producers and 5% at general services[33] (Table 5).

[33] *Ibid*.

Table 5 – Fossil fuel support (%)



Source: OECD, *Green Growth Indicators 2017*, OECD Green Growth Studies

The consequences of government support for fossil fuels are significant: it compromises environmental policies' effectiveness by further reducing the already low cost of emitting CO_2, making difficult the achievement of a more energy-efficient and low-carbon economy. Fossil fuel subsidies not only create obstacles in tackling climate change, they also distort costs and prices, making production and use of energy less efficient throughout the economy. Moreover, they influence resources allocation across sectors: when long-term capital investments are directed towards sectors that produce fossil fuels or use them intensively, this affect low carbon-energy and other economic activities. Economy's long-term productive capacity can be undermined by those policies that support fossil fuels: these subsidies, which can either increase public expenditures or reduce tax revenue, exert great pressure on government budgets and this is quite relevant in a time in which countries are

trying to reduce their public debt[34]. In conclusion, governments should overcome two main challenges: firstly, when implementing green tax reforms, environmental externalities should be addressed across all sources of emissions in a systematic way. Secondly, governments should abort any type of support or preferential tax rates for fossil fuels. Moreover, they should impose taxes to provide market signals to guide long-term investment decisions (e.g. alternative energy sources). Lastly, potential losses in competitiveness of domestic industries can be mitigated thanks to a stronger international coordination since at current carbon prices, competitiveness have received little negative impacts[35].

1.2.2 Consumers' sustainable behaviour

Another key player in overcoming sustainability issues are consumers: consumers are the ultimate beneficiaries of the measures adopted by other actors and whose demand has dramatic impacts on business worldwide. Latest trends in consumption show that consumer and capital markets for green products have been expanding rapidly in the last decade and this explains why companies in order to collect the benefits of these growing markets are now reporting the greenness of their products and practices[36]. This results from consumers' attitude and responsibility towards the environment which are constantly changing: consumers now are more committed in environmentally friendly actions since they believe that they can protect the environment by engaging in these activities such as purchase of green products or use of green services[37]. In business, the terms "green product" and "environmental product" describe those that fight to protect or boost the natural environment by conserving energy and/or resources and abating use of toxic agents, pollution, and waste. The wide range and increasing availability of green products suggest that consumers are not detached from the

[34] *Ibid*.
[35] *Ibid*.
[36] Delmas M. A., Burbano V. C., *The Drivers of Greenwashing*, California Management Review, Vol. 54, No. 1. University of California Press, 2011.
[37] Lee K. *Gender differences in Hong Kong adolescent consumers' green purchasing behaviour*, School of Journalism and Communication, Chinese University of Hong Kong, Shatin, Hong Kong, Journal of Consumer Marketing, 26(2), 87–96, 2009, doi:10.1108/07363760910940456.

offered value of environmental benefits. However, not necessarily consumers buy green for environmental reasons: for example, the market growth of organic foods and energy-efficient appliances are evidence of the fact that consumers respectively want their perceived safety and money savings[38]. Even if consumers are becoming more interests in environmental issues, they still need more information to guide them when choosing, and actors as companies, through their practices, can influencing consumers' activities. However, companies sometimes can mislead their consumers using positive communication about their environmental performance while still be involved in environmental harmful activities, thus engaging in the so-called greenwashing[39]. Credibility is the foundation of effective green marketing since consumers do not always have expertise to verify environmental and consumer values, thus creating scepticism. Green products must meet consumer expectations by delivering their promised consumer value and providing environmental benefits[40]. Consumers can exert great influence and pressure on companies, but they still need support of regulators to address companies' misconduct[41].

As a matter of fact, governments are determinant in providing consumers with the needed information to engage in more conscious activities, this by encouraging them in considering environmental impacts in their daily life. As stated before, many actors as governments can play a crucial role in guiding consumers' behaviour towards a more conscious consumption through the use of several instruments: economic instruments (as explained above, environmentally related taxes, but also waste charges, grants for insulation), direct regulation (e.g. water use restrictions), labelling and information campaigns (e.g. eco-labels), and environment-related public services (e.g. recycling schemes, public transport). These measures encourage "environmentally responsive" consumer choices and behavioural responses, either by changing prices of more and less environmentally harmful products,

[38] Ottman, J. A., Stafford, E. R., Hartman, C. L., *Avoiding green marketing myopia: Ways to improve consumer appeal for environmentally preferable products*. Environment, 48(5), 22–36, 2006, doi:10.3200/ ENVT.48.5.22-36.
[39] Delmas M. A., Burbano V. C., *The Drivers of Greenwashing*, 2011.
[40] Ottman, J. A., Stafford, E. R., Hartman, C. L., *Avoiding green marketing myopia: Ways to improve consumer appeal for environmentally preferable products*, 2006.
[41] Delmas M. A., Burbano V. C., *The Drivers of Greenwashing*, 2011.

in this way reducing or extending consumers' options, or providing information which allows them to make more informed choices[42].

Environmentally related taxes as well as subsidies seem to the similar impacts on consumers' behaviour: while the former promote consumption choices reflecting associated environmental impacts, even if consumers are not directly aware of them, by shaping prices of different products, the latter, in particular in the form of economic incentives, can direct consumers' choices towards less polluting alternatives. The success of these instruments depend on the extent to which they can target the environmental damage, and especially for subsidies, for which is difficult to target efficiently at the level of the good (e.g. energy-efficient appliances) or the beneficiary of the programme (e.g. insulation programmes). The use of direct regulation is another instrument that impacts household decisions since it constrains the choices available to consumers, and it has proved to be effective and often efficient. An example, governments' standards on the energy or water efficiency of appliances can remove "wasteful" products from the market. However, consumers with different demand and market conditions are not free to exchange product attributes or behavioural choices in a way that can show their underlying preferences. Information-based instruments such as eco-labels are often used by policy makers since they allow households to make more conscious decisions regarding both the private (e.g. financial cost) and public (e.g. environmental impacts) consequences of their choices. Using public information campaigns, it is possible to raise awareness on the environmental impacts of their consumption choices, however if it exists an underlying demand for environmental quality, household's choices in the market will be affected. Finally, policy makers can guarantee households' access to goods or services that discourage environmentally damaging practices thus adopting environmentally benign ones. For example, being governments providers or regulators of transport, energy and water services, they exert a certain influence on these services'

[42] The Organisation for Economic Co-operation and Development (OECD*), Greening Household Behaviour: Overview from the 2011 Survey* – Revised edition, OECD Studies on Environmental Policy and Household Behaviour, OECD Publishing, 2014, http://dx.doi.org/10.1787/9789264214651-en.

characteristics[43]. In conclusion, since sustainability is destined to lead twenty-first century commerce, it is important that players in the market do not underestimate this trend.

1.2.3 Companies' sustainable business model

In a global market where trends are shifting towards green consumption due to the rising awareness of environmental issues, more companies, across all industries, are now becoming to understand the emergency to act[44], even if some obstacles may be encountered: companies' current goal is maximising profit, which means maximising shareholder value, however this shareholder model is preventing companies from engaging in sustainable business practices. It can be crucial to better balance other stakeholders' interests in order to retain shareholder value, but a transition to the stakeholder model involves the creation of new rules for corporate governance and decision-making on corporate investment that include sustainability factors in it. Moreover, another challenge is the current business approach based on short-term value, whose practices are supported by the efficient market hypothesis, which is centred on stock price, deemed as a fundamental measure for executives and investor performances[45]. A more sustainable approach, which engages in the creation of long-term value, aims at ensuring corporate durability[46]. To overcome the challenges of meeting their sustainability objectives, thus starting a transition towards a sustainable economy, companies should incorporate such externalities in their business model, since they are largely produced at corporate level[47]. Sustainability is becoming for many companies a source of competitive advantage[48], since the perspective of adopting a sustainable business model might produce an addition benefit of higher risk

[43] *Ibid*.
[44] Haanaes K., *Why all business should embrace sustainability*, International Institute for Management Development (IMD), last accessed 2 May 2020, available at https://www.imd.org/research-knowledge/articles/why-all-businesses-should-embrace-sustainability/.
[45] Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, 2019, p. 74.
[46] Haanaes K., *Why all business should embrace sustainability*, last accessed 2 May 2020, available at https://www.imd.org/research-knowledge/articles/why-all-businesses-should-embrace-sustainability/.
[47]Geissdoerfer M., Vladimirova D., Evans S., *Sustainable business model innovation: A review*, Elsevier Ltd, https://doi.org/10.1016/j.jclepro.2018.06.240, 2018.
[48]Scott M., *What do Investors want to know about your Sustainability Strategy? Now Companies have a Guide*, Forbes, 2019 (https://www.forbes.com/sites/mikescott/2019/02/17/what-do-investors-want-to-know-about-your-sustainability-strategy-now-companies-have-a-guide/#3c6f8a563dfd), accessed 9 May 2020.

mitigation and resilience, but also provide value creation opportunities[49]. Therefore, companies whose strategy foresees the relevance of internalisation of social and environmental externalities are more likely to succeed both in long-term value creation (LTVC) and in the transition towards a more sustainable economy[50]. This transition requires a transformational change in the system: economists agree on the fact that a more integrative view on corporate sustainability is the key factor in this transformation, but few companies have reached this stage of business sustainability, which it is referred to as business sustainability 3.0[51], which means focus on sustainability challenges as starting point, creation of value for common good and taking and outside-in view, while business as usual have concentrated its concerns on economic challenges, value creation for shareholders and the adoption of an inside out perspective[52]. However, not always advanced sustainability approaches will meet economic reality's requirements, also because in some industries sustainability challenges are not as pressing as in others, but, in the end, companies that engages in sustainability activities and that provide solutions for other industries will be the one to lead the adaptation process in the economy[53].

In this view, companies are now moving towards the adoption of sustainable business models, which involves the integration of social and environmental challenges together with the financial viability of their business model. As stated before, businesses are now facing an important transformation towards a circular economy, regenerative by intention and design, which means that such businesses aim at preserving a product's added value for as long as possible, hence circular business models aim at designing products to be long lasting, in order to extend their use phase, thus minimizing resource-intensive activities and reusing products or materials[54]. This principle is in line with firms' ultimate

[49]Geissdoerfer M., Vladimirova D., Evans S., *Sustainable business model innovation: A review*, 2018.
[50] Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, 2019, p. 117.
[51] Dyllick T., Muff K., *Clarifying the Meaning of Sustainable Business: Introducing a Typology from Business-as-Usual to True Business Sustainability*, SAGE Publications, DOI: 10.1177/1086026615575176, 2015.
[52] *Ibid*.
[53] Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, 2019, p. 119.
[54] Circle Economy, *Master circular business with the value hill*, Utrecht, https://www.circleeconomy.com/master-circular-business-with-the-value-hill/, 2016, accessed 11 May 2020.

purpose, which is not only the pursuit of profitability maximization[55] but also of LTVC, which means that companies try to balance three dimensions (financial, social and environmental) whose interconnections and trade-offs are taken into account without prevailing one in favour of the others[56]. Companies that aim at pursuing LTVC should integrate sustainability and externalities in all functional business areas, including investment decisions and reporting to guarantee corporate's prosperity[57].

This overview of some of the main actors involved in the process of sustainability-achievement allow us to understand the interdependence and the mutual influence that each player can have on the other and the need for them to work together. This is in accordance with the United Nations' SDGs, which support a joint responsibility of governments, companies and consumers in the pursuit of sustainable development[58]. Hence, in this transition, it is important for companies to be prepared and open to change towards sustainability, to integrate it in their business strategy and decision-making, not only because governments can implement policies overnight without offsetting companies' losses, but also for possible long-term investors that are now expecting more responsible actions[59].

1.3 The role of finance in Sustainable Development

In this transition towards a low-carbon economy, a leading role can be assumed by the financial sector, whose main task is to allocate funding to its most productive use[60]: by choosing to finance sustainable companies and projects, finance can become a means to accelerate such transition[61]. Finance can support strategic decisions on the trade-offs between sustainable objectives; moreover, investors can influence corporates in which they invest thus driving them towards sustainable activities. Finance is

[55] Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, 2019, p.141.
[56] Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, 2019, p. 83.
[57] Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, 2019, p. 142.
[58] Schoenmaker D., *From Risk to Opportunity: a framework for sustainable finance*, Rotterdam School of Management, Erasmus University, Rotterdam, 2017.
[59] Scott M., *What do Investors want to know about your Sustainability Strategy? Now Companies have a Guide*, Forbes, 2019 (https://www.forbes.com/sites/mikescott/2019/02/17/what-do-investors-want-to-know-about-your-sustainability-strategy-now-companies-have-a-guide/#3c6f8a563dfd), accessed 9 May 2020.
[60] Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, 2019, p. 3.
[61] Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, 2019, p. 31.

also good at calculating risk and this can help with the uncertainty about environmental issues[62]. Traditional finance support profit maximization for organizations and economy growth, it aims at the optimization of financial return and risk trade-offs. Sustainable finance includes the impacts at both social and environmental level, and it strives for their optimization. In this view, sustainable finance is now moving towards LTVC, which can eventually lead to the pursuit of new opportunities which involves a combination of financial, social and environmental factors[63]. To explain the evolution of sustainable finance over the last decades, Schoenmaker used the concept of business sustainability developed by Dyllick and Muff[64]: by adapting their typology for sustainable finance, it is possible to analyse its different stages that move from ranking finance first, to social, environmental and financial impacts equal, to finally consider social-environmental impact first[65].

1.3.1 Three stages of Sustainable Finance: the evolution

Moving from traditional finance, the so-called stage of finance-as-usual, whose main task is to achieve shareholder value maximization and short-termism, the first stage of sustainable finance (SF 1.0) to be analysed is the one that aims at profit maximisation while preventing financial institutions from investing in, or lending to, "sin" companies, those that create negative impacts. For example, at environmental level, such companies are the one that engages in environmental harmful activities such as dumping waste or whale hunting, but recently financial institutions have driven away investors also from investing in coal, by including coal in exclusion list because of carbon emissions. However, disinvestment and exclusion lists show limited effects: a rising number of disinvestments might cause a reduction of company's share price, which can result in enhancing new capital by issuing more expensive shares for the company, which is still a second source of funding after retained earnings and debt financing. Disinvestment may also condemn a sector or companies to the level of

[62] Schoenmaker D., Schramade W., *Principles of Sustainable Finance*, 2019, p. 4.
[63] Schoenmaker D., *From Risk to Opportunity: a framework for sustainable finance*, 2017.
[64] Dyllick T., Muff K., *Clarifying the Meaning of Sustainable Business: Introducing a Typology from Business-as-Usual to True Business Sustainability*, 2015.
[65] Schoenmaker D., *From Risk to Opportunity: a framework for sustainable finance*, 2017.

losing their social license, causing less investment in that sector[66]. Including sustainability in decision-making and actions means to understand the growing social-environmental concerns, integrate them in the corporate's practices without changing the fundamental business outlook: the underlying objective of a company's activities remains economy, but introducing sustainability to business may create positive consequences, since the main purpose is abate costs and minimize business risks, to improve reputation and attractiveness for new or existing customers thus increasing profits, market positions and competitiveness, all this driven by shareholder value creation in the short term[67].

The second stage (SF 2.0) involves the explicit internalisation of negative social-environmental externalities in financial institutions' decision-making. Incorporating externalities can reduce the risk of financial investments' unviability and help financial institutions and companies to restore their reputation, since in the long-term these externalities may be priced and affect negatively companies[68]. In this stage, companies create values not as a side-effect of their business actions but as planned in their programs addressed at sustainability issues[69]. By giving a financial value to social-environmental impacts, the optimization process is facilitated, and their sum allows the calculation of the integrated value. But the optimization of the integrated value can have negative consequences, for example, deforestation can be offset by large economic gains, that is why it is important that social-environmental value is not worsened in respect to their initial value. Even if SF 2.0 adopts an extended stakeholder approach (shareholders, suppliers, employees, customers but also environment are included), corporates are still focused on how to reduce social and environmental impact from an inside-out perspective, minimizing their success in addressing such challenges[70].

[66] Schoenmaker D., *From Risk to Opportunity: a framework for sustainable finance*, 2017.
[67] Dyllick T., Muff K., *Clarifying the Meaning of Sustainable Business: Introducing a Typology from Business-as-Usual to True Business Sustainability,* 2015.
[68] Schoenmaker D., *From Risk to Opportunity: a framework for sustainable finance*, 2017.
[69] Dyllick T., Muff K., *Clarifying the Meaning of Sustainable Business: Introducing a Typology from Business-as-Usual to True Business Sustainability,* 2015.
[70] *Ibid.*

The last stage of sustainable finance (SF 3.0), involves moving from risk to opportunity: in this phase, financial institutions only invest in sustainable companies and projects. Finance becomes a positive means to stimulate sustainable development in the medium to long term. Since social-environmental impacts are the starting point, financial viability is the element to be analysed, essential for sustainable development: in the form of a fair financial return (which at the minimum preserves capital), financial viability is required for investment and lending, otherwise projects may be shut down for financial losses[71]. Impact investors target financial return ranging from capital preservation to competitive market rate. In the Annual Impact Investment Survey 2019, respondents mostly target risk-adjusted, market-rate returns (66%). Of the remainder, 19% primarily target returns below market-rate that are closer to market-rate returns, and 16% seek returns that are closer to capital preservation[72], hence, just a small majority pursue lower returns for sustainability reasons, meaning that in order to obtain social-environmental returns, they are willing to forego financial ones. However, it is not possible to foresee the influence that impact investing exerts on financial return: a coalition among investors might accelerate the transition towards sustainable development, which would result in reduced chance of negative financial returns, having mitigated the risks of extreme weather events or stranded assets[73]. Researches on the short and long-term benefits of organisational resilience through sustainable business practices, show that companies that adopt responsible social and environmental approach expect a higher survival rate over a 15-year period, lower financial volatility and higher sales growth, as resilience helps sustainable organization to prevent crises. Moreover, the absence of differences in short-term profits suggests that there is no short-term cost to adopting sustainability practices[74]. SF 3.0 ultimate task is achieving LTVC for the common good, this means that companies seek for legitimization of their actions in order to obtain approval from society and, in this way,

[71] Schoenmaker D., *From Risk to Opportunity: a framework for sustainable finance*, 2017.
[72] Global Impact Investing Network (GIIN), *Annual Impact Investor Survey 2019*, Global Impact Investing Network, New York, 2019.
[73] Schoenmaker D., *From Risk to Opportunity: a framework for sustainable finance*, 2017.

[74] Ortiz-de-Mandojana, N. and P. Bansal, *The long-term benefits of organizational resilience through sustainable business practices*, Strategic Management Journal, 2016, 37(8): p. 1615-1631.

guaranteeing their perpetuate existence. This is possible only if taking an outside-in approach, by asking what solutions can be found to solve social and environmental challenges[75].

Comparing the three stages, we can affirm that the objective of the first two stages is to avoid reputation risk, because society demands a minimum level of Corporate Social Responsibility (CSR) and externalities are expected to be priced-in eventually. Only the third stage aims at pursuing the opportunity of reducing social-environmental impact through investment and lending. Most companies put financial value first (SF 1.0), most financial institutions (30-40%) and corporates (20-30%) incorporate sustainability in their business practices, and only less than 1% of financial institutions adopt SF 3.0[76].

1.3.2 Challenges to Sustainable Finance

In moving away from traditional finance, obstacles may be encountered, making difficult the incorporation of sustainability in financial system. Schoenmaker identifies three main challenges to the integration of sustainable finance: insufficient collective effort, a bias towards the short term and aversion to change[77]. As we already explained the importance of a mutual collaboration among the main players involved in this transition and their different role in ensuring its success, particularly stressing that of corporates, we will focus mainly on the short-termism problematics, being the main concern.

Behavioural bias towards the short term is a major challenge to sustainable finance: traditional finance is mostly centred on short-termism, while the impacts of economic actions on both society and environment are witnessed in the long term. In sustainable finance the costs of action are immediate while the benefits remain in the future. There are several practices that encourage short-termism that make the transition to sustainable finance hard: quarterly financial reporting by companies, monthly

[75] Dyllick T., Muff K., *Clarifying the Meaning of Sustainable Business: Introducing a Typology from Business-as-Usual to True Business Sustainability*, 2015.
[76] Schoenmaker D., *From Risk to Opportunity: a framework for sustainable finance*, 2017.
[77] *ibid*.

or quarterly benchmarks for measuring investor performance, long and complicated investment chains, etc. all these comprise LTVC typical of sustainability[78].

Looking more carefully at challenges arisen from quarterly financial reporting, there is evidence that most managers choose to adopt a short-term approach when investing due to the pressure of reporting with high frequency while aiming at continuously gaining a strong share price. However, less frequent reports could serve as better incentives for project selection decisions even though the information provided to the capital market are reduced. Nonetheless, it is important to timely publish information that has a material impact on the company's performance, focusing on metrics such as economic value added over ten years, R&D efficiency, etc. It is also essential that financial reporting include social and environmental externalities that may impact economic value, which is possible through integrated reporting. However, even though some companies have started to publish integrated reports, the quality of the reported information is not always reliable. Integrated reporting represents a way of attracting long-term investors, it enhances integrated thinking across the organisation, and it is also a chance to build trust with important external stakeholders[79]. As a matter of fact, if willing to change, companies assume a leading role in the transition towards a more inclusive economy, thus making a difference and minimizing impacts on both society and environment. Investors and lenders can influence companies towards more sustainable practices. For the purpose, stock markets are the appropriate tool: they assist investors needing liquidity in the short-term and long-term business projects. They boost corporate's governance by making information available to investors mainly through disclosures required from listed companies[80]. Stock exchanges' role in fostering sustainability will be further discussed, examining, in particular, the adoption of one of the latest trends in governance: environmental, social and governance (ESG) issues-criteria.

[78] *Ibid.*
[79] *Ibid.*
[80] United Nation Environment Programme (UNEP), *Inquiry: Design of a Sustainable Financial System*, International Environment House, Chemin des Anémones 11-13, Geneva, Switzerland, 2015.

1.4 Stock Exchanges involvement in Sustainable Development

In the view of achieving a more sustainable economy, one that would not neglect increasing social inequalities and whose impact would not overcome planetary boundaries, the creation of a sustainable financial system, more stable and resilient, is a key objective to reach. For the purpose, stock exchanges serve as the bridge to the gap between listed companies and investors: in a growing number of exchanges, companies listed are required to comply with standards and to disclose information about company's performance, thus attracting more investors with long-term horizon and guaranteeing allocation of capitals to its most productive use. As the World Federation of Exchanges (WFE) states in its membership requirements, "Exchanges should pursue purposes that are in the public interest, should be fair, orderly and neutral to safeguard all public participants' interests", thus implying a broader public utility role and for that explains why exchanges around the world are engaging, at different levels, with sustainability issues[81]. Stock exchanges can play this role by encouraging new issuers to enter into the market, by promoting their efforts to comply with best market practices and by trusting investors. For the purpose, exchanges should provide solutions for improved disclosure, by facilitating financial instruments issuance on one side and by ensuring compliance of the issuer's commitment to publish transparent information on the other. This will enhance market integrity and reinforce investor trust in the market. Along with Stock Exchanges, the UN Sustainable Stock Exchanges (SSE) initiative can encourage the application and development of standards as well as leveraging the existing ones, thus enhancing integrity and growth of green finance, the latter, according to the G20, understood as the 'financing of investments that provide environmental benefits in the broader context of environmentally sustainable development'. Exchanges gain important benefits and opportunities from green finance, including attracting new listings, strengthening its competitive position, meeting a growing investor and issuer demand, and reinforcing its social license. This is possible though the introduction of new green products, which

[81] *Ibid.*

involves developing, promoting and investing in explicitly labelled environmentally linked financial products, and through the integration of environmental issues in the financial markets[82].

In its Voluntary Action Plan for Stock Exchanges, the SSE initiative has developed a diagnostic checklist (Table 6) to be used as a starting point to help stock exchanges in self-evaluating their current engagement in green finance: through the SSE Green Finance Diagnostic Checklist, an exchange can benchmark its current support for green capital markets, acknowledge which areas represent opportunities to act and finally track progress of its involvement in green finance.

Table 6 – SSE Green Finance Diagnostic Checklist

Action plan area		Action point
Promote green products and services	1.1	**Product offerings and partnerships:** Has your exchange developed and offered green products or services for your market or partnered with another financial services institution to do so?
	1.2	**Visibility:** Does your stock exchange make green products easy to find through dedicated platforms or listing labels?
	1.3	**Green Terminology:** Does your exchange provide guidance to its market on green terminology?
Greening financial markets	2.1	**Market education:** Does your exchange educate issuers and investors on the importance of incorporating environmental issues into investment practices?
	2.2	**Standards:** Has your exchange incorporated environmental disclosure standards into its listing rules?
	2.3	**Benchmarking:** Does your exchange make benchmarks available for your market in the form of green indices or environmental rating systems?
Strengthen environmental disclosure	3.1	**Written guidance:** Does your exchange provide written guidance on environmental disclosure?
	3.2	**Training:** Is your exchange providing training for capital market participants on environmental disclosure and/or integration?
	3.3	**Leading by example:** Does your exchange produce a report on its own environmental policies, practices and impacts?
Grow green dialogue	4.1	**Green financial centres:** Does your exchange have an action plan or roadmap to grow green finance in your market?
	4.2	**Standards and policy dialogues:** Does your exchange stimulate policy dialogue on green standards?
	4.3	**Investor-issuer dialogue:** Does your exchange facilitate a dialogue between issuers and investors on green finance?

Source: SSE Initiative, *How Stock Exchanges can Grow Green Finance: A Voluntary Action Plan*, 2017

Stock Exchanges can design their own action plans starting from the following action areas: promotion of green products and services, greening of financial markets, reinforcement of environmental disclosure and growth of green dialogue. Looking closely at the action area regarding greening financial markets, in particular, at the action point regarding the environmental disclosure standards an exchange have or have not incorporated in its listing rules, it emerges the growing trend towards the adoption of ESG criteria: stock exchanges and regulators function as drivers for the

[82] Sustainable Stock Exchange (SSE) Initiative, *How Stock Exchanges can Grow Green Finance: A Voluntary Action Plan*, 2017.

standardisation and growth of environmental reporting and the introduction in listing rules of environmental related requirements for reporting practices plays a fundamental role in greening mainstream financial markets. The required disclosure of comparable, accurate, timely corporate environmental information and ESG information derives from a growing investors' demand, and the strong preference among financial services providers and exchanges serves to ensure investors to make informed decisions when investing in the market. Due to this market's interest in the financial impacts of ESG-related issues, has emerged the need to disclose how an issuer impact the environment but also how the environment might influence business in the future (e.g. revenues, expenditures, assets and liabilities)[83].

1.4.1 ESG Reporting: Exchanges' Requirements and Challenges

As we explained before, more investors consider integrating environmental, social and corporate governance (ESG) policies and activities into a company's strategy and daily operations an important practice for LTVC, since ESG factors, especially those related to climate change, are potentially key drivers of portfolio risk and return. Moreover, from a policy point of view, there is a desire to control the financial weight of institutional investors, leading them to support global accords such as the Paris Agreement and the Sustainable Development Goals[84]. Therefore, clarity around how a company manages ESG risks and opportunities is part of its value proposition.

Using ESG criteria means assess how far advanced are companies with sustainability activities, specifically related to Environmental, Social and Governance factors. Environmental factors include companies' efforts with regards to climate change through GHG emissions, waste management and energy efficiency, due to the ascending importance of combatting global warming and decarbonizing is acquiring. Social factors are related to human rights, labour standards in supply chain and in general adherence to workplace health and safety, elements that could ensure a company to have a "social

[83] *Ibid*.
[84] The Organisation for Economic Co-operation and Development (OECD), *Investment governance and the integration of environmental, social and governance factors*, 2017.

license" to operate with consent. Governance refers to rules or principles defining rights, responsibilities and expectations among stakeholders in the governance of corporations. A well-structured corporate governance system can be used as a tool to support a company's long-term strategy.

Reporting on ESG considerations is rapidly advancing: companies practice a variety of reporting in different industries and countries, but even if it does not exist yet a standardized global standard-approach, common practices include: adopting existing reporting processes or establishing new ones in line with investor expectations; considering national securities laws, which may already require disclosure of material information, and international best practices[85]. Moreover, stock exchanges have different options for the integration of disclosure standards in their listing rules, depending on its regulatory authority and market composition: for markets where stock exchanges have the authority to set listing rules, issuers need to be prepared for any suggested changes, while in markets that do not have the authority to set listing rules, engaging in dialogue with regulators can help develop listing rules that support the green economy[86]. Reporting on ESG information is a key function to companies in every industry, and it is about corporate accounting and reporting mechanisms. ESG factors are sometimes deemed as "non-financial", however according to the way a company manages them, there are financial consequences, in fact they can impact: access to capital, cost savings and productivity, risk management, revenue growth and market access, brand value and reputation, licence to operate and more[87].

Analysing stock exchanges' efforts in boosting sustainability, there is evidence of their engagement in different activities enhancing ESG information disclosure: more stock exchanges in different markets include ESG information in their listing requirements, usually on a "comply or explain" basis.

[85] Sustainable Stock Exchanges (SSE) Initiative, *Model Guidance on Reporting ESG Information to Investors: A Voluntary tool for Stock Exchanges to Guide Issuers,* 2015.
[86] SSE Initiative, *How Stock Exchanges can Grow Green Finance: A Voluntary Action Plan*, 2017.
[87] SSE Initiative, *Model Guidance on Reporting ESG Information to Investors: A Voluntary tool for Stock Exchanges to Guide Issuers,* 2015.

Many stock exchanges have created sustainability-related indices, such as the Dow Jones Sustainability Index, the Stoxx Europe Sustainability Index, and more. In several jurisdictions, policies that encourage the integration of ESG factors in investment governance complements standards and risk-based controls, for example, the European Commission's Action Plan on Building a Capital Markets Union issued in September 2015 makes specific reference to "harnessing finance to deliver environmental sustainability". Moreover, more countries limit institutional investments in some "unethical" sectors Belgium, Ireland, Italy, Luxembourg and Spain ban investments in cluster munitions producers[88].

However, there is still evidence of difficulties and concerns of exchanges about current and future engagement in sustainability efforts. From the WFE Annual Sustainability Survey (2019), it has emerged that 46% (29/63) of responding exchanges still have "business or economic concerns" about the effectiveness of such initiatives, and showed other main concerns such as "lack of resources to implement initiatives" (44%) and "insufficient demand" (35%). Other reported concerns include lack of cohesive effort amongst key stakeholders in the ecosystem, lack of engagement by the regulator, lack of interest from the local market and lack of consensus on ESG reporting and metrics. However, 18% of the responding exchanges (18/63) affirmed they have no particular concerns about realizing their sustainability efforts[89]. Nevertheless, the survey reported a growing evolution in WFE members' efforts with ESG and sustainability: overall, exchanges more actively incorporate sustainability within the exchange, promote ESG disclosure by listed companies, even though it remains largely voluntary, and offer products supporting the development of sustainable finance. Exchanges maintain their major role of key promoter of ESG disclosure in their respective markets, and even if some are still at the preliminary stages in ESG initiatives due to low market awareness and insufficient support from market participants, exchanges are willing to promote the sustainability agenda[90].

[88] OECD, *Investment governance and the integration of environmental, social and governance factors*, 2017.
[89] World Federation of Exchanges (WFE), *WFE Sustainability Survey April 2019: Exchanges Advancing Sustainable Finance*, 2019.
[90] *Ibid.*

Chapter 2: Green Finance in China: the evolving engagement towards green growth policies

The globally growing concerns over environmental-related issues and especially climate change's impact over the last decades has shifted the attention on the world's second largest economy, the People's Republic of China (PRC), whose role in addressing such problematics has become even more crucial after United States of America's decision to withdraw from Paris Climate Agreement. With its efforts, the country is on the right path to become the greenest one in the world: for instance, it is the world's largest investor in renewable energy, especially regarding wind and solar power, which confers an influential role on the country being also a key exporter of clean energy technology in the world. At the same time, however, China is one of the world's most polluted country, responsible for 26% of global greenhouse gas emissions[91], which is mainly due to its heavy reliance on coal as a fuel. It is also one of the world's main oil importer since the supply of these natural resources has been essential to sustain China's economic growth until now. The diversification of its domestic energy supply can be a crucial method in improving its trade balance but also can prevent the risks of energy disruption from occurring which could affect negatively China's economic targets [92]. Moreover, China is rapidly assuming a leading role in enhancing green finance internationally, being the G20 summit held in Hangzhou in 2016 a turning point for the country. Promotion and use of financial tools such as green bonds, for which China is a frontrunner, have certainly elevated China's international profile; nonetheless, some obstacles still emerge that prevent the full commitment of Chinese investors in ESG investing, such as lack of understanding of these factors: the number of investors who choose to invest green is still limited due to the considerable opportunity cost that engaging in green finance seems to have[93].

[91] Last data available are from 2016 at Ge M., Friedrich J., *4 Charts Explain Greenhouse Gas Emissions by Countries and Sectors*, World Resources Institute, 2020. https://www.wri.org/blog/2020/02/greenhouse-gas-emissions-by-country-sector#fn:1.

[92] Global Commission on the Geopolitics of Energy Transformation, *A New World: The Geopolitics of Energy Transformation*, International Renewable Energy Agency (IRENA), 2019.

[93] United Nations Environment Programme (UNEP), G20 leaders welcome "green finance" in summit communiqué, 2016. https://unepinquiry.org/news/g20-leaders-welcome-green-finance-in-summit-communique/.

The chapter, whose aim is to examine Chinese government evolving engagement towards the adoption of greener policies, will first have a brief overview over PRC's economic growth from its foundation until now, highlighting the implication that such growth had on the environment. The chapter will further analyse the main governmental initiatives adopted to address both domestic and global environmental related issues, particularly climate change, the effects of such measures on both companies and consumers, especially for the latter whose role is often crucial in guiding regulators towards change. The cooperation among these actors is particularly important in China where this conscious awakening is relatively new and both a bottom-up and top-down approach is effective to support sustainable development. Finally, the chapter will focus on China's efforts to establish a comprehensive green financial system, which can serve as the key tool to both elevate China's economic status at the international level and to educate the domestic market on ESG related issues, and the importance to manage them properly to obtain a long-term success. The role of stock exchanges is crucial: through their requirements and several sustainable initiatives, mainland China's stock markets have the possibility to attract international investors who now consider the integration of ESG factors by companies an increasingly important element for their investment decisions. The chapter aims at investigating whether mainland China's stock exchanges' efforts lag behind compared to their relevant neighbour Hong Kong, whose well-developed financial system is already incorporating ESG, aiming at the establishment of the city as a predominant green financial hub.

2.1 Economic History of the People's Republic of China: moving towards green growth policies

Since the proclamation of the People's Republic of China in 1949, the government desire for the country's economy to grow has caused several consequences that have impact, in many ways, our planet. In the view of modernizing the country, Mao's response to the lack of advanced technology and the need to improve country's welfare was to build a great labour force, thus stimulating population growth which almost doubled from 1949 to 1976, the year of Mao's death. In Mao's mind,

economic growth was meant to be at the expense of the environment, the latter serving the nation's cause: an ever-growing population needed more arable land to work, which led to recover lands, open wasteland, to fill rivers with soil and to deforestation[94]. With the launch of the "Great Leap Forward" campaign in 1958 and the establishment of "people's communes", Chinese peasants were asked to produce "more, better, faster and cheaper". The introduction of new techniques like "close planting" and the use of fertilization proved to be ineffective measures: in some cases, the soil was contaminated and damaged by overfertilization and/or improper fertilization, making impossible to further work the lands. Moreover, the campaign had also the goal of expanding the industrial production. The aim of outperforming in iron and steel output, claiming to be able to surpass United States' production in 15 years, led to solicit Chinese people to create "backyard furnaces" from which steel was produced, creating even heavier consequences for both the environment and the people: in order to obtain fuel for their furnaces, they demolished entire forests and yet the furnaces' output was useless due to its low quality. The imprudent agricultural practices, the deviation of farm labour from crop production to steel production, and the government's failure to address the derived problematics were all responsible for one of the worst famines in history, with almost 40 million deaths. Nonetheless, Mao's view that "man must conquer nature" (人定胜天 *ren ding sheng tian*) persisted in other phases of China's history, as economic growth continued to be considered the priority. However, since Deng's era, during which the country's economy prospered, the attention has slowly shifted on environmental protection, and especially on the side-effects such improvement had on it[95].

2.1.1 China's economic growth and its implications on the environment

Starting from 1978, under Deng Xiaoping lead, a series of reform were introduced with the aim of revitalising China's economy and elevating people's living standard, which mainly included decollectivization of agriculture, openness towards foreign trade and investment and the possibility

[94] Gardner D. K., *Environmental Pollution in China: What everybody needs to know*, Oxford University Press, New York, 2018.
[95] *Ibid.*

to establish private enterprises. The reforms have provided an incredible boost to China's economy: since 1978, China's GDP grew by an annual average of almost 10%, making China in 2010 the world's second largest economy. This economic prosperity allowed the achievement of middle-income class and improvement of millions of people's lives. The economic expansion was supported mainly by the industry sector, which has risen at a faster rate than GDP for almost three decades, but at a slower pace since the global financial crisis. The sector's fast growth served as a driving force for both economic transformation and urbanisation. The mutual relation between industrialisation, urbanisation, progressive opening-up of the economy and infrastructure development have created strong domestic demand for the products of the industry sector. Employment grew fast in China especially in the manufacturing sector, in which goods could be produced inexpensively, which resulted in China starting to export, thus soon becoming the world's largest exporter of merchandise. China's economy benefited also from globalization: especially from the country's entry in the World Trade Organization (WTO) in 2001, which allowed the liberalization of China's terms of trade with the rest of the world, not only China was able to export in other markets, but also became an appealing market itself for multinational corporations, due to its cheap labour, lax environmental laws, abundant availability of cheap energy and its growing consumerism[96]. All these factors cooperated in making China the factory of the world, as it was cheaper for countries to import products from China or to outsource their production and directly produce from there. Chinese manufacturing became competitive internationally and witnessed structural change throughout this time, shifting from low-tech products such as textile at its beginning to high-tech goods such as electronics, electrical machinery and more[97].

However, the phenomenal economic growth did have many environmental implications: over the last decades, the impressive growth of China's industrial sector and the radical changes in all its structural features (especially in mining, manufacturing and energy) have cooperated in worsening the

[96] *Ibid.*

[97] Development Research Center of the State Council (DRC), the Organisation for Economic Co-operation and Development (OECD), *Industrial Upgrading for green growth in China*, 2017.

environmental damage. The predominance of heavy industry in the sector together with the massive use of resource and pollution-intensive industrial processes have affected both the environment and people's health. In recent years, China has eliminated these obsolete production practices, nonetheless, further development of eco-friendly technologies could be essential for the country's welfare. Being the factory of the world also implied a heavy reliance on energy consumption for China: the country's dependence on coal as a fuel for several industrial processes provoked heavy consequences on the generation of carbon emissions and other indirect environmental effects[98]. Nowadays, China uses as much coal every year as the rest of the world does: while at the beginning of XXI century was consuming 1.5 billion tons of coal per year, in 2016 China consumed more than 4 billion tons, ranking first in the world for coal consumption. Emissions of pollutants and carbon dioxide from burning coal are directly responsible for most of the smog in the country's air and for almost 30% of the world's GHGs emissions, which contributed in increasing China's mortality rate. Furthermore, in 2018 China's CO_2 emissions per capita was 7.95 metric tons, growing at an average annual rate of 5.97%. Industry only accounts for more than 80% of the country's waste and CO_2 emissions, mainly because of weak enforcement of existing regulations that have resulted in greater environmental impact than what predicted. Moreover, PRC's need for energy security has played a crucial role in enhancing the coal industry, whose processes are water-intensive, thus further threatening the country's limited water availability. Industrial wastewater dumped directly in rivers and lakes also contributed in contaminating most of the country's water, making it undrinkable.

Air and water pollution together with soil degradation are some of the environmental issues China's is currently facing as a result of the first two decades of reforms during which governmental policies prioritized economic growth over environmental protection. The aim of improving the country's welfare at all costs, in the end, has come at the expense of the environment and also at those of Chinese people: the economic expansion certainly made people's wealth grow, thus guaranteeing

[98] *Ibid.*

them better living standards and the possibility to afford goods once considered inaccessible such as cars. However, throughout this time, the growing concerns over health-related side-effects of the economic prosperity (e.g. food contamination derived from soil pollution) have arisen Chinese citizens' awareness to the level of urging the governments to change its priorities[99]. Today, the Chinese government has acknowledged the benefits of making economic growth and economic protection coexist, which is reflected in its new policies. China is strongly committed to addressing environmental issues, and is currently engaged in the global battle of mitigating climate change, for which, in recent years, has set different targets to create an "ecological civilization" (生态文明 *shengtai wenming*) and to build a "Beautiful China" (美丽中国 *meili zhongguo*).

2.1.2 Government's commitment to the environmental crisis: progress towards green growth

As argued before, the pressuring need for improving the country's welfare led to the adoption of several economic reforms that eventually increased the pressure on the ecosystem: fast-rate industrialisation, intensive agricultural production and urbanisation allowed Chinese citizens to enhance their living standards, but the derived high demand for energy and raw materials affected the environment and people's health. With the slogan "pollute first, clean up later" (先污染后治理 *xian wuran hou zhili)*, during the early period of reforms, governments declared their intention of prioritizing economic growth over environmental protection, but conveying the idea of addressing such problematic once increased country's richness. Throughout the last four decades, Chinese leadership efforts in battling against environmental challenges have slowly transformed into a growing interest in enhancing green growth, which is demonstrated by the number of instruments used for the internalisation of such externalities, both regulatory and market-based. Analysing Chinese central governmental policies, those related to environmental and emission have been characterised by incredible changes, especially in the last two decades: from the first regulation addressing environmental pollution issued in 1979, the "Environmental Protection Law", in which

[99] Gardner D. K., *Environmental Pollution in China: What everybody needs to know*, 2018.

were delineated the first principles of environmental protection, the number of large-scale national policies initiated have increased and have covered more specific areas of environmental management, the latest implemented being the 2015 Environmental Protection Law, the 2017 Environmental Protection Tax Law, and the Air Pollution Prevention and Control Action Plan in 2013 (the latter highlighting government's preferential attention on dealing with air pollution). Nonetheless, the essential difference with the first environmental laws stays in their legal enforcement: in fact, from the first reforms, environmental policies have experienced a transition from weak to strong enforcement, since, during the 1980s and 1990s, an inadequate enforcement have allowed enterprises not to comply with the requirements, thus causing, particularly in the industry sector, disparity among firms. Due to the low control, heavily polluting plants have continued to exacerbate the overcapacity and poor environmental performance of the sector, damaging less-polluting firms. Provinces and local authorities are some of the main reasons for this lack of enforcement and the central government have engaged with new measures in the attempt of addressing legislation and institutional framework weaknesses. For example, with the 2015 Environmental Protection Law the government committed to reinforcing penalties for environmental violations, such as restricting access to credit and tax breaks, while in 2016 sent environmental inspection teams to evaluate provinces' efforts in enforcing environmental laws. These measures proved to be more effective, as the teams successfully identified breaches from which entailed the imposition of sanctions.

The growing attention of the central government for the environmental cause is shown by the progressive integration of more ambitious environmental policy targets in the latest Five-Year Plans (namely 11th, 12th and 13th). Even though the previous Plans already included some objectives concerning environmental protection, the predominant goal was still quantitative growth. Starting from the 11th Five-Year Plan (2006-2010), priority was given to make economic, environmental and social goals coexist. Rebalance China's growth pattern was expected to be achieved putting domestic demand as the main driver together with resource conservation, energy efficiency and environmental protection. The ultimate goal was to pursue a more people-centred growth and development, thus

creating a more "harmonious society" (和谐社会 *hexie shehui*)[100]. As regards environmental protection and more closely climate change, the 11th Five-Year Plan was the first one to introduce content related to GHGs emission, indicating the government's increasing concern over climate change problems. However, even though the Plan was innovative, it only included a general statement on mitigating climate change, without setting any specific targets[101]. Nonetheless, the 11th Five-Year Plan was the first to include two major air pollutant control indicators as binding indicators: the aim was to reduce the emissions of sulphur dioxide (SO_2) and chemical oxygen (COD) by 10% by 2010 compared to the levels of 2005, and according to the Environmental Protection Authority statistics, at the end of the Plan, SO_2 emissions reduction exceeded the expectation with an emission reduction of 14%. In addition, since the implementation of the Plan, the Chinese industry sector has removed many outdated production capacities, and in general, signs of progress have been achieved in reducing environmental impact[102]. However, it is under the 12th Five-Year Plan (2011-2015) that China's central government devoted huge attention to address environmental degradation and to boost the creation of a clean energy industry. The Plan strengthened measures with the aim of pursuing green development, with low carbon emission, including measures for both energy conservation and energy efficiency such as the promotion of new and renewable energy development. The 12th Five-Year Plan also introduced the implementation of China's Circular economy policy, stressing the importance of recycling and re-use practices in the industrial sector[103]. As for what concerns climate change and GHGs emissions, the Plan set more specific targets, including a 17% reduction of CO_2 emission per unit of GDP based on the value of 2010, a 21,66% rise in forest coverage and 600 million cubic

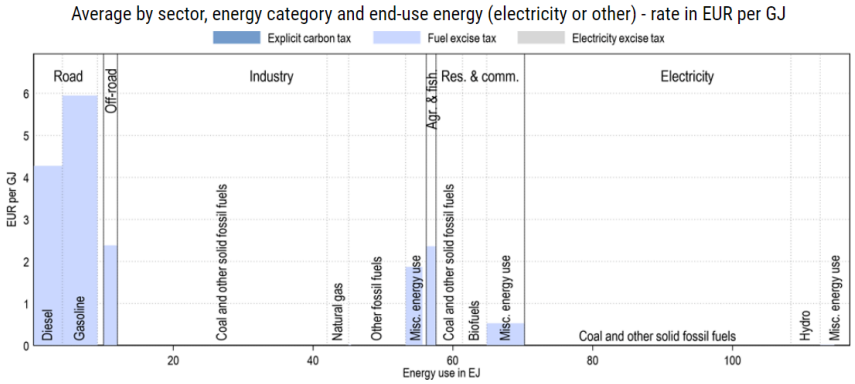
[100] World Bank Office, *Mid-term Evaluation of China's 11th Five Year Plan*. DOI: http://documents1.worldbank.org/curated/en/777321468022743338/pdf/566560WP01ADD01ear1Plan1overview1en.pdf.
[101] Xueliang Y., Jian Z., *Transition to low carbon energy policies in China—from the Five-Year Plan perspective*, 2011.
[102] Linster M., Yang, C., *China's Progress Towards Green Growth: An international Perspective*, OECD Green Growth Papers, No. 2018/05, OECD Publishing, Paris, 2018.
[103] More than 60% of the industrial waste generated in 2014 was "utilised". Recovered materials and products grow on average by 0.3% annually. In 2015, China recovered a total of 246 million tonnes of scrapped metals, plastics, paper, glass, tyres, batteries, electrical and electronic equipment, automobiles and ships, representing a total value of 515 billion yuan. (Linster M., Yang, C., *China's Progress Towards Green Growth: An international Perspective*, 2018).

meters increase in forest volume, providing a consistent improvement in reinforcing the implementation measures for carbon emission[104]. In particular, as regards the goal of reducing air pollutant emission, along with SO_2 and COD, the Plan added other two binding indicators, namely nitrogen oxides (NO_x) and ammonia nitrogen (NH_3-N), and set a target of a further 8% reduction for the formers, and a 10% reduction for the latter[105], targets that were successfully met. The evolving introduction of more detailed environmental policy targets in the Five-Year Plans is evidence of the Chinese government long-term commitment to reduce environmental pollution and tackle climate change. Along with more stringent regulations, the central government employs other instruments to promote the transition to green growth, such as taxes and subsidies.

As we saw in the first chapter, the imposition of environmental-related taxes can facilitate raising revenues, but it can also help with the reduction of coal consumption. In the past 15 years, Chinese central government have experienced an increasing use of environmental taxes with a consequent increased share of revenues in total tax revenue and in GDP. As an example, the tax revenue generated in 2014 are 1.3% of GDP, whose dominant tax base is transport and energy[106]. In a closer analysis of Chinese efforts in taxing energy use, it emerges that explicit carbon taxes are not levied; nevertheless, China imposes a fuel excise tax on gasoline and diesel, which applies to these fuels use across all economic sectors: in particular, gasoline and diesel are taxed at high effective tax rates in the road, off-road transport and industry sectors (see figure below), while other fuels used in these sectors are untaxed[107].

[104] Xueliang Y., Jian Z., *Transition to low carbon energy policies in China—from the Five-Year Plan perspective*, 2011.
[105] Linster M., Yang, C., *China's Progress Towards Green Growth: An international Perspective*, OECD Green Growth Papers, 2018.
[106] *Ibid*.
[107] In China, the Refined Oil Excise Tax (成品油消费税 *chengpinyou xiaofeishui*) applies to gasoline, naphtha, solvent and lubricating oil at a uniform rate of CNY 1.52 per litre, as well as to diesel, and fuel oil at a uniform rate of CNY 1.2 per litre. Taxed gasoline and diesel account for more than 90% of energy use and carbon emissions from the road sector. Taxed gasoline and diesel account for close to 90% of energy use and carbon emissions in the off-road transport sector. Untaxed coal and coke dominate energy use and carbon emissions from energy use in the industry (88% of carbon emissions from energy use. (The Organisation for Economic Cooperation and Development (OECD), *Taxing Energy Use 2019: Using Taxes for Climate Action*, OECD Publishing, Paris, https://doi.org/10.1787/058ca239-en, 2019).

Table 7 – Effective tax rates by sector in China



Note: Tax rates applicable on 1 July 2018. Energy use data is for 2016 and adapted from IEA (2018), World Energy Statistics and Balances. The figure groups energy categories that represent less than 2% of the horizontal axis into "miscellaneous energy use", which is not always labelled.

Source: Linster M., Yang, C., *China's Progress Towards Green Growth: An international Perspective*, 2018

More generally, it is important to stress that a uniform form of taxing energy use does not exist: different rates can be justified by revenue-raising considerations but also by the fact that not every type of energy use have the same external costs on society. Looking at China tax rate profile (table 7), most of energy use is not taxed, rates differ across the taxed energy use and they are not properly aligned with the polluter-pays principle[108] which requires a simultaneous review of both tax rates and tax rates when planning new energy reforms. The common aspect of imposing specific taxes on energy use is that the final price of the taxed energy products is increased, which can help encouraging citizens and businesses to consume less energy, thus contributing significantly to the challenge of tackling climate change.

Among the market-based instruments employed for environmental protection purposes, Chinese central government have also relied on subsidies, however, in most of the cases, public fund preferably supported the instalment of end-of-pipe technologies to reduce emissions of SO_x, NO_x and COD. This has reduced companies' possibility to have incentives for the application of efficient measures for pollution reduction, such as the upgrading of processing technology for lessening pollutants emissions or the development of clean technologies. However, the government has recently

[108]The polluter-pays principle is the principle according to which the polluter should bear the cost of measures to reduce pollution according to the extent of either the damage done to society or the exceeding of an acceptable level (standard) of pollution. (Glossary of Environment Statistics, Studies in Methods, Series F, No. 67, United Nations, New York, 1997).

moved to funding research and development of key renewable energy technologies, including solar and wind power. Finally, the government has also showed a great effort in reforming fossil fuel subsidies that are economically inefficient and affect negatively both public resources and the environment, since such subsidies offer incentives to produce GHGs emissions and to generate air pollutants such as SO_x. In this regard, during the G20 in 2016, China sustained the first voluntary peer review of fossil fuels, identifying nine fossil fuel support policies to reform. By following peer review's suggestions over the reforms, the government would be able to internalise environmental costs in the energy-intensive sectors thus reducing incentives to pollution[109].

In conclusion, this overview of the environmental-related policies and instruments the Chinese government has employed during the period going from the first economic reforms of 1978 to the end of the implementation of the 12th Five-Year Plan in 2015 served to analyse China growing attention over environmental protection and its successful commitment to decoupling some environmental pressures from economic growth. By slowly embracing more environmental-oriented measures and gradually integrating more stringent policies, removing first inadequate and unsustainable measures from both economic and environmental point of view and later adopting policies stimulating clean energy growth, China has become a leader in national policy measures to reduce GHGs emissions. Still, being China the world's largest emitter of GHGs, it needs to achieve further progress to improve green policies, so to fully commit to tackling climate change also at an international level, therefore it is important to analyse its role in promoting international cooperation on climate change.

2.1.3 China's role in the cooperation on climate change: The Paris Agreement

As we have seen before, climate change is a pressuring reality that is largely related to the global economic growth occurred over the last century. The concentration of CO_2 in the atmosphere caused

[109] Linster M., Yang, C., *China's Progress Towards Green Growth: An international Perspective*, OECD Green Growth Papers, 2018.

by human activities has generated many consequences as global warming, rising sea levels, and more common episodes of extreme weather. The urge to act and avoid the risk of ecological consequences, especially in the last decades, has led countries around the world to gather and discuss about reaching a common solution to address climate change. International negotiations have the objective of finding an effective and equitable global response to such issues, therefore they require big efforts since they come with heavy responsibilities, and since the first attempts, progress in cooperation has been achieved, gradually considering a win-win perspective. The Paris Agreement on Climate Change adopted in 2015 is the result of the last efforts of the involved countries to find measures to better understand and mitigate climate change and it is also evidence of China's evolving role in the global collaboration to find a solution, in which it has become an active participant and contributor. This is a turning point because China, since the 2000s, has been accused by the international community of not taking more responsibility for climate change considering its fast-growing economy but also of impeding the achievement of an improved global agreement[110]. Ever since, however, China has gradually incorporated climate change in its policies (e.g. by implementing its targets through the Five-Year Plans, in particular starting from the 11th Five-Year Plan), shifting its domestic actions towards the adoption of carbon emissions reduction policies and incentives to clean energy development. Moreover, starting from 2002, the central government has launched the preparation of the National Assessment Report on Climate Change, realising three reports respectively in 2006, 2011 and 2015. They were prepared according to the IPCC review procedures together with top Chinese scientists who evaluated climate change impacts, social-economic conditions and measures China could take in the global fight against climate change and the latest assessment showed China could reach its upper-limit target of reducing 40%-45% of CO_2 emissions by 2020 based on the level of 2005. These reports demonstrated that China achieved significant improvement in climate change assessment by filling the gap in regional information in IPCC assessment reports, which also provided

[110] Li A. H. F., *Hopes of Limiting Global Warming? China and the Paris Agreement on Climate Change*, 2016.

more scientific knowledge to use as a reliable basis for domestic policies, enabling its active presence in the international negotiation on climate change. As a matter of fact, thanks to such growing scientific knowledge, the Chinese government could put itself in a leading position in the international negotiations, which resulted in a constructive engagement in sealing a deal during the Paris Climate Summit in 2015. The resulted legally binding Paris Agreement, adopted by 175 signatory countries on the first day and a total of 195 countries, it is proof of a high common necessity of the international community of mitigating climate change with a sustainable development. The agreement set a global agenda for addressing climate change by 2020 and beyond with the aim of fostering climate resilience and low GHG emissions development. During the COP21, China submitted its Intended Nationally Determined Contributions (INDC), in which promised to peak CO_2 emissions by 2030, reduce the emissions of CO_2 per unit of GDP by 60%-65% on the basis of 2005 level by 2030 and increase energy consumption of non-fossil fuels to approximately 20%[111], thus stressing the intention of a transition towards a low-carbon, more sustainable economy from which the country could benefit in the long run. Addressing climate change internationally by reducing the reliance on fossil fuels and increasing the share of clean and renewable energy it is in line with Chinese domestic concerns over environmental protection and public health. The Action Plan for Air Pollution issued in 2013 required the implementation of adjusted measures in the energy mix and the introduction of more clean energy at national, local and industrial levels and this is in perfect synergy with the targets of the Paris Agreement, whose realisation and incorporation in the country's ecological initiative could further foster China's actions in both tackling climate change and restraining air pollution.

In conclusion, the Paris Agreement is the first multilateral climate agreement who received global consensus, in which developed and developing countries commit to cooperating to promote sustainable development, enhance mutual learning, resilience and reduce vulnerability by assuming their responsibilities and contributing to the cause. The Conference became an important stage for

[111] Gao Y., *China's response to climate change issues after Paris Climate Change Conference*, https://doi.org/10.1016/j.accre.2016.10.001, 2016.

China's relevance in the international negotiations on climate change, whose efforts are deemed to be successful in the participation in international governance. China's proposed model of a win-win cooperation, inviting countries to contribute to the best of their ability, following the rule of law, fairness and justice, and inclusiveness serve as guidelines for the execution of the Paris Agreement and for its participation in creating a common destiny for all. China commitment to implementing the Paris Agreement consists in the integration of climate change into China's ecological initiative together with a socioeconomic transformation toward low-carbon economy. The 13th Five-Year Plan, released in 2016 after the Paris Climate Change Conference, is a statement of the country's engagement in addressing climate change which includes several related targets such as effective control of GHG emissions, climate resilience and international cooperation[112]. The Plan, that will be further discussed in detail, is considered to be the greenest of the Plans so far: it aims at achieving an overall improvement in the country's environment by adopting green practices in the industry sector and in daily life thus guaranteeing less pollution and biological diversity.

2.2 Green and innovative development: The 13th Five-Year Plan and others

In the view of a gradual transition towards a low-carbon, more sustainable economy and a long-term contribution to address climate change, following the COP21, the central government has committed to enhancing the country's future prosperity by placing a strong emphasis on innovation (创新发展 *chuangxin fazhan*) and green development (绿色发展 *lvse fazhan*) in the most recent Five-Year Plan. Along with the pursuit of a coordinated, open and shared development, these are the guiding principles of the 13th Five-Year Plan (2016-2020), whose covered period is crucial for China's ambition to achieve a moderately prosperous society[113] (小康社会 *xiaokangshehui*). Five key words are representative and inspiring for the new country's future development: innovation, which will

[112] *Ibid*.
[113] "Moderately prosperous society" is the official translation of *xiaokangshehui*, a term borrowed from ancient Confucian philosophy by Deng Xiaoping after he launched his economic reforms in 1978. (Miles J., *Meet "moderately prosperous" China,* The Economist, https://worldin.economist.com/article/17353/edition2020meet-moderately-prosperous-china, last accessed 8 May 2020).

drive China's development in advancing in every field, from theory to technology, to science; coordination, which will guarantee a well-balanced social development among different areas, both rural and urban areas, and among different industry sectors; green development, which will provide the conditions to ensure long-lasting development whereby people can achieve a better living standard; openness, which will secure a greater active presence for the country in global economic governance; inclusive growth, described as the essence of Chinese-style socialism, will help people move towards a more equal and shared growth, increasing unity among them. This new development philosophy inaugurates a new stage for the country's economic development, which is based on adapting to the "new normal" (新常态 *xinchangtai*) of a moderate growth: the government call for a greater dependence on national consumption and the service sector rather than export and investments serves to ensure that China's 2010 GDP and per capita personal income double by 2020 while committing to achieve a more balanced and sustainable development, thus including economic efficiency, social inclusion and environmental protection[114].

Considered to be the greenest of all, the 13th Five-Year Plan largely highlights the importance of conserving resources and protecting the environment, thus accomplishing a new model of modernization whereby humankind lives in harmony with nature. The objective is to build a Beautiful China and to further contribute to ensuring global eco-security. The 13th Five-Year Plan is totally composed by 80 chapters, of which 7 are dedicated to environmental protection and are grouped in the section named "acceleration to improve the ecological environment" (加快改善生态环境 *jiakuai gaishan shengtai huanjing*). The section covers several environmental-related themes which regard namely: a faster development of functional zones, the promotion of an efficient use of the resources, a larger environmental governance, ecological conservation and restoration, active response to global climate change, improvement of the ecological security mechanisms and the development of green

[114] China's 13th Five-Year Plan aims at maintaining sustained economic growth with an average annual growth rate of 6.5% over 2016-20, while achieving domestic environmental objectives and international commitments under the Paris Climate Agreement. The Plan also forecasts progressive changes in the economic structure, with a further expansion of the service sector's share in the economy to 56% by 2020.

industrial sectors[115]. It is interesting to stress that of 13 of its obligatory targets, the Plan's main economic and social development indicators include 10 quantitative binding targets related to environmental and natural resources specifically covering climate and energy issues, air, water and soil pollution and forest coverage and land ecosystems related targets. The number of such targets is higher, and they are more detailed than the ones covered in previous Five-Year Plans, as we can see in Table 8: for what concerns the energy field related targets, the Plan aims at reducing energy consumption per unit of GDP by 15% from 2015 levels by 2020 and an increase by 15% of non-fossil energy in primary energy consumption. For the first time, the Plan further limits China's total energy consumption at 5 billion tons of standard coal equivalent by 2020, a 16,3% increase in consumption from 2015 levels (in 2015 reached 4.3 billion tons of coal equivalent). As regards the climate targets, the Plan sets the goal of reducing the CO_2 emission per unit of GDP by 18% compared to the level of 2015 by 2020, thus committing to reducing CO_2 intensity per unit of GDP by at least 40% from its 2005 level, which is perfectly in line with China's pledge at COP21 to lower carbon emissions by 60-65% per unit of GDP compared to 2005 level and to peak its carbon emissions by 2030.

[115] People's Republic of China, *13th Five-Year Plan on National Economic and Social Development*, 2016. Translation. http://www.gov.cn/xinwen/2016-03/17/content_5054992.htm.

Table 8 - Environmental targets in China's 11th, 12th and 13th Five Year Plans (FYP)

Environmental issues and indicators		11th FYP (2006-2010)		12th FYP (2011-2015)		13th FYP (2016-2020)
		Target	Actual	Target	Actual	Target
Main air pollutant emission reduction (%)	SO_2	-10	-14.29	-8	-18	-15
	COD	-10	-12.45	-8	-12.9	-10
	NOx	-	-	-10	-18.6	-15
	Ammonia Nitrogen	-	-	-10	-13	-10
Energy supply intensity per unit of GDP (%)		-20	-19.1	-16	-18.2	-15
Carbon dioxide emission intensity per unit of GDP (%)		-	-	-17	-20	-18
Non fossil **energy** share in primary energy supply (%)		-	-	11.4	12	15
Water consumption per unit of industrial Added Value (%)		-30	-36.7	-30	-35	-20
Water consumption per unit of GDP (%)		-	-	-	-	-23
Total use of **water** (billion cubic meters)		-	-	-	-	< 670
Air quality	Days with good urban air quality[1] in cities at or above Prefecture-level	-	-	-	-	> 80
	Reduction of PM2.5 concentration in substandard[2] cities at or above Prefecture-level (%)	-	-	-	-	-18
Surface water quality	Surface water of at least Grade III quality[3] (% of monitored sections)	-	-	-	-	> 70
	Surface water worse than Grade IV quality (% of monitored sections)	-	-	-	-	< 5

Note: Table 8 only considers energy, climate, air and water targets. (*Source*: Linster M., Yang, C., *China's Progress Towards Green Growth: An international Perspective*, OECD Green Growth Papers, 2018.)

The Plan further sets ambitious targets to reach progress in air, water and soil management and quality: for instance, it is the first Five-Year Plan to introduce a specific target for PM2.5, a fine particulate that is a strong concern for people's health and contributes to air pollution, setting the goal of reducing PM2.5 concentration by 18% in substandard cities at or above Prefecture-level. Another measure taken to address air pollution is the further reduction of the main air pollutant emission compared to the previous Plans (15% reduction for SO_2 and NO_x, 10% reduction for COD and NH_3-N), together with the requirement of 80% of days with good air quality by 2020[116].

For what concerns water pollution, which, as we have already seen, is primarily caused by the industry sector and agriculture, the Plan caps total water consumption at 670 billion cubic meters, by committing to reducing water consumption per 10000 yuan of GDP by 23%. The Plan further stresses the need to enhance both conservation and reuse of water resources and the persistent use of monitoring systems.

[116] D'Aprile A., *Climate and energy targets in China's 13th Five-Years Plan*, International Climate Policy, n.40, 2016. http://www.cmcc.it/wp-content/uploads/2016/04/ICCG-International-Climate-PolicyMagazine-N.40.pdf.

Furthermore, the plan addresses soil degradation but by only setting the one specific goal to reduce the area of land designated for construction per unit of GDP by 20%, acknowledging that soil degradation is strictly connected to food safety.

Finally, the Plan also sets ecosystem-related targets by committing to grow forest coverage at 23.04%, by engaging in afforestation and by abolishing the use of forests for commercial purposes. It also aims at better treating and controlling grassland degradation, desertification, and salinization, and ensuring a 56% grassland vegetation coverage growth[117].

These planned objectives are evidence of the matured commitment of the Chinese government to fight for the environmental cause both nationally and globally and proof of the increasing responsibility towards the impact of climate change, air and water pollution, soil degradation, energy security and efficiency. According to the official mid-term evaluation report about the implementation of the 13th Five-Year Plan, over its first two years, the Plan has achieved remarkable results which provide positive expectations for the success of its complete realisation. It is claimed that the progress of the main indicators has been generally in line with predictions, further stating that 2 of the total 25 indicators were completed in advance. As regards sustainable development of resources and the environment, progress has been reached: in the first two years, energy consumption per unit of GDP and CO_2 emissions have been cut respectively by 8.5% and 11.4%, water consumption per 10000 yuan of GDP has dropped by 13.2%, PM2.5 concentration has decreased by 15.8% and, lastly, the goal related to forest stock was completed ahead of schedule. However, few targets have lagged far behind expectations (e.g. two binding indicators related to environmental protection), and this is strictly related to challenges and changes in the external environment[118].

[117] Seligsohn D., *How China's 13th Five-Year Plan addresses Energy and the environment*", 2016. http://www.uscc.gov/sites/default/files/Deborah%20Seligsohn_Written%20Testimony%20042716.pdf.

[118] The National People's Congress of the People's Republic of China, *State Council on the mid-term evaluation report of the implementation of "People's Republic of China 13th Five-Year Plan for economic and social development"*, http://www.npc.gov.cn/npc/c12491/201812/dd10049384bc443ea0a87538f7a06515.shtml, 2018.

Nonetheless, the active promotion and the commitment to fulfil the Plan's targets is the priority for the government to succeed in the creation of a healthy society living in a prosperous economy.

An important element that highlights Chinese government efforts in promoting a greener growth is the gradual increase in investments and incentives towards the renewable energy sector: as a matter of fact, from the 13th Five-Year Plan guidelines emerges also the government's acknowledgement of the economic benefits derived from using renewable energy, which led to set a 15% increase in clean energy use as binding target. As we argued before, Chinese concerns over energy security have affected both the national economy and environment due to the heavy reliance on coal and oil imports and, in the view of protecting national interests, they have inevitably influenced international relations and creation of alliances. However, with the increasing use of renewables and the consequent diversification of domestic supply, countries like China have more opportunities of achieving energy independence thus having greater energy security and more power in energy-related decision-making. China's boost in use of renewable energy has started since the world's financial crisis, from that moment on to be considered a strategically important industry. The government's support to renewables, even with some challenges, has gradually grown to the level of reaching unprecedent results: the government intensive efforts to research and invest in clean energy technologies development and renewables has succeeded in making China the world's renewable energy superpower in 2017. Innovation has been the definite factor in ensuring the fostering of this industry, defining the country as one of the frontrunners in the global energy transition, particularly in solar and wind power sectors. As a result, China is today the world's largest producer and exporter of solar panels and wind turbines, has reached a dominant position in sectors such as electric vehicles, and it is the world's leader in energy patents[119]. This leading position that the country holds in renewables provide China a competitive advantage both in trade and in the enhancing of the country's economic growth. Nevertheless, even if the country is nationally striving to improve and increase its share of

[119] Global Commission on the Geopolitics of Energy Transformation, *A New World: The Geopolitics of Energy Transformation*, International Renewable Energy Agency (IRENA), 2019.

renewables, the latest assessments indicate a discouraging growth in fossil fuel consumption since coal still accounts for 57.7% of China's energy use; this has caused an estimated 4% increase in CO_2 emissions in 2019, which is inconsistent with the Paris Agreement. Along with its domestic actions, Chinese overseas activities must be monitored since they as well are responsible for impacts on future global GHGs emissions[120]. Through initiatives like the Belt and Road Initiative, the government promoted the building of both fossil-fuel and renewables infrastructure worldwide, however renewables investments (both wind and solar power) are lagging far behind China's extensive coal power projects. Despite this persistent and concerning dedication to coal as a fuel both in domestic and abroad activities, based on the country's current policies, it is estimated that the rate of increase of the China's GHGs emissions will slow by the end of 2020s, which implies that the country is still on track with meeting its 2030 INDC targets.

Even if with obstacles, the determination in solving environmental issues has gradually influenced the central government to adopt improved initiatives which would include an environmental-protective perspective. As a matter of fact, in addition to the 13th Five-Year Plan, in the last few years, the Chinese government has launched several initiatives to strengthen the support in innovation, the most notable are Made in China 2025 (中国制造 2025 *zhongguo zhizao*) and Internet Plus (互联网 +, *hulianwang*) both launched in 2015. These initiatives both include environmental components which aim at ensuring China's transformation from large to strong manufacturing country while respecting the eco-system. The Made in China 2025 initiative aims at establishing China as a global manufacturing power by enhancing China's innovation, productivity, quality, digitalization and efficiency by 2025. One of the five guidelines of Made in China 2025 is green development, which specifies that one of the objectives is to make China one of the world's leader in reduction of energy and resources consumed and pollutants emissions released per unit of industrial added value. To become a "green manufacturer", the initiative includes a strategic project which aims at "fostering

[120] Climate Action Tracker – China, available at https://climateactiontracker.org/countries/china/, last accessed 25 May 2020, updated to 2 December 2019.

energy efficiency, clean production, water conservation and pollution control, and recycling in traditional manufacturing industries." The Internet Plus initiative supports the environmental cause by aiming at improving environmental monitoring for waste recycling through the creation of a system of trading in waste. Primarily, the initiative serves to harness the potential of new technologies, particularly digital technologies, which are part of the new industrial revolution. As a result, many Chinese companies have made progress in creating and using new production technologies, to the level of establishing China as the world's largest user of industrial robots, and the world's largest market for machine-to-machine services. The huge boost to research in technology can serve as a significant mechanism to achieve environmental goals, since the application of new technologies can be fundamental to reduce the amount of energy and materials used, also by using alternative materials that are less dangerous than those in use[121].

In conclusion, this chronological overview of Chinese economic and environmental policies has served to better understand the reasons behind the country's slow progress in adopting a greener approach. The implementation of the 13th Five-Year Plan is the latest result of the strong commitment of the Chinese government in finding solutions to deal with environmental issues so to be able to improve its position domestically and abroad. As a matter of fact, the challenges encountered over the years by the government in implementing and enforcing environmental regulations have gradually influenced Chinese citizens attitudes towards such policies. The previous unequal level of knowledge and education among Chinese people from an environmental perspective has not allowed to improve their living standards. The fast-rate economic growth has indeed had a tremendously positive impact on Chinese people's wealth, allowing them to consume and buy goods which were not affordable before; however, their quality of living has dramatically worsened on an environmental point of view: not only the low enforcement of regulations have had a considerable impact but also the increased consumption of the new "middle-class" has cooperated in the environmental degradation, to the level

[121] Linster M., Yang, C., *China's Progress Towards Green Growth: An international Perspective*, OECD Green Growth Papers, 2018.

of making China the world's third largest waste producer. As we have already seen, over the years, the government initiatives have tried to address issues that affected their citizens and the environment directly through the above-mentioned policies, however, the rise of people's awareness and the newly acquired knowledge of this pressuring situation, has guided the real change towards the Chinese green movement. This social awakening has had impacts on companies who have been pressured to green their products and their products. This social change and market evolution must be considered as it is essential not only in China's improvement towards green management, but it can have implications globally.

2.3 Chinese green consumption: companies' response to the trend

As we argued before, over the years, the increasing social knowledge has certainly influenced consumers behaviour and attitude towards environmental protection. During the last decade, the "green" concept has attracted the attention of Chinese consumers as concerns over environmental pollution implication on their health have driven them to a better understanding of products' choices. Consumers play an essential role in the market equilibrium mechanisms determining market price, and due to the increasing awareness of environmental protection and ethical consumerism, now more than ever ethics and social responsibility are taken into consideration in consumers' purchasing decisions together with the price and products' features. According to a survey conducted by Ogilvy & Mather, a global advertising and marketing, in 2011, Chinese consumers already had some preference for more sustainable products, particularly 71% of the 1300 Chinese consumers surveyed stated they were willing to pay up to 10 percent more or higher for green products; however, they would not choose a products primarily for its sustainability credentials[122]. More recent researches show that Mainland consumers are demanding green products more than ever, which reflects their increased consciousness towards environmental protection: among green products, they mainly prefer

[122] Martina M., *Sustainable consumption on the fringe in China: study*, Reuters, https://www.reuters.com/article/us-china-consumption-sustainability/sustainable-consumption-on-the-fringe-in-china-study-idUSTRE73H1P320110418, 2018.

to buy food, drinks, clothes and household cleaning products, that are made from recycled or recyclable materials, that are energy efficient and that respect more the environment. The constant demand for safer, healthier and greener products has had an incredible impact on governmental policies over the years which have consequently pressured enterprises in engaging in more sustainable activities: specific regulations to protect consumers have been implemented, particularly those related to green marketing, which includes the launch of eco-labelling programs (e.g. China's Green Watch program) demanding companies to communicate product components. Gradually, Chinese companies have understood the importance of providing their consumers with more detailed information towards such topics, and some of them, better than others, have taken advantage of the new-born market opportunity and engaged in green marketing activities to gain market share and acquire a competitive advantage enhancing their reputation. However, the nature of green products implies that companies do not engage in mere communication of some marketing strategy: additional pressures have been exerted to push Chinese enterprises to adopt environmental management practices, which means incorporate green activities in their business model. The international support for green manufacture, an eco-friendly supply chain cooperated in pressuring more Chinese suppliers to adopt ISO 14001 environmental certification [123], which contributes to prove enterprises' engagement in environmental protection. This certification is mainly used for industrial marketing purposes by Chinese companies, but it can be an added value for gaining reputation and legitimacy in consumers markets[124].

Over the last years, to prove their grown attention over sustainable issues, more companies from Mainland China have engaged in private initiatives to address such problematics. For example, Alibaba Group, Chinese multinational technology company, host of two of the world's largest e-commerce platform (Taobao and Tmall), has launched different initiatives contributing to 16 of the

[123] ISO 14001 sets out the criteria for an environmental management system and can be certified to. It maps out a framework that a company or organization can follow to set up an effective environmental management system.
[124] Sarkis J., Zhu Q., *Green marketing and consumerism as social change in China: Analyzing the literature*, Elsevier B.V., 2016.

17 SDGs according to a report from the Chinese Centre of International Knowledge on Development. Through its activities, the Group has made efforts in extirpating poverty, inclusive economic growth and sustainable consumption and production. Among them, it is valuable to mention Alibaba's logistics affiliate Cainiao Network's initiatives, which had a direct impact in reducing waste: the package recycling program, the use of biodegradable package materials and digital invoices[125] have helped achieve SDG 12 "ensuring sustainable consumption and production patterns". Another green initiative from the Group was the launch of the mini-program Ant Forest within the Alipay mobile payments app, with the aim of helping combat deforestation in China. Users of Ant Forest has already helped plant more than 120 million trees in country's areas with lack of vegetation, saving over 150000 tonnes of CO_2.

Another major tech company has actively engaged over the years in empowering ecological conservation: in collaboration with WWF, Tencent has adopted a digitally-driven approach to pursue ecological protection, with the final aim of building a Beautiful China. Their cooperation has initiated three different projects Digital Landmark, Digital Classroom and Digital Rescue which respectively aim at increasing public awareness of ecological conservation, nurturing conservation talent and fighting internet-based illegal wildlife trade.

A last mention is worth giving to Baidu efforts in ensuring sustainable disposal and recycling through O2O approach. The internet company, search engine leader, has created a collaboration with United Nation Development Programme (UNDP) to address electronic waste, a problem pressuring around the world, especially in China considering that the country is responsible for recycling 70% of the world's e-waste. The collaboration resulted in the creation of a smartphone app called Baidu Recycle, which aims at connecting consumers to government certified e-waste recycling companies through pick-up services, thus ensuring environmentally responsible recycling.

[125] For example, Cainiao's digital invoice system helps save 20 billion pieces of paper a year in the logistics industry in Mainland China.

All these are examples of how the rise in popular consciousness has served as a trigger to Chinese companies to devote more efforts to the ecological cause, which in turn can influence more consumers to be active in the transition towards a sustainable economy.

Moreover, Chinese companies may also engage in other sustainable activities to attract more investments, such as disclosing social and environmental-related information: integrated reporting is more than ever gaining momentum globally as investors are incorporating in their decision-making process the social and environmental externalities that can impact a company financial performance. As we argued before, integrated reporting has become a valuable way for attracting long-term investors, and in the case of China, it can be fundamental especially to attract foreign ones. The demand for compulsory environmental information disclosure to be formulated has gradually grown in a country in which domestic pollution problems have also tremendous effects on the rest of the world. This is one part of a broader plan to enhance the building of a Chinese green financial system, which is relevant to the efforts of substantially improve the country's environment. Together with the implementation of the above-discussed policies, the Chinese government and other institutions have pushed for the creation of a green finance system through the development of guidelines that could help allocate public funds towards green projects.

2.4 Green Finance in China: Stock Exchanges creating climate-resilient market

As we argued before, the financial sector is deemed to be a great ally in the pursuit of sustainable development: for instance, finance can be used to address environmental problems by primarily guiding governments, institutions or companies towards a more conscious allocation of more capital to sustainable economic development, this aims at enhancing long-term value creation for corporates' durability, thus implying to move away from the maximization of shareholders' value and taking a broader approach, from a stakeholders' interests' perspective. Social pressures over the years, both globally and domestically, have driven countries to embrace a more sustainable approach and to cooperate to establish a green financial system. To this purpose, China has gradually engaged soon

becoming leader in the innovation in the green financial sector: the creation of a Green Finance Task Force cosponsored by People's Bank of China and the UNEP Inquiry in 2014 had the objective of designing a comprehensive financial system able to identify ways to improve access to finance in order to comply with environmental requirements. Adjusted measures directed at corporations and investors are required and the emphasis is put on the importance of the incorporation of negative externalities in market prices since they do not reflect the externalities of their production and consumption which does not represent the best interests for society. The proposed three sets of measures aim at increasing the return on investment of green projects by increasing the revenues for cleaner products, and reducing taxes on them and costs of production; by reducing the return on investment of polluting projects through the implementation of taxes on pollution and the reduction of subsidies that incentive such projects; by increasing responsiveness to these signals among investors, companies and consumers through mandatory risk assessment disclosure requirements for companies and financial institutions on the environmental impact of their investment projects[126]. In 2016, the People's Bank of China, together with other six institutions, has issued guidelines for establishing a green financial system which has put China as a frontrunner in the G20 context to promote green finance. Following the indications of the Green Finance Task Force, the Guidelines include a series of policy measures aiming at mobilising and incentivising more social and private capital towards green sectors while limiting investments in polluting sectors; measures included are green guarantee programs, interest subsidies for green loan-supported projects and the launch of a national-level green development fund.

The Guidelines further require the development of green insurance and trading of environmental rights, demanding the implementation of regulations for introducing a mandatory pollution liability insurance system. They also stress the importance of local governments support in establishing green development funds together with a stronger commitment in the international cooperation on green

[126] Research Bureau of People's Bank of China, UNEP Inquiry: Design of a Sustainable Financial System, *Establishing China's Green Financial System: Final Report of the Green Finance Task Force*, 2015.

finance, contributing to build a global consensus in the G20 context, which can allow the enhancement of China's green outward investment.

To this purpose, the Guidelines emphasize the essential role of the securities market in financing green investment, requiring a unification of the domestic green bond standards together with the development of green bond indices, green equity indices and other products, supporting green companies to raise funds via IPOs and finally requiring a gradual establishment of a mandatory environmental information disclosure system for listed companies and bond issuers[127].

The relevance stressed on environmental information disclosure is related to the growing focus of investors on taking efforts to create long-term responsible investment strategies and enhancing risk-adjusted returns. Globally, especially in Europe and US, environmental factors are recognized as drivers of investment performance, and at large, managing ESG factors is becoming a predominant element in investors' decision-making process. Their interest in knowing environmental and social impacts on corporate's performance and investments, both positive and negative, is pushing companies to publish their efforts in their report. Although the weighting of ESG factors can vary depending on investor profile, client priorities, investment objectives and other related factors, there is a growing group of impact investors looking for positive environmental performance alongside financial returns.

As we have already seen, the fact that it does not exist yet a uniform standard-approach for the disclosure of such information have represented an obstacle for companies internationally to disclose ESG related information. China, particularly, is now catching up with this relatively new trend, pushing for the adoption and application of ESG factors in companies' activities to attract domestic investors who are gradually including these factors in their decisions, but mostly foreign investors who already have a more conscious attitude. Financial institutions demand for the creation of mandatory ESG information disclosure is particularly difficult in a country with low enforcement of

[127] The People's Bank of China, *The People's Bank of China and six other agencies jointly issue "Guidelines for Establishing the Green Financial System",* http://www.pbc.gov.cn/english/130721/3131759/index.html#, 2016.

environmental laws, but the introduction of regulations requiring mandatory disclosure based on standardized ESG indicators could provide Chinese market with long-term motivation for high quality reporting on ESG matters since they can ensure market efficiencies. To this purpose, the role of stock exchanges in encouraging and guiding their listed companies towards a transparent disclosure of ESG information in their report proves to be significant also for the creation of more sustainable capital markets. In terms of ESG disclosure, Mainland China is still ranked low in comparison with other countries, and environmental factors get more attention and scrutiny than social and governance ones. However, there is evidence of expertise and competence on ESG disclosure, with leading companies voluntarily reporting key ESG data. Compared to international corporate ESG reporting practices, the disclosure is based on a similar set of ESG principles; however, since ESG data is not standardized, it is not yet comparable across markets, industries and portfolios.

Moreover, even if both the Shanghai and Shenzhen Stock Exchanges have issued guidance for better disclosure of ESG reporting by listed companies, being ESG data in China still policy-based than quantitative, lacking a set of specific primary ESG indicators, represents another obstacle for investors to have usable and comparable data. To this purpose, it is important that Chinese companies use standard indicators and that refer to existing international and regional frameworks[128].

Compared with Mainland China Stock Exchanges, the Stock Exchange of Hong Kong has shown a greater engagement in ESG disclosure requirements from its listed companies, upgrading its ESG reporting obligations from a "voluntary" regime to a "comply or explain" reporting framework in 2015, creating a set of primary ESG indicators to integrate in companies' report as a listing requirement. The international visibility and economic prominence that Hong Kong has acquired over the years relative to Mainland China is reflected also in this matter, in which the city is engaged in establishing Hong Kong as a green financial hub. Its key position and evolving commitment could serve for both Shanghai and Shenzhen Stock Exchanges as a guide to implement more stringent

[128] United Nations Environment Programme (UNEP) Finance Initiative, *ESG data in China: recommendations for primary ESG indicators*, 2019.

regulations. A comparison between the two realities can help understand the importance that reporting and monitoring on ESG issues have gained for investors decision-making and the educational role that stock exchanges assume in the capital market.

2.4.1 Shanghai, Shenzhen and Hong Kong: China's regional economic hub

A brief reference to the three cities' evolving global financial relevance seems necessary to better understand their inseparable interconnection. Hong Kong predominant position at the international level is mainly related to the flourishing growth in economy the city experienced under the UK sovereignty. Even after the handover of sovereignty back to China in 1997, Hong Kong has continued to benefit from a well-developed financial system and from very light regulation. Other important factors cooperated in maintaining Hong Kong's thriving position as an international financial centre: features such as the provided tax incentives, free inflow and outflow of capital, easy convertibility of currency and, most of all, the rule of law and the independence of the judiciary have guaranteed the existence of a freer market; however, these characteristics are in contrast with mainland China, where financial systems are less developed, government's regulations are heavier but in constant transformation. Over the years, the unique position acquired by Hong Kong compared to China has established the city as the world's third global financial centre, making it Asia's leading financial hub. This financial hub has served mainland China's interests over the years, being the Hong Kong market an important source of capital for mainland companies: its role as a centre for the initial public offerings (IPOs) of Chinese firms has enabled to attract crucial global capital, serving as a key intermediary for growing and internationalising Chinese economy. Nonetheless, the boost given by Chinese government to Shanghai and Shenzhen during the period of reforms in the 1980s to enhance their economic growth has contributed to elevate the two Chinese cities economic status relative to Hong Kong. On one hand, Shanghai, now defined as China's financial capital, has historically experienced a predominant position compared to other Chinese cities being one of the largest cities in the world and also the most cosmopolitan, industrial and shipping city in the country. However,

latest developments in reforms, especially through the XXI century, have enabled Shanghai to experience a fast-growing economy, which resulted in the city acquiring a new international status as it soon became a global receiver of foreign direct investment (FDI), allowing Shanghai to almost offset the gap with the Special Administrative Region (SAR)[129]. On the other hand, Shenzhen, chosen as the first Chinese Special Economic Zone (SEZ) during the reform period, also for its geographical proximity to Hong Kong, is the city that most of all has experienced a tremendous growth: from a small city to leader for economic and political reform, has raised its competitivity thanks to the continuous innovation in every sector. These two Chinese cities, with two different historical backgrounds, are now two of the four Chinese first-tier cities, have gained over the years more relevance at international level, and are now both established as emerging financial centres, thus becoming strong constituents of the regional economic hub of the country together with their neighbour Hong Kong.

The connections and ties between these three global cities built over the time can turn into factors of competition or collaboration depending on the influence of state policy, market dynamics and global forces. As we argued before, the Chinese government is constantly working on the improvement of these two cities economic status to establishing them as China's effective financial centre. However, Hong Kong market still plays a crucial role for China on an international level. Although Shanghai and Shenzhen hosts Mainland China's two stock exchanges, these are still relatively young relative to others stock markets: even though the Shanghai Stock Exchange[130] (SSE) opened during the 1860s, it only reopened in 1990 after being closed in 1949 with the foundation of the People's Republic of China, while Shenzhen Stock Exchange[131] (SZSE) only opened in 1990. For instance, Hong Kong Stock Exchange (HKG) was founded in 1891 and it is one of the largest markets in Asia with 2449

[129] Hong Kong is a special administrative region (SAR) that exists as part of the People's Republic of China under the "One Country, Two Systems" doctrine. The "One Country, Two Systems" doctrine stipulated that the People's Republic of China's socialist system would not be practiced in Hong Kong, and Hong Kong would maintain its political and economic quasi-independence for 50 years after the transfer of sovereignty, until 2047.

[130] Shanghai Stock Exchange is today the largest stock exchange in mainland China, with a market capitalization of $4.7 trillion in May 2020.

[131] Shenzhen Stock Exchange has a market capitalization of $3.5 trillion in May 2020.

listed companies as at the end of 2019, whose growth has been fuelled by Chinese companies' listings starting from the late 1990s. The launch of the Shanghai – Hong Kong Stock Connect programme in 2014, then extended to Shenzhen in 2016, gave the markets a big boost as it marked a major opening of the mainland capital market, enabling global investors to access in an previously almost closed off stock market and to profit from China's economic growth[132]. The Stock Connect scheme is designed as a cross-boundary investment channel connecting the two stock markets, and it allows to trade shares in each market on the other market using the local brokers and clearing houses. Hong Kong's importance at both the global and regional levels is proven by the fact that the Stock Connect international programme allows foreign investors to gain preferential treatment when buying Chinese shares through Hong Kong, but also allows Chinese investors to buy Hong Kong and Chinese companies' shares listed in Hong Kong. This newly-created single "China" stock market brings several advantages for both parties: provides international investors with more than 1400 companies to invest in, helps with the diversification of Chinese investors' portfolios, increases trading's efficiencies in Chinese companies that are dual-listed, and increases the possibilities of Chinese shares of being included in global benchmark stock indices.

The relevance acquired by these stock markets at the international level has achieved the aim of attracting a growing number of foreign investors, whose attention over the years have shifted towards the potential benefits that sustainable and responsible investment (SRI) could bring in the long run. As we have already seen, international investors growing demand for ESG factors' inclusion in companies' business model has resulted for China in a significant uptake of sustainable investment. This growing trend, already relevant in Europe and US, has grown in the last decade in Asia, especially in Hong Kong, whose commitment to establish itself as a green financial hub is evident not only in the enhancement for ESG-related investments, but also in Hong Kong Stock Exchange requirements to integrate ESG factors in reporting activities. Even though there is evidence of

[132] Chen X., *Lost in competition: Rethinking Hong Kong, Shanghai, and Shenzhen as a new triangle of China's global cities and regional hubs,* from *Routledge Handbook of Contemporary Hong Kong*, 2018.

increasing awareness among Chinese companies over ESG issues, Mainland China's Stock exchange still lacks efficient regulations on companies' disclosure which would provide significant improvements with ESG data availability and quality for Chinese companies. Another obstacle for China in this matter is companies' low understanding of ESG investing, which has contributed in a slower incorporation of ESG factors in their practices: the inclusion of China A-share in major international indices has brought international scrutiny of Chinese companies, which, on the a positive note, can help boost the awareness of ESG investing by attracting more conscious investors, adhering to ESG policies, that can eventually educate Chinese companies on ESG investing. The role of regulators, security exchanges and associations in developing rules and standards for disclosure is essential to help companies respond to the increasing demand on their ESG risk exposure by shareholders and bondholders. Following Hong Kong's example, together with a stronger enforcement of existing policies, mainland China's stock exchange could elevate their international position relative to the matter, as they can reduce investment risk by including ESG factors. For instance, Chinese companies listed on Hong Kong Stock Exchange have experienced more stringent regulations on ESG information disclosure since the stock market requires, in its listing rule, companies to report ESG related activities, which has contributed to enhance their awareness on sustainability themed activities. A more detailed comparison between the stock markets' sustainable approach is deemed relevant to better evaluate whether and to what extent the different requirements and regulations have an impact on companies' performance.

2.4.2 Mainland China and Hong Kong Stock Exchanges: an ESG perspective

As we argued, the integration of ESG factors by companies are becoming increasingly relevant to investors in their evaluation and considerations for investments decisions. In all the major markets, this now positive investment trend has led government, regulators, security exchanges and investors to set standards and provide training for ESG issues. The demand of Chinese financial institutions to build a mandatory ESG information disclosure system is driven by this significant global uptake of

ESG investing. Looking at the current ESG related regulations in China, ESG disclosure is structured by mandatory requirement limited to air, water and solid pollutants, voluntary guidance by stock exchanges and voluntary ESG disclosure by listed companies through annual financial reports and/or sustainability reports. Overall, the reported ESG data is comparable to the data provided by companies internationally; however, the lack of standards and specific indicators affect the quality of ESG data in mainland China.

ESG disclosure in China is determined by three sets of policies and institutions: the Environmental Protection Law, which emphasizes the responsibility of key polluting companies in disclosing environmental information; the China Securities Regulatory Commission (CSRC), which has issued standards for the content and format of environmental information disclosure of listed companies; and the Shanghai Stock Exchange and Shenzhen Stock Exchange, which have issued guidelines on environmental and social information disclosure of listed companies. From these sets of policies emerges the major attention that environmental information disclosure have been reserved in China compared to other ESG factors: with these policies, heavily-polluting companies have been gradually required to disclose information relative to key pollutants discharging such as water, atmosphere, soil, acoustic environment and other pollutant discharging units. However, the mandatory disclosure is limited to requirements on these five categories of key pollutants discharging units; moreover, Chinese regulatory and supervision authorities only encourage companies to voluntarily report any other relevant information relative to the protection of ecology, prevention of pollution and the performance of its environmental responsibilities, without setting specific indicators to guide companies, thus compromising the good quality of ESG data and its comparability across markets.

Analysing the contribution of mainland China's stock exchanges to create ESG related regulations in the last two decades, both two stocks have written guidance on ESG reporting. In 2006, Shenzhen Stock Exchange (SZSE) issued the "Guidelines for Corporate Social Responsibility of Shenzhen Stock Exchange Listed Companies", in which listed companies where required to pursue social responsibility, assess the performance of their corporate social responsibilities on a regular basis and

voluntarily report it. In 2010, further guidance was provided in the "Guidelines for the Standardised Operation of Listed Companies", which contained two separate chapters of "Corporate Governance" and "Social Responsibility". In 2015, SZSE further revised the "Guidelines for the Standardised Operation of Listed Companies", issuing the "Guidelines on Standard Operations of Small and Medium-Sized Boards of Listed Companies" which mandates listed companies affected by a major environmental pollution problems to timely disclose the cause of the problem, the impact on the company's performance and measures taken to solve the problem.

Two years after SZSE first instructions, the Shanghai Stock Exchange (SSE) issued the "Notice on Strengthening the Social Responsibilities of Listed Companies" and the "Guidelines for the Environmental Information Disclosure of Listed Companies", which required listed companies to reinforce the fulfilment of social responsibilities and disclose their relative activities and achievements on a voluntary basis. The Guidelines allow the SSE to take "necessary punishment measures" against those companies violating of the disclosure rules. Incentives such as election into the Shanghai Corporate Governance Sector are provided to listed companies that promote CSR. At the end of 2008, SSE also issued the "Guidelines for the Preparation of the Report on Performance of Corporate Social Responsibility", aiming at encouraging listed companies to disclose their efforts to facilitate environmental and ecological sustainability, such as preserve water resources and energy, always on a voluntary basis[133]. They are also engaged in other sustainable activities: both stock markets provide ESG related training, including seminars covering topics of SRI investing, and guidance for the compilation of CSR report; they both are covered by sustainability related indices, for instance the SSE Corporate Governance Index and SZSE Environmental Protection Index. However, even if the number of companies disclosing environmental information in their semi-annual and/or annual report has grown over the years in both markets, the quality of information is still uneven, suffering from a lack of standardisation which makes hard for investors adhering to ESG

[133] United Nations Environment Programme (UNEP) Finance Initiative, *ESG data in China: recommendations for primary ESG indicators*, 2019.

policies to make decisions. In the long run, this could lead Chinese companies in a disadvantaged position as globally financial authorities are increasingly urging to the adoption of a uniform ESG approach. More recently, mainland China's stock exchanges have been pushed to follow Hong Kong's lead which has historically been more active in encouraging and requiring its listed companies to adopt an ever-growing sustainable approach.

As a matter of fact, the stricter obligations introduced for ESG disclosure which came into effect on the 1st of January 2016, marked a significant departure from the previous voluntary reporting approach in Hong Kong: the then newly-introduced "comply or explain"[134] reporting approach represented a major commitment of the city to meet the needs of investors and stakeholders who were not satisfied by previous low commitment. Hong Kong Stock Exchange's reporting requirements are included in Appendix 27 to the Main Board Listing Rules, and the ESG Reporting Guide. Among the main changes introduced in ESG and listing rules, there is the requirements for issuers to timely publish ESG reports on an annual basis regarding the same period covered in their annual reports[135]. The Guide introduced in the Appendix comprehends two levels of disclosure obligations: the above-mentioned "comply or explain" provisions, and recommended disclosures. The Guide is also organised into two ESG subject areas, environmental (Subject Area A) and Social (Subject Area B), while the Corporate Governance Code is separately dedicated to corporate governance. Each subject area has several aspects which define general disclosures and key performance indicators (KPIs) for listed companies to demonstrate how they have performed in ESG related matters, by reporting their goals and achievements[136]. In the Guide, the Exchange encourages issuers to disclose additional ESG issues and KPIs that reflect the issuer's environmental and social impacts together with the "comply or explain" provisions. However, it is stressed that the Guide is not comprehensive and that the issuer

[134] The "comply or explain" framework implies that the issuer does not report on one or more of the "comply or explain" provisions, it must provide considered reasons in its ESG report.

[135] The Guide also specifies that whether the ESG information is not presented in the issuer's annual report, the issuer should publish this information as close as possible to, no later than three months after, the publication of the issuer's annual report.

[136] The upgrade of the KPIs for "Subject Area A. Environmental" to "comply or explain" came into effect for issuers' financial years beginning on or after 1 January 2017.

can refer to existing international ESG reporting guidance depending on its industry or sector and also its location. The adoption of international ESG reporting guidance is accepted as long as it includes comparable disclosure criteria to the "comply or explain" provisions written in the Guide[137]. The aim of the introduction of more stringent regulations is related not only to the contribution that the city provides to the environmental cause, hoping to influence corporate behaviour and understanding, but also to the potential attraction of western investors. However, the last review of ESG reporting conducted by the Hong Kong Stock exchange and published in 2019 show that even if overall companies have produced more comprehensive and detailed ESG report, in some cases even beyond the minimum requirements by the listing rules, there still was room for improvements in certain areas for some companies. For instance, it has been noted that some of the issuers have treated the ESG reporting activity as a "box-ticking" exercise: many companies have only disclosed historical figures without providing an analysis on what the data provided meant for the operational risks, cost savings and business opportunities. Others failed to adequately explain whether the requirements were not met, compromising the good quality of ESG reporting. These still not satisfying results are evidence of the fact that Hong Kong's listed companies do not understand yet ESG value, which makes Hong Kong's existing practices still behind in achieving standards of more established markets such as UK and US. However, Hong Kong listed companies must now prepare for tougher disclosure obligations since following the publication of the conclusions to the consultation on the review of ESG reporting at the end of 2019, the Exchange have introduced a revised version of ESG Reporting Guide which demand listed companies to increase ESG disclosure. The ESG Reporting Guide set new requirements that will be imposed on companies whose financial years start on or after the 1st of July 2020 and include two levels of disclosure provisions: mandatory disclosure requirements, and "comply or explain" provisions. In particular, the Exchange will require disclosure of significant climate-related issues that have impacted or may impact the issuer, will update the KPIs related to

[137] Hong Kong Stock Exchange, *Main Board Listing Rules, Appendix 27*. https://en-rules.hkex.com.hk/sites/default/files/net_file_store/new_rulebooks/h/k/HKEX4476_3841_VER10.pdf.

environmental factors to require disclosure of relevant targets and will upgrade the disclosure obligation of social KPIs to "comply or explain"[138]. This revision of the ESG Guidelines encourages companies to strengthen their own risk control management, and more importantly, it will enhance the transparency and effectiveness of corporate information disclosure.

The imposition of stricter requirements for ESG disclosure is once more driven by the intention of luring bigger numbers of foreign investors. Historically, the above-discussed financial incentives provided by Hong Kong have ensured the prosperity of Hong Kong's stock market internationally and established its position as the most significant financial centre in Asia. The attractiveness of a market with a larger number of investors has created for Chinese companies the perspective of greater growth, which has brought significant financial benefits to both the stock market and its listed companies. However, when speaking about ESG disclosure, Chinese companies have struggled more than others to see the long-term benefits that they could receive by disclosing more details about their ESG practices and, consequently, to comply with the requirements published by Hong Kong stock exchange. The major relevance of the government in the functioning and the purpose of market compared to the demand of domestic investors, together with the latter's low understanding of ESG investing have contributed to the later adoption of ESG standards for Chinese companies. As a matter of fact, China's current average ESG disclosure score calculated by Bloomberg is 21,6%, less than half of France's score which is 46,9%[139]. However, a more adequate disclosure of ESG related information could open for Chinese companies a new-born market, in which foreign investors can be more easily attracted. Among ESG issuers, there is a few Chinese companies that have distinguished themselves as frontrunners of ESG reporting: these Hong Kong listed companies' performances in

[138] Hong Kong Exchanges and Clearing Market (HKEX), *Consultation conclusions: Review of the Environmental, Social and Governance Reporting Guide and Related Listing Rules*, 2019. https://www.hkex.com.hk/-/media/HKEX-Market/News/Market-Consultations/2016-Present/May-2019-Review-of-ESG-Guide/Conclusions-(December-2019)/cp201905cc.pdf?la=en.

[139] Poh J., Ishikawa M., *China Set to Lead ESG Disclosure to Lure Foreign Investments*, Bloomberg, https://www.bloomberg.com/news/articles/2019-06-20/china-set-to-lead-esg-disclosures-to-lure-foreign-investments, last accessed 20 June 2020.

ESG management areas have been assessed and approved to be selected as constituents of internationally recognized sustainability indices, which track the sustainability of global listed companies.

Starting from the introduction of the sustainable indices chosen for the examination, the following chapter will proceed with the analysis of Hong Kong listed companies from mainland China that have been selected to be constituents of these indices. By comparing them with firms of the same sector that are not constituents to these indices, the chapter aims at verifying and assessing whether and to what extent the financial performance of this group of Chinese companies has been influenced by the internalisation of ESG related factors.

Chapter 3: Green finance in China: Analysis of mainland Chinese companies listed in Hong Kong and their environmental approach

The world's rising trend of ESG factors' incorporation in investing decision-making has had a great impact on companies of developed countries (especially from US and EU) which, over the years, have gradually integrated ESG relevant features in their business models, which is further reflected in deeper attention towards the improvement of ESG reporting activities. As regards Chinese companies, they have struggled more than their peers from the West in engaging in sustainable activities mainly due to slow adoption of ESG-oriented regulation by both the government and financial institutions. However, the late uptake of ESG investing in China, has led some companies to disclose ESG information in their report, thus becoming first adopters in the country where any mandatory disclosure regulations exist yet. In the past, being listed in the Hong Kong Stock Exchange has implied for Chinese companies to have a better perspective of attracting more foreign investors, as the strict regulations of Chinese stock markets did not allow to directly trade there. Now, the possibility of attracting foreign investors could be reinforced by the stronger enforcement of ESG reporting regulations sustained by the Exchange, as the inclusion of extra-financial information in their report could cooperate in making these companies acquire greater visibility internationally. In this view, being selected for internationally recognized sustainability indices could mean for Chinese companies to be globally appreciated, since the indices are used as benchmarks by sustainability-oriented investors. As the traditional market indices provide an instrument of evaluation of the investment performance, sustainability indices serve as instruments to measure the responsibility of companies related to environmental and social matters. They are designed for providing information to investors that value companies' relevance of ESG related responsibility in their everyday management, along with their economic results, to include these factors in their buying decision to purchase shares. Independent rating companies are required to design the methodology of assessment, to set the parameters on which the selection of the companies is based and then to select the constituents of the analysis process that is repeated at different times. On an international level, among

the world's most popular and representative indices there are the families of the Dow Jones Sustainability Indices (DJSI) and the FTSE4Good Indices, which both comprises global, regional and country benchmarks in which are assessed companies' efforts and results in economic, environmental and social areas. The DJSI evaluates companies ESG related practices based on 24 parameters, and assigns three different scores relative to the ESG factors and an overall score respectively from 0 to 100, while the FTSE4Good gives an overall score of 0 to 5 to six different ESG designated areas: environmental management, climate change, human rights, labour rights, labour standards in the supply chain, corporate governance and the fight against corruption. Over the years, more Chinese companies have been chosen to be part of these indices, in general becoming constituents of the Emerging market subfamily, evidence of the gradual recognition of their increased improvement with regards to ESG related activities[140].

To investigate whether the market rewards Chinese green businesses – or sustainable at large –, the analysis will proceed with the study of a sample of companies from mainland China listed in Hong Kong selected for the FTSE4Good Emerging Index at the 31st December 2019. Among them, the companies chosen for the examination operate in three different industries (telecommunications – both services and equipment –, shipping and port operators, and airlines), to which it has been added a sample of Chinese companies listed in Hong Kong from a fourth sector (automotive), that are not constituents of any sustainable index: these companies have been included in order to complete the analysis, since the automotive is a sector that in China is growing at a fast pace and, at the same time, is traditionally polluting. The analysis will exclude companies operating in the financial and banking sectors, as they have no impact on the environment; for this reason, the analysis will not consider Chinese companies that are constituents of the DJSI Emerging Markets, also because the number of companies is not considerable (only 2). The analysis will continue with the comparison of the

[140] In order to be included in the FTSE4Good Emerging Index, companies must have an overall ESG Rating of 2.9 out of 5, while to be removed, companies must have an overall ESG Rating of lower than 2.4 out of 5. This ensures only companies demonstrating strong management of ESG risks are included. The threshold is higher for Developed markets to reflect market differences.

companies included in the FTSE4Good Emerging Index with companies belonging to the same sector that are not part of the sustainability index at the date considered[141]: through the analysis of the trend of the *price – earnings ratio* (P/E ratio) during the years 2017, 2018 and 2019, and the analysis of the growth rate of net income and revenues for same period, the paper aims at investigating the relation between companies' financial performance and their attention towards environmental issues: the evaluation of the ratio trends will allow to understand whether companies dedicating major attention on environmental issues can be considered as a value driver for the market, and the growth rates will allow to assess whether these companies perform better than the companies not included in sustainability indices.

3.1 ESG practices: analysis of Chinese companies selected for the FTSE4Good Emerging Index

As we argued before, the growing attention of the capital market towards companies' behaviour relative to ESG risk management practices has gradually led some Chinese companies and some financial institutions to adopt stricter requirements for ESG reporting. However, the difference in stringency of ESG disclosure between mainland China and Hong Kong stock exchanges required to their listed companies eventually had an impact on Chinese companies' attitude towards ESG reporting. For this reason, the analysis will mainly focus on the performance of mainland Chinese companies listed in Hong Kong, with the aim of verifying whether these companies have benefited in the market from the more stringent requirements existing in the Exchange. To this purpose, the chapter will proceed with a market analysis with regards to the companies' environmental approach and ESG factors management.

Considering that the companies listed in Hong Kong are all required to disclose relevant ESG information to be published in their annual report or in an independent ESG report, according to the sector in which they operate and other factors, it is assumed that these companies have a better approach to ESG reporting than the companies listed in the two mainland Chinese stock exchanges,

[141] With the exception of the companies operating in the automotive sector, for which will be used another criterion to establish whether a company is more sustainable than another.

as the disclosure is still on a voluntary basis, and therefore, for the purpose of the analysis, they may be defined as "sustainable" companies. Hence, to investigate whether the market rewards Chinese businesses that provide particular attentions to environmental issues, it has been chosen a sample of mainland Chinese companies listed in Hong Kong by dividing them in "more sustainable" and "less sustainable"; the criterion used to distinguish them is the inclusion of these companies into sustainability indices: the Chinese companies that are components of the FTSE4Good Emerging index are here referred to as "more sustainable", while the companies that are not included in any sustainability index are here referred to as "less sustainable".

Over the years, the number of Chinese constituents to the FTSE4Good Emerging Index has grown from 8 at the 31st December 2015 to a total of 33 at the 31st December 2019: according to the last reviews[142], the Index includes companies from mainland China that are all listed in Hong Kong (with the exception of one listed in the New York Stock Exchange), and this can be deemed as a first evidence of the effectiveness that the enhanced ESG information disclosure required by the Hong Kong stock exchange had, since, as we have said, starting from the 1st January 2016 it was introduced the "comply or explain" provision relative to environmental information disclosure.

In Table 9 is shown the complete list of Chinese equities listed in Hong Kong selected to be constituents of the FTSE4Good Emerging Index at the 31 December 2019, which already excludes companies operating in the financial and banking sectors. Among these 16 "more sustainable" companies, for the purpose of the analysis, only companies from mainland China operating in sectors considered to be environmentally harmful have been chosen to be compared with mainland Chinese companies listed in Hong Kong operating in the same sector but that are not included in any sustainability index ("less sustainable" companies).

[142] The FTSE4Good Index Series is reviewed semi-annually in June and December, therefore the last review considered is the one on the 31st December 2019.

Table 9 - Constituents of FTSE4Good at 31/12/2019		
EQUITIES	**EXCHANGE & TICKER**	**INDUSTRY**
Alibaba Pictures Group (P Chip)	HKG: 1060	Consumer Discretionary - Movies & Entertainment
Air China (H)	HKG: 0753	Consumer Discretionary - Travel & Leisure – Airlines
Bosideng International Holdings (P Chip)	HKG: 3998	Consumer Discretionary - Textiles & Clothing - Apparel
China Literature (P Chip)	HKG: 0772	Consumer Discretionary - Media & Entertainment – Publishing
Shanghai Fosun Pharmaceutical Group (H)	HKG: 2196	Healthcare - Pharmaceuticals & Biotechnology – Pharmaceuticals
WuXi Biologics (P Chip)	HKG: 2269	Healthcare - Pharmaceuticals & Biotechnology – Biotechnology
COSCO Shipping Holdings (H)	HKG: 1919	Industrials - Industrial Transportation - Shipping & Port Operation
COSCO SHIPPING Ports (Red Chip)	HKG: 1199	Industrials - Industrial Transportation - Shipping & Port Operation
COSCO Shipping Energy Transportation (H)	HKG: 1138	Industrials - Industrial Transportation - Shipping & Port Operation
Qingdao Port International (H)	HKG: 6198	Industrials - Industrial Transportation - Shipping & Port Operation
Sinotrans (H)	HKG: 0598	Industrials - Industrial Transportation - Shipping & Port Operation
GCL Poly Energy Holdings (P Chip)	HKG: 3800	Industrials - Industrial Engineering - New Energy Materials
Xinjiang Goldwind Science & Technology (H)	HKG: 2208	Industrials - Industrial Engineering - Environmental Engineering
China State Construction International (Red Chip)	HKG: 3311	Properties & Construction - Construction - Heavy Construction & Engineering
China Mobile (Red Chip)	HKG: 0941	Telecommunications - Telecommunications services
ZTE (H)	HKG: 0763	Telecommunications - Telecommunication equipment

Notes: The term **P chip** (P 股 *gu*) refers to Chinese companies listed on the Hong Kong Stock Exchange which are incorporated in the Cayman Islands, Bermuda and the British Virgin Islands with operations in mainland China, and are run by private sector Chinese businessmen.
Red chips stocks (红筹股 *hongchougu*) are the stocks of mainland China companies incorporated outside mainland China and listed in Hong Kong. These businesses are based in mainland China and controlled, either directly or indirectly, by the central, provincial or municipal governments of the People's Republic of China but listed in Hong Kong to allow overseas investment in the companies.
The term **H shares** (H 股 *gu*) refers to the shares of companies incorporated in mainland China that are traded on the Hong Kong Stock Exchange. H shares of Chinese companies listed on the Hong Kong Stock Exchange are quoted and trade with a face value of Hong Kong dollars. These shares are open for trading to all investors, while the shares of companies based and listed in mainland Chinese stock exchanges are generally only available for trading to mainland Chinese citizens (**A shares** - A 股 *gu*). Many companies float their shares simultaneously on the Hong Kong market and one of the two mainland Chinese stock exchanges in Shanghai or Shenzhen, they are known as **A+H** companies.

In Table 10 it is provided the full list of the sample of companies on which the analysis is based, of which 8 are “more sustainable” companies and 17 are “less sustainable” companies, for a total amount of 25 companies.

Table 10 – List of the companies included in the analysis			
EQUITIES	**EXCHANGE & TICKER**	**INDUSTRY**	**FTSE4Good Emerging Index Constituent**
BYD Company (H)	HKG: 1211	Consumer Discretionary – Automobiles	NO
Geely Automobile Holdings (P Chip)	HKG: 0175	Consumer Discretionary – Automobiles	NO
Great Wall Motor Co. (H)	HKG: 2333	Consumer Discretionary – Automobiles	NO
Brilliance China Automotive Holdings (P Chip)	HKG: 1114	Consumer Discretionary – Automobiles	NO
DongFeng Motor Group (H)	HKG: 0489	Consumer Discretionary – Automobiles	NO
BAIC Motor Corporation Ltd. (H)	HKG: 1958	Consumer Discretionary – Automobiles	NO
China Mobile (Red Chip)	HKG: 0941	Telecommunications - Telecommunication services	YES[1]
China Unicom (Red Chip)	HKG: 0762	Telecommunications - Telecommunication services	NO
China Telecom (H)	HKG: 0728	Telecommunications - Telecommunication services	NO[2]
Xiaomi (P Chip)	HKG: 1810	Telecommunications - Telecommunication equipment	NO
ZTE (H)	HKG: 0763	Telecommunications - Telecommunication equipment	YES[1]
BYD Electronic (International) Co. (Red Chip)	HKG: 0285	Telecommunications - Telecommunication equipment	NO
Lenovo Group (Red Chip)	HKG: 0992	Information Technology - IT Hardware - Computers & Peripherals	NO[2]
Haier Electronics Group Co. (P Chip)	HKG: 1169	Consumer Discretionary - Household Goods & Electronics – Home Appliances	NO
Air China (H)	HKG: 0753	Consumer Discretionary - Travel & Leisure – Airlines	YES[1]
China Southern Airlines Company Limited (H)	HKG: 1055	Consumer Discretionary - Travel & Leisure – Airlines	NO[2]
China Eastern Airlines (H)	HKG: 0670	Consumer Discretionary - Travel & Leisure – Airlines	NO[2]
Beijing Capital International Airport (H)	HKG: 0694	Consumer Discretionary - Travel & Leisure – Airlines	NO[2]
Hainan Meilan International Airport (H)	HKG: 0357	Consumer Discretionary - Travel & Leisure – Airlines	NO
COSCO Shipping Holdings (H)	HKG: 1919	Industrials - Industrial Transportation - Shipping & Port Operation	YES[1]
COSCO SHIPPING Ports (Red Chip)	HKG: 1199	Industrials - Industrial Transportation - Shipping & Port Operation	YES
COSCO Shipping Energy Transportation (H)	HKG: 1138	Industrials - Industrial Transportation - Shipping & Port Operation	YES[1]
Qingdao Port International (H)	HKG: 6198	Industrials - Industrial Transportation - Shipping & Port Operation	YES
Sinotrans (H)	HKG: 0598	Industrials - Industrial Transportation - Shipping & Port Operation	YES[1]

Tianjin Port Development Holdings Ltd. (Red Chip)	HKG: 3382	Industrials - Industrial Transportation - Shipping & Port Operation	NO

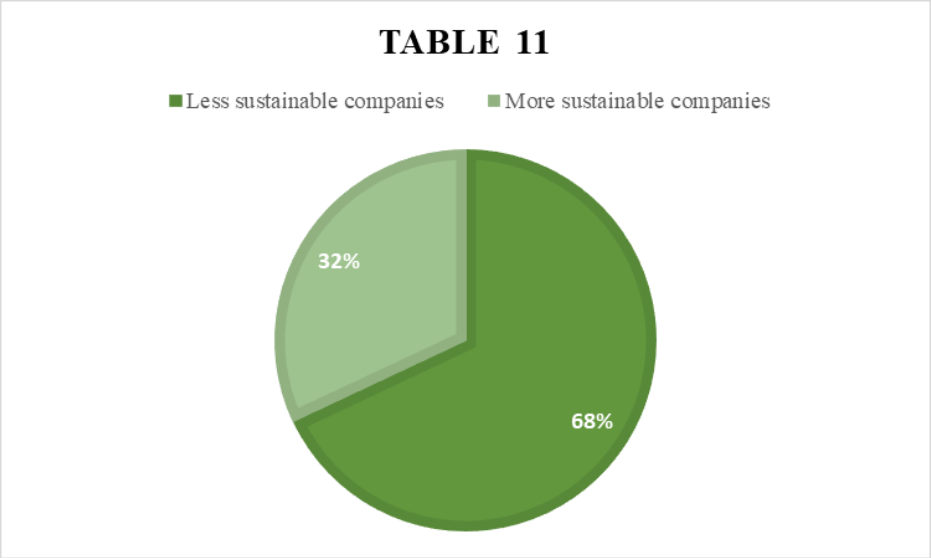
[1]: In these cases, companies were included in the FTSE4Good Emerging Index also in previous reviews.
[2]: In these cases, companies' inclusion in the FTSE4Good Emerging Index has varied from the previous years.

Note: Lenovo and Haier are two companies not strictly related to the telecommunications sector, however, due to their extended production to those products, they are included in this analysis.

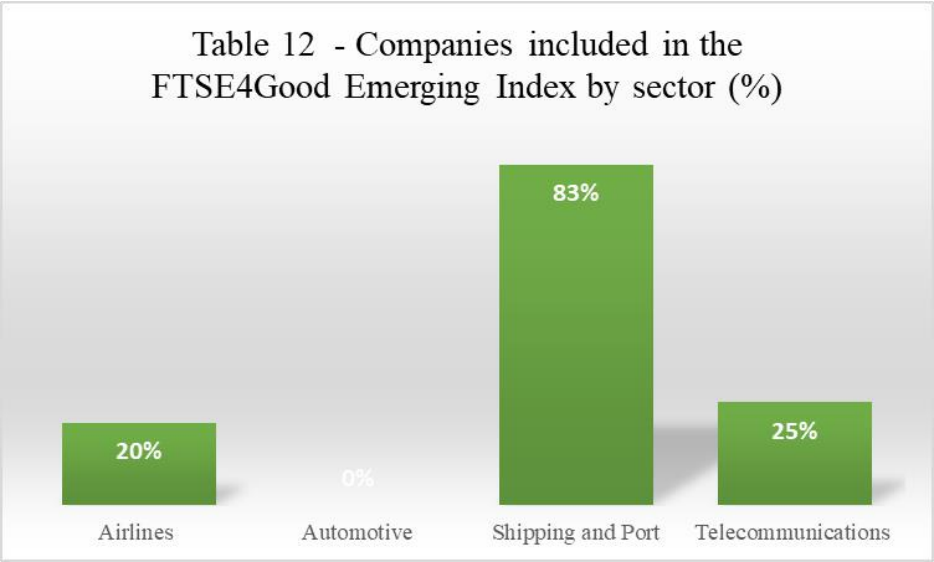
The companies included in the examination operate in four different sectors: the automotive (6), the telecommunications (8), airlines (5) and shipping and port operation (6). The decision to proceed with the analysis of the companies belonging to these four sectors relies on different reasons: first, even if these sectors may not be conventionally perceived as environmental harmful, however, their actions have incredible implications on the environment. For instance, companies such as manufacturer of telecommunications equipment in China must be monitored for their ESG related practices since they belong to a sector that, in the last decade, has experienced a tremendous growth, and the derived disposal of e-waste is one of the problems China is currently striving to fight. Second, from a sector representation point of view, the chosen companies belong to the sectors with the most components to the FTSE4Good Emerging Index at the 31st December 2019, with the shipping and port operation sector leading with 5 companies out of the 16 sifted and skimmed in Table 9, followed by the telecommunications sector with 2 companies, and, finally, the airlines sector with 1 constituent. Third, the inclusion into the analysis of a sector in which companies are not selected in any sustainable indices (e.g. the automotive sector) it appeared relevant as the sector in question is not only a growing one in the country, but it is also responsible for air pollution and relative health problems; however, it is one of the sectors in which the government has pushed the most to adopt a greener approach, therefore, in this contest, its inclusion was deemed to be appropriate in order to verify whether the sector is rewarded by the market for its ESG actions. Last, choosing these sectors also depended on the fact that some of the companies analysed were previously included in the FTSE4Good Emerging Index, and, since they have been deleted in the review taken into consideration, the analysis also aims at investigating whether their addition and then deletion from the Index had an impact on the companies' performance.

Before moving to the analysis of the ESG related actions by sector, the examination will first start with a general overview of the 25 companies analysed: as Table 11 shows, 68% of the chosen companies are "less sustainable", since, for the sectors considered, there was in general little representation of "more sustainable" companies, except for the shipping and port operation.

TABLE 11



As a matter of fact, as Table 12 shows, of the sectors taken into consideration, "more sustainable" companies' representation is uneven, moving from an 83% in the shipping and port operation sector to a 0% in the automotive sector. However, this could be mainly linked to the limited number of companies analysed, since the companies considered have the characteristics of being from mainland China and of being listed in Hong Kong and, in general, still few mainland Chinese companies from these sectors are listed in Hong Kong, or are constituents of any sustainability indices.



Another element to take into consideration through the examination is the fact that some of the companies considered were already listed in FTSE4Good Emerging Index, as it emerges from the previous reviews, namely: China Mobile, ZTE, Air China, and COSCO Shipping Holdings, all included in the Index at the 31st December 2015[143], which is a significant data since the inclusion itself is an evidence of the recognition of these companies' commitment to ESG practices, but also because they were included even before the introduction of the "comply or explain" provisions by the Hong Kong Exchange; COSCO Shipping Energy, constituent at the 31st December 2017, and Sinotrans, included at the 31st December 2018.

Moreover, in the sample, there are also companies that have been deleted from the latest review considered but were included in the previous ones, namely: China Telecom, China Southern Airlines, China Eastern Airlines, Beijing Capital International Airport, and Lenovo Group, as shown in Table 10. The analysis will also aim at understanding whether the deletion from the Index had an impact on the companies' financial performance.

To the purpose of the analysis, before moving to the analysis of the companies' performances, the examination will now briefly introduce the efforts of each sector in addressing environmental

[143] The oldest data available were the review provided by FTSE Russell at the 31st December 2015.

problems, emphasizing the commitment of the best performing companies in ESG matters though the data disclosed in their latest sustainable report.

3.1.1 ESG in the Telecommunications sector

In China, the telecommunications sector has experienced an incredible boost since the beginning of the 1990s, rapidly making the country a significant player in the global telecommunications industry. Both the growing expansion of telecommunications infrastructure together with the increasing capacity in telecommunications equipment manufacturing have been significantly pushed by the government, whose concerns included providing universal coverage, controlling the industry and improving the efficiency of state-owned enterprises, in order to meet the rising demand of the country's enormous market and of the business sector, asking for freer and more rapid movement of information (on the Internet).

However, the rapid expansion of the sector has carried in the country a series of negative environmental implications no longer neglectable: the telecommunications service sector is globally responsible for the excess use of energy through fossil fuels, inevitably causing emission of GHGs, as we have already seen, harmful both for the environment and the people's health. The increasing exposure to electromagnetic radiation caused by the rapid development of mobile communication system technologies also have impact on people's health and the ecosystem. Finally, the increasing consumers' need for new products caused by the rapid technological advances, expanding product lines and planned obsolescence cooperate in making China's telecommunications equipment sector responsible for increasingly generating e-waste. Hence, the need for this sector to "go green" becomes even more crucial in the world's leading country for telecommunications sectors.

Together with the support of the government through the implementation of more stringent environmentally related rules, some companies operating in the sector have distinguished themselves being frontrunners in the fight against environmental issues.

Among them, for the telecommunications service sector, China Mobile's role is worth mentioning: in 2008, the leading mobile operator already had set out a series of measures to reduce carbon

emissions, including the establishment of 2135 base station powered by renewable energy resources such as wind, solar and others. This was in line with the Green Action Plan initiated in 2007 with the aim of reduce carbon emissions and enhancing energy saving[144]. Since then, the company has increased its commitment to support the environmental causes as, globally, the Information and Communications Technology (ICT) sector has been put under the spotlight being a key actor in the monitoring of climate change and the promotion of green circular economy. The continuous evolution of 5G technology is an example of how the ICT industry is trying to balance energy demand and low-carbon development. What emerges from the 2019 sustainability report of the company is its restless commitment to promote green growth in every area: the diligently written report shows the company's achievements in the last year and its goals for the future, by disclosing significant KPIs, offering the possibility to view the improvements in the last 3 years, of which it has been chosen the most significant to be shown in Table 13.

Table 13 – China Mobile Ltd Environmental KPIs

Energy			
Indicators	2017	2018	2019
Direct Energy Use Coal consumption (10,000 tonnes)	0.1	0.2	0.05
Gasoline consumption (million litres)	121.5	112.4	101.3
Equivalent annual GHG emission reduction (10,000 tonnes)	148.5	170.6	141.5
Emissions			
Indicators	2017	2018	2019
CO_2 emissions (million tonnes)	15.98	16.17	17.32
SO2 emissions (tonnes)	23.59	35.93	9.28
Source: 2019 Sustainability Report China Mobile Ltd.			

Over time, the company commitment to sustainability has been recognized by several awards and also by being included in the DJSI since 2007. For a long time, China Mobile was the first and only mainland Chinese company to be ever listed in the DJSI, and its inclusion for 10 consecutive years reflected the international recognition of the company's continuous efforts in pursuing sustainable development. Nonetheless, the company was eventually deleted from the DJSI due to difficulties in

[144] Gupta L., Gupta V. k., *Going Green-Methods and Initiatives in Telecom Sector for Energy Management*, Journal of Telecommunications System & Management, 2018.

maintaining its previous standards (e.g. the increase of CO_2 emissions as shown in Table 13): its deletion in 2018 after the review conducted by RobecoSam, the Index rating company, represented one of the largest in that year for the Index, considering the weight of the company in the Index portfolio.

The company is still one of the top 10 constituents of the FTSE4Good Emerging Index, which reflects the Index appreciation for the company sustainable performance, but also the differences in assessment of the two leading sustainability indices.

For these reasons, the company represents a relevant case to be further analysed, to investigate whether the market rewards its ESG related efforts.

Another valuable mention for the sector it is one of the country's leading telecommunications equipment manufacturer, ZTE. Listed in the FTSE4Good Emerging Index for 4 consecutive years, throughout the years, the company has successfully incorporated the environmental externalities produced in its business model. As stated in its 2019 Sustainability Report, ZTE applies the principles of circular economy "Reduce, Reuse, and Recycle" throughout the full product lifecycle in accordance with the requirements of the ISO14040 Environmental Management—Life Cycle Assessment—Principles and Framework. From the choice of using sustainable raw materials for its products to have low impact on the environment, to a sustainable production operation in which attention is preferentially given to energy consumption, water consumption, waste management and emissions of GHGs, the fulfilment of low carbon principles is also seen in the promotion of a sustainable use of the products thanks to the collaboration with other industries providing other optimized technological means, and, finally, in the after purchase use, in which ZTE encourages its customers to properly recycle the already-used phones by providing repair and recycling services: not only offers the possibility of repair by express delivery, repair in-store and door-to-door service by appointment, the company also nominated a dedicated personnel assigned to recollect and manage the accounts of hazardous wastes and submit them to a qualified disposal company.

Nonetheless, from a qualitative perspective, however, the report seems less precise as it does not offer an immediate comparison with previous years achievements as the report of China Mobile Ltd do. For instance, considering the sector in which operates, to better appreciate the improvement of the companies' sustainable activities, a comparison among the disposal of hazardous and non-hazardous solid waste among the years could be significant for a conscious investor who values transparency of information. In Table 14, it is provided this data, however, showing an increased disposal of waste.

Table 14 – ZTE Environmental KPIs

Indicator	Unit	2019
Total Hazardous Wastes	Tons	454.11
Total Non-hazardous Wastes	Tons	7,818.03
Indicator	Unit	2018
Total Hazardous Wastes	Tons	195.9
Total Non-hazardous Wastes	Tons	1,979

Source: ZTE 2019 Sustainability Index; ZTE 2018 Sustainability Index.

3.1.2 ESG in the Shipping & Port Operation Sector

China has experienced rapid development in another sector in recent years, the port industry, with some ports, such as Shanghai port, becoming one of the biggest and most important maritime transportation service providers in the world. Water transport is one of the most important means of transportation in the country, and superior port conditions and shoreline resources are of great relevance for international trade. China's port industry plays an increasingly important role in the country's domestic economy and even in the global economy. As a matter of fact, Chinese coastal area tends to be the richest relative to the western areas of the country, as the GDP of the provinces of this area is two-thirds of the national areas, which show the contribution that the development of ports has provided to the country's economic growth and prosperity.

However, port operations and shipping activities often lead to negative impacts on the environment, mainly undermining air and water quality, such as vessels oil spills, ballast water disposal, channel dredging, waste disposal at sea and air pollution from port operations and construction activities,

including smog and toxic particulate pollution[145]. Among the consequences of air pollution emitted from port-related activities, significant is the impact on port workers' health, as well as residents of nearby port area, and the contribution to regional air pollution problems. Since in the past, air pollutant emissions were not largely regulated, ships and port facilities were among the world's most polluting combustion sources. Moreover, water quality is compromised, and its contamination not only could threaten water-related ecosystems but also people's health. More recently, measures to pursue ecological and green shipment to protect the marine environment and maintain the marine ecosystem have been taken in China, for which China COSCO Shipping Holdings stands out.

The state-owned enterprise specialized in maritime transportation, operates in almost 20 ports of the Chinese coast, making it one of the China's leader in the industry. Over the years, it has strongly contributed to ensure the safety of water though practices of respecting seas, protecting the marine ecology and development of green shipping.

In the 2019 sustainability report, the company states the importance that environmental protection has, acknowledging the impact that their sector reverses on the environment. The company dedicates its attention on the importance of pursuing green shipping through the engagement in energy saving and emission reduction, the development of green shipbuilding, and the establishment of green ports, in which the promotion of mode powered by electricity instead of oil guaranteed the reduction of pollutants by the company, the improvement of the efficiency of automated terminals and the reduction of energy consumption continuously. As a matter of fact, the company stresses that need of strong support from ports to pursue energy conservation and emission reduction in the marine shipping sector, as still the main energy sources for terminal operations are fuel and electricity. To reduce pollutant and tackle climate change, the company continues to increase investment in relevant technology, unswervingly implementing the "oil-to-electricity conversion" project and using cleaner energy, such as electricity.

[145] Luo M., Yip T. L., *Ports and the Environment: Maritime policy and management*, Routledge, 2016.

COSCO Shipping Holdings also established ISO14001 environmental management system and ISO 50001 energy management system for a long time and has been continuously certified by external professional organizations. The company also actively follows the national 13th Five-Year Plan for emission reduction, setting lower fuel consumption targets year by year to cut greenhouse gas (GHG) and other waste gas emissions. It has also established an energy management system to improve energy efficiency. Moreover, the oily wastewater and garbage on board produced during operations are thoroughly treated to minimize the impact on the environment.

The company also provides an overview of the past three years, in which certain results have been achieved in energy conservation and emission reduction: the fuel consumption intensity and greenhouse gas and exhaust emissions intensities have decreased to varying degrees. In 2019, the marine fuel consumed by COSCO SHIPPING Lines was 5,122,752.60 tons, decreased from the previous year. The marine fuel consumption intensity decreased by 4.80% from 2018. The carbon dioxide emission intensity decreased by 4.83% from the previous year. The emission intensities of NOx and SOx decreased by 4.65% and 3.57% respectively over the previous year.

It is also emphasized the role of the company in the marine biodiversity protection, a in 2018, COSCO SHIPPING Lines took part in the “Protecting Blue Whales and Blue Skies”. To protect one of the world’s major habitations of blue whales, from July to December 2018 and May to November 2019, the ships lowered speed to 10 knots when sailing through the Santa Barbara Channel Region and the San Francisco Bay Area. The ship’s low speed has cooperated in the reduction of GHGs emissions, suspending particles and other pollutants significantly, guaranteeing the company international protection awards. What emerges from the report is that the company shows a great commitment to environmental protection, understanding the importance of action and teach others how to behave.

3.1.3 ESG in the Airlines Sector

The Airlines sector in China has experienced a considerate growth in the last decade as the number of passengers in Chinese airports has been growing year by year, with an increase of 167% between

2009 and 2018 (from 229,062,099 to 611,439,830)[146]. The Chinese market is constituted by different private companies which operate domestically and internationally, but the leading role is detained by the three big State-owned enterprises: Air China, China Southern Airlines and China Eastern Airlines.

After the entrance in the WTO in 2001, China definitively opened its existing barriers to the outside, giving the possibility to foreign airline companies to enter the huge market that is China: in order to face the competitive pressure generated from these new rivals in the market, in 2002 the different State-owned aviation companies were merged together and the above mentioned three big enterprises that now dominate Chinese market[147]. Other important steps towards the development of the Chinese aviation sector were made in 2004 and in 2012: in 2004 China signed the "Sino-US Expansion of Aviation Service Agreement" which further improved the openness of China to foreign airlines, whilst, in 2012 the Government published the new travel policy, in which the air travel between China and ASEAN countries was stimulated. Moreover, the development of the Belt & Road Initiative has worked as a "push-factor" for the expansion of Chinese aviation sector, which could intensify the air travels in the countries that became economic allies in the above mentioned Chinese economic project. Eventually, the improvement of the standards of living of Chinese people (consistent urbanization and higher wages) has led to an increasing desire for them to spend their time and their money in leisure activities, such as tourism and shopping: in this way the demand for air travels increased and so the aviation sector has seen a huge opportunity of growth[148].

The incredible expansion of the sector has inevitably created its implication on the environment: the aviation sector is one of the main producers of high-altitude greenhouse gas: the consumption of CO_2 has increased during the years along with the development of the sector, which started to peak after

[146] The World Bank Data, *Air transport, passenger carried – China,* https://data.worldbank.org/indicator/IS.AIR.PSGR?locations=CN, last accessed 20 June 2020.
[147] After this huge administrative maneuver, the companies became independent from the CAAC (Civil Aviation Administration of China, the national aviation authority established in 1949 by Mao and under the control of the Ministry of Transport of the People's Republic of China) and so acquired more freedom to expand their business scope at a global level.
[148] Wang J., Wang H., Yang H., *The Evolution of China's International Aviation Markets from a Policy Perspective on Air Passenger Flows*, Sustainability, 2019. https://doi.org/10.3390/su11133566.

the mid-1990s. Among the factors related to the variation of the amount of emitted CO_2 there are energy consumption intensity, transportation amount growth, alternative fuel effects and aviation transport structure effects. As regards the energy consumption intensity, the peak was reached in the first half of 1990s, in which, along with economic policies of opening up and being more competitive in the international scene, China's aviation industry had to satisfy not only the demands of the mere transportation, but also the parameters that civilians were in sought of: speed, commodity, flexibility and other similar requests needed to be realised in order to keep considering Chinese airlines as top-tier, at the same level of the other foreign rivals; moreover, the realisation of airplanes implied more emissions of carbon fossils. As we have seen for other sectors, energy consumption intensity is strongly related to the reduction of carbon emissions by the aviation industry, and energy saving is a key factor for environmental protection. Another factor to be taken into account is the transportation amount growth, even if its contribution to the total emission of carbon fossils is relatively small: with the passing of the time, the air traffic is more concentrated than it was in the past, but the contribution ratio between 2010 and 2015 accounted for the 6.4% of the total emissions; in the future better route planning and flights administration could help reducing the already-minimum contribution ratio. Eventually, to better engage in the reduction of CO_2 emissions, the possibility of adopting alternative fuel appears relevant since leads to a less strong environmental impact: nowadays the contribution ratio of alternative fuel is 0%, but the research is headed towards a path of acknowledgement of the importance of this source, which could be adopted in the future[149].

As stated before, Air China is one of the big three State-owned aviation companies and it can be taken as a clear example of aviation enterprise which has decided to adhere to environmental sustainable policies: as the last report published regarding 2018, Air China formulated the "Three-Year Action Plan to Win the Blue Sky Protection Campaign", in which the company states its effort to establish a green operational model, to reduce the impact of production and operation on the environment and to

[149] Yu J., Shao C., Xue C., Hu H., *China's aircraft-related CO_2 emissions: Decomposition analysis, decoupling status and future trends,* 2020. https://doi.org/10.1016/j.enpol.2019.111215.

increase its commitment in the adherence to green policies. Following the directives set by the last four Five-Year Plans (10^{th}, 11^{th}, 12^{th} and 13^{th}), first Air China focused its attention to the problem of fuel conservation management establishing a committee in charge of its supervision and promulgating interim regulations, and then the company dealt with the energy conservation and the emission reduction management establishing an office in charge of limiting the energy consumption and formulating reporting systems. In the last two Five-Year Plans, Air China put its efforts in diminishing the emission of carbon fossils, also trying test flights with biofuels.

The moves done by Air China have all been aimed at reducing the emissions of fine powders and it can be said that their outcome has always been positive and it should not be strange to take Air China as an example of a company that works in a traditionally highly-polluting sector but tries its best to reduce the impact of its hazardous business. Through the continuous implementation of efficient models, the company in the last year got rid of old and more-polluting aircrafts and substituted them with new-generation ones, whose environmental impact is less strong and deep than the predecessors. As regards the fuel conservation management, Air China started its corrective operations in 2004 and kept implementing fuel conservation measures during the years through the optimization of domestic and international routes, the reduction of the aircraft weight, the aircraft performance monitoring, the improvement of redispatch plan and other similar measures; therefore, Air China claimed to have reduced fuel costs of RMB40 million since the implementation of such rules and to have saved 9,205 tons of fuel.

Another factor to consider is the consumption of ground vehicles: even if they are not part of the fleet, they are assets of the company, and thus Air China had to extend the range of application of green policies also onto them. The company started working in this field very recently, in 2018, substituting fuel vehicles with New Energy Vehicles through an investment of the value of RMB39 million. Moreover, the company planned to invest RMB24 million for the implementation of a vehicle pollutant control device in Beijing Capital Airport.

The last topics to analyse are the management of waste materials and the water resources management. In the aviation sector the waste materials are all those products used for the maintenance of the aircraft, such as waste oil, mineral oil and chemicals (especially during the painting process): Air China has established a specific unit for the disposal of hazardous waste following the relative provisions on hazardous waste management; non-hazardous waste such as newspapers, tablets and headphones are recycled or an external disposal unit is called in order dispose of it with harmless treatment. The water used in the canteen is disposed after oil separation and biochemical treatment, whilst, industrial wastewater is discharged after a treatment that has encountered specific requirements.

Air China is a company that has made green policies as an essential constituent of its business, providing a better service to customers with the additional value of being a virtuous enterprise in its sector.

3.1.4 ESG in the Automotive Sector

As said before, the automotive sector is the only one included in the examination even though companies are not listed in any sustainability index. The relevance of this sector for the examination is linked to two main reasons: Chinese automotive industry has been experiencing a rapid growth in the last years and has started to join proactively the global market: in 2016 the sales amount peaked to 28 million of cars, ranking first globally. Nevertheless, as it is happening in the other sectors, automotive industry too must face sustainable issues in order to keep its appeal in both international and domestic markets and not to lose the pace kept by its competitors.

After the entrance of China in the WTO, the country experienced an improvement in the standards of living, allowing the population to purchase more easily a car, which led to a significant increase of fine powders' emissions such as CO_2. The automotive sector is one of the most traditionally polluting since car fuel produces a lot of CO_2, and for this reason it must meet certain standards of sustainability. As seen in the aviation industry, a massive environmental problem for which the sector is responsible is the fuel consumption management, however, this problems are strongly related to the lack of settled

standards: the Ministry of Ecology and Environment has not outlined yet standards for oil production quality also because it has not the right to design it. The National Petroleum Products and Lubricants Standardization Committee is the body in charge of the designation of the standards, but the majority of its members (the total amount of them is 67) come from the petrochemical industry, and just 6 of them are related to the above mentioned Ministry: this demonstrates how this part of the automotive industry is still controlled by the enterprises and that the central government plays a not relevant role on the scene[150].

Another problem, that is strictly linked to the previous one, is the lack of coordination between the implementation of fuel emission standards and of vehicle emission standards. As a matter of fact, fuel emission standards have often lagged behind the vehicle ones, creating a situation in which it is very unlikely to keep the pace of sustainable policies year by year. On the contrary, the simultaneous implementation of both standards should obviously bring about environmental benefits in the automotive industry[151].

The last issue to analyse is the slow passage from fuel vehicles to New Energy Vehicles (NEVs): even though China has gradually adopted during the years an electric public transportation service[152], the total substitution of fuel vehicles is far from the realization. However, notable is the government's role as all the company providing NEVs – which are in most cases Battery Electric Vehicles (BEVs) – are funded by the Government. BEVs are theoretically the best solution for the environmental issue, but it is also true that their usage is cumbersome and even impossible in particular situations: BEVs are strictly linked to charging stations, which, where available, spend a time much longer to recharge the vehicle than the time spent to load fuel; then the Government should provide a robust and long-term support to such technologies.

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[150] Wang J., Wu Q., Liu J., *Vehicle emission and atmospheric pollution in China: problems, progress, and prospects*. 2019. https://doi.org/10.7717/peerj.6932.

[151] *Ibid*.

[152] As a matter of fact, China is the first country in which a city have a full electric bus fleet; the city just mentioned is Shenzhen; further information at https://www.theguardian.com/cities/2018/dec/12/silence-shenzhen-world-first-electric-bus-fleet.

Among the companies included in the sample to analyse, chosen among the major companies of the sector listed in Hong Kong, it can be mentioned the role of BYD Auto in the promotion in the country of a more conscious way of production. As stated in the 2019 CSR report of the company, BYD commitment to environmental protection through the promotion of NEVs has brought in 2019 a considerate sale amount of 219,353 units, the majority of which were Electric Vehicles (EVs), thus managing to secure the first place in domestic new energy vehicle sales for the 6th consecutive year.
In conclusion, the automotive sector is moving towards a more sustainable direction, but the path is still long and tortuous: the Chinese government is isolated by private enterprises and the sector is still dominated by the needs of the market and of enterprises.

3.2 Price – earnings ratio trends of mainland Chinese companies

After the overview of the contribution to the environmental cause of the best ESG performing companies operating in the considered sectors, the chapter will now proceed with the analysis of trends of the price – earnings ratio (P/E ratio) in each sector to verify whether companies with a more sustainable approach receive better expectations from the market relative to the less sustainable.
The P/E ratio of a stock (also referred to as the price multiple or the earnings multiple) is the ratio that measures a company share price relative to its earnings per share (EPS). It indicates what amount an investor is willing to pay for a stock against every dollar/euro of earnings. It is a market prospect ratio used by investors and analysts to determine the relative value of company in a reasonable comparison. As a matter of fact, it can be used to compare a company against its own historical record or to compare industries over time.
The high multiple could mean that investors expect higher growth in the future from the company compared to the overall market, or else that the company's stock is over-valued. While, a company

that have no earnings or with a loss may produce an insignificant multiple, as there is nothing to put in the denominator[153].

Since the ratio may vary among different industries and companies, the examination will proceed by sectors as it has been with the dissertation on companies' ESG commitment.

The multiple can be calculated in different ways depending on what it is tried to be proved. Here, the ratio has been determined by dividing the stock price at the end of each year considered (December 2017, 2018 and 2019) by the realized EPS of the past relative years (specifically, the Normalized Diluted EPS that signals the company's performance over the past 12 months): the examination tries to evaluate for each sector whether the considered "more sustainable" companies are expected to have a higher growth rate from the market. If that is the case, over the years considered, it is expected that the multiple will grow as more investors shall value the company's performance in that specific sector. If not, it is expected a certain stability or a decrease in the multiple value which may be due to different possible reasons further discussed.

3.2.1 Price – earnings ratio trends in the Telecommunications sector

The analysis will start from the Telecommunications sector with a proposed overview of the P/E ratio trends per year of the three years considered for each company operating in the industry. Data are provided in Table 15 with numerical references and in Table 16 in a graph to better appreciate the ratio trends in the single companies of the sector.

Table 15 – P/E Ratio in the Telecommunications sector

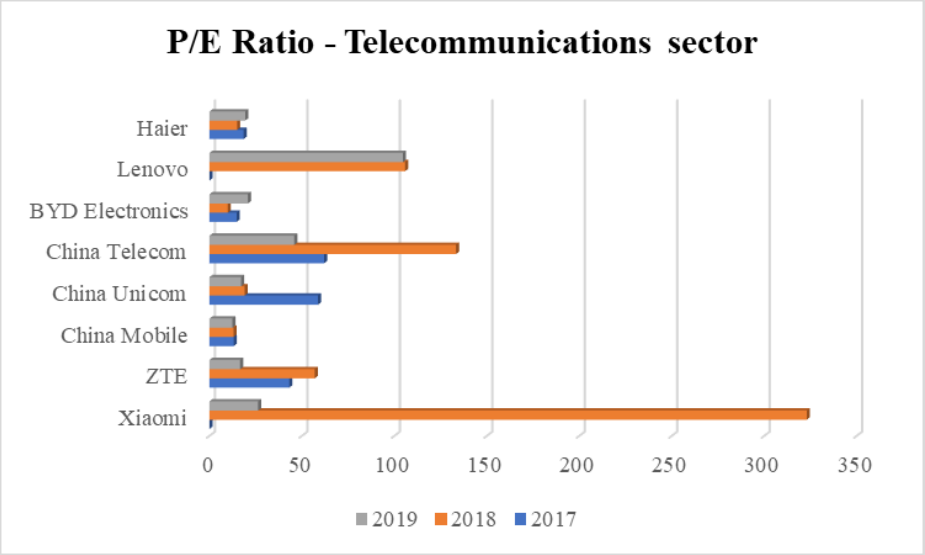
Equities	2017	2018	2019
Xiaomi	0[1]	323	26,29
ZTE	43,16	56,92	16,56
China Mobile	13,08	12,99	12,38
China Unicom	58,67	19,00	17,07
China Telecom	62,00	133,33	45,86
BYD Electronics	14,67	9,84	20,81

[153] Hayes A., *Price to Earnings ratio*, https://www.investopedia.com/terms/p/price-earningsratio.asp#:~:text=The%20price%2Dto%2Dearnings%20ratio,multiple%20or%20the%20earnings%20multiple, last accessed 30 June 2020.

Lenovo Group	0[2]	105,8	104,6
Haier Electronics Group	18,45	14,93	19,33
Note: P/E Ratio was calculated by data provided by Investing.com[154]. 1: The company was only listed in the Hong Kong Stock Exchange in July 2018. 2: The company suffered a loss in 2017, that is why the multiple is not significant in that year.			

At a first view, the ratio value does not grow year from year, except for two companies (BYD Electronics and Haier Electronics Group) that see an increase from 2018 to 2019, after a decrease relative to 2017. Moreover, very high P/E ratios are found in the data of three companies (Xiaomi, China Telecom and Lenovo Group) relative to the year 2018, and 2019 for Lenovo Group. The high value is explained by the very low EPS (e.g. Xiaomi EPS was equal to 0.04 in 2018), divided by which, the multiple value inevitably rises. However, in the case of Xiaomi, it can be conjectured that the high value can be also related to the optimism derived from the listing in the Hong Kong Exchange in the second part of 2018, and, due to companies' greater international visibility, the market has expected great growth from it. As Table 15 shows, the multiple referred to Xiaomi has eventually stabilized in 2019 (also due to the increase of the EPS to 0,41).

Table 16

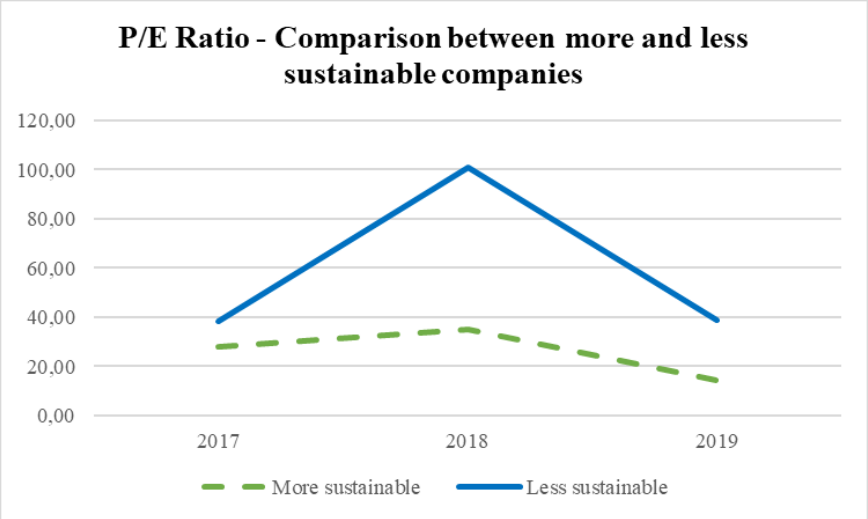


Source: *Investing.com*.

[154] All the following tables provide data calculated from Investing.com.

To the purpose of the analysis, the examination will proceed with the P/E ratio of the considered companies grouped in "more sustainable" and "less sustainable", so to verify whether there is any difference in market expectations between the two groups. Among the companies of the sample, two are considered more sustainable companies (China Mobile and ZTE), while the rest belongs to the group of less sustainable companies. In Table 17, it is provided the average value of the multiple for the two groups in the three years considered.

Table 17 – Telecommunications sector



Source: *Investing.com*.

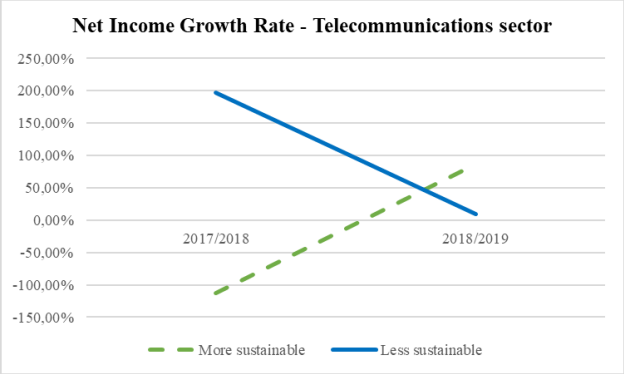
As assumed, both groups demonstrate a first period (from 2017 to 2018) of increasing value of the multiple, with a significant gap between the two groups in 2018, then registering a decreasing trend in the multiple. However, less sustainable companies show higher P/E ratio in value relative to the more sustainable, with quite difference throughout the years, and a significant peak registered in 2018 by the less sustainable companies[155].

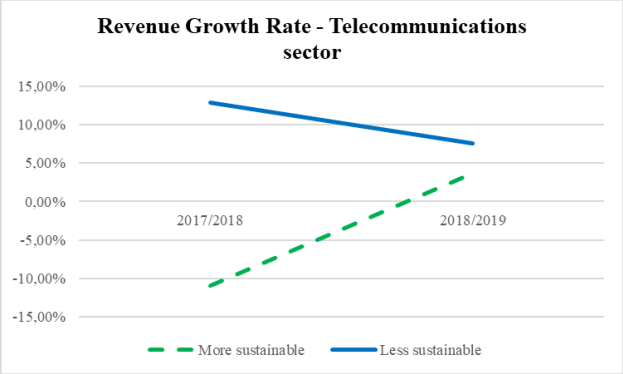
This may imply stronger expectations of high growth in the future for the less sustainable companies compared to the group of more sustainable companies, even with a decreasing trend, however, meaning that the market may not appreciate the performance of the more sustainable companies from this sector.

[155] The high value of the multiple registered in 2018 is probably linked to the high value of the companies discussed before (Lenovo Group, Xiaomi, and China Telecom).

As the values of the multiple do not show the results expected, the analysis will continue with the comparison of the groups' growth rate relative to revenue and net income, to verify whether the decrease of the multiple depends on the variations of these rates and to investigate whether more sustainable companies present better performance than less sustainable in the present. These data are considered since, as said before, the multiple is the ratio between the share price and the earnings per share. In case the price is constant, the variation of earnings can determine the decrease or the increase of the multiple. In Table 18 is proposed the graph with the comparison between the two groups relative to the growth rate of the net income and revenue relative to the years considered: the rate is calculated at 2018 and 2019 compared to their respective previous years[156].

Table 18 – Growth Rates in the Telecommunications sector





Source: *Investing.com*.

As the Table demonstrates, over the last period considered, more sustainable companies show a positive and growing trend for both rates, while less sustainable companies registered a negative performance as, over the years, both rates for the group show a significant decrease, in particular the net income growth rate that moves from a growth of 197% between 2017 and 2018 to a growth of 9,45% between 2018 and 2019.

This outcome is strongly related to reason why the P/E ratio for more sustainable companies is decreasing, as an increasing value at the denominator determines a decreased value of the multiple.

[156] Specifically, the growth is calculated by subtracting the previous period's figure (net income or revenue) from the current period's figure of the entity and diving the result by the previous period's figure. It is then multiplied by 100 to get a percentage growth rate between the two periods.

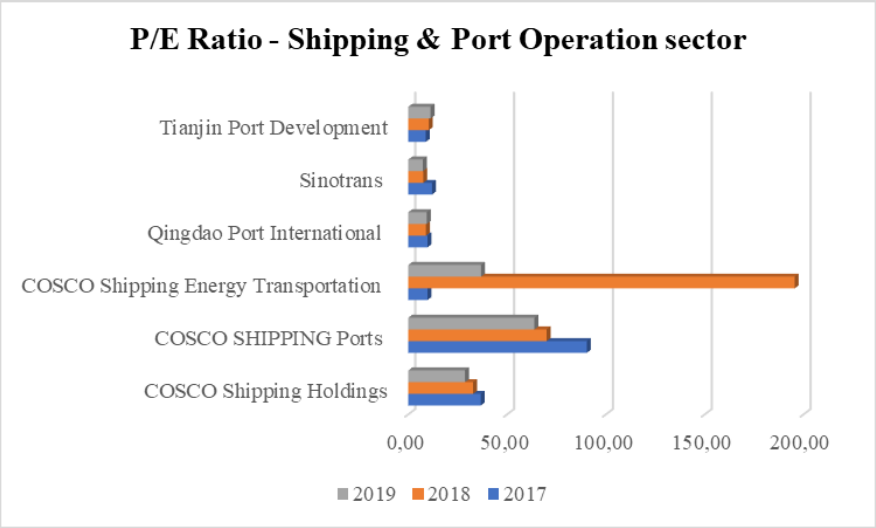
Even though the P/E ratio for less sustainable companies of the telecommunications sector presents a higher value than the other group (as saw before, the multiple presents a great growth from 2017 to 2018, and then dramatically decreases but maintaining a higher value relative to 2017 and the group of more sustainable companies), with a decrease in growth for both rates, it could be easily explained the relation between the higher multiple and the considerable decrease in growth for these companies. A final consideration may be done to the sample of chosen companies operating in this sector, as even though the market may expect higher growth in the future from the less sustainable companies, looking at the marginality indices, the performance of more sustainable companies is deemed more positive in the last period considered.

All the companies included in this sector's examination demonstrate high standards of compliance with ESG disclosure information according to their ESG report, and it has to be stressed that some of the less sustainable companies have been included in the FTSE4Good Emerging Index in previous reviews, certifying the recognition by the international well-known index of their ESG practices' commitment. This may justify the mixed outcome between the value of the multiple, the financial performance and the sustainability approach of these companies, but it also must be considered that this sector is highly depended on the consumers' demand since the action related to products such as smartphones, and consequently mobile services (e.g. the internet), have shifted to the mass market, due to the fact that such products have become an essential need for people's daily life. This sector is becoming more sustainable conscious also thanks to the greater attention to these themes of their customers, hence, the explanation for the mixed and discontinuous results may also depend on the global economic situation of a sector with constant and quick upgrade of high and new technologies. In conclusion, the end-users seem to appreciate companies with a higher sense of sustainability by buying their products, while the investment market is still not validating specifically this group of companies not only for the previous reasons, but also because the group is made of companies that are included in sustainability indices for more than 5 consecutive years, which looking at the multiple trends, may imply no differentiation from investors for these companies' sustainable approach.

3.2.2 Price – earnings ratio trends in the Shipping & Port Operation Sector

The analysis now moves to the sector with the most representation of more sustainable companies: the shipping and port operation sector. As for the telecommunications sector, the analysis will first start with an overview of the single companies' multiple to then proceed with the comparison of the P/E ratio trends for the two groups of companies considered. Table 19 shows the ratio value for the three years considered.

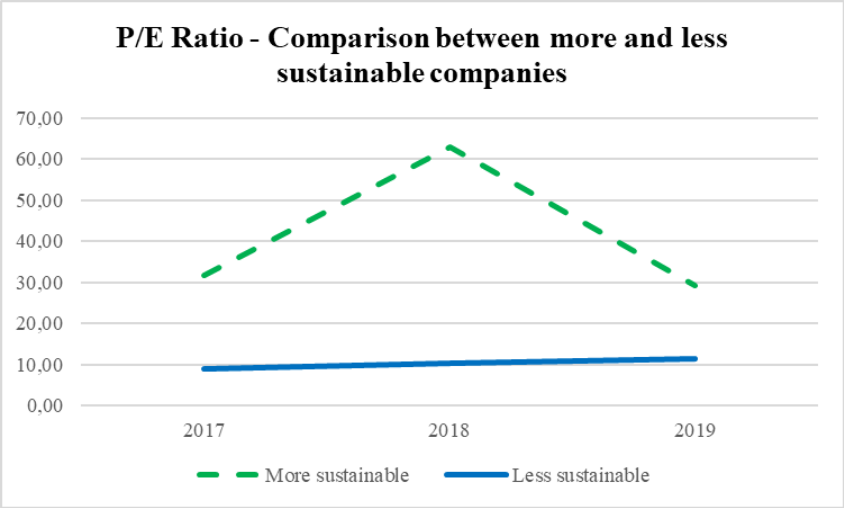
Table 19



Source: *Investing.com*.

At a first view, as for the telecommunications sector, also the companies operating in these sectors do not show an increase in the multiple over the years: while the majority of the companies show a decreasing trend of the multiple, one company stands out for a moderate increase throughout the years: the Tianjin Port Development Holdings. Another element that is visible is the high value registered in 2018 by COSCO Shipping Energy Transportation, which can be mainly related to the very low EPS registered by the company in that year (0,02). As happened for Xiaomi in the telecommunications sector, the multiple eventually decreased and stabilized, as the EPS registered a significant increase (0,1). In Table 20, it is provided a comparison between the groups of companies chosen for the sector, for which 5 out of 6 are those considered to be more sustainable.

Table 20 – Shipping & Port Operation sector

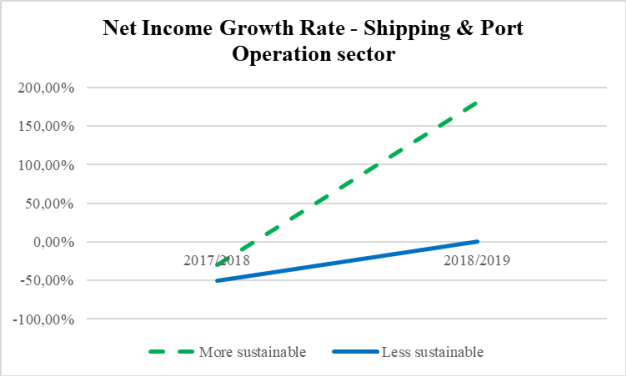


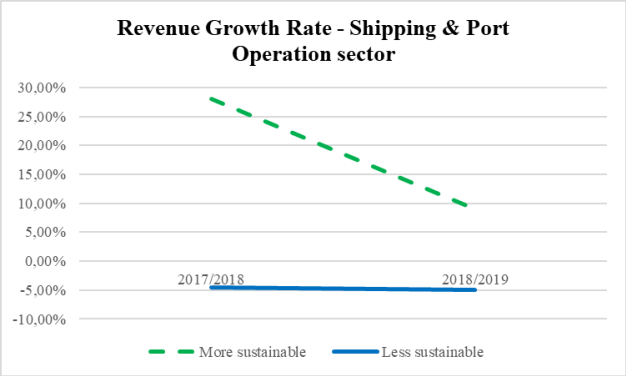
Source: *Investing.com*.

As the Table shows, the group of more sustainable companies demonstrate higher values of the multiple, with consequent stronger performances, and throughout all the years considered maintaining a considerate gap between the multiple of the two groups, with a particular peak in 2018 (considering also the high value of the ratio for COSCO Shipping Energy Transportation). The less sustainable companies, in this case only one (Tianjin Port Development Holdings), registered a quite low value for the multiple, however showing a slightly increasing trend over the period considered, while the more sustainable companies, after the peak in 2018, undergo through a significant decrease, as the multiple lowers also compared to the values of 2017.

Moving to the evaluation of the financial performance of these two groups, as for the previous sector examined, the analysis will now proceed with the growth rate of revenue and net income to verify whether more sustainable companies have a better performance than less sustainable companies, and also to investigate whether there is any correlation with the results obtained from the multiple.

Table 21 – Growth Rates in the Shipping & Port Operation sector





Source: *Investing.com*.

What emerges from Table 21 is the significant net income growth registered by the more sustainable companies from 2018 to 2019, which explains the decreasing value of the P/E ratio in 2019. The Tianjin Port Development, representative of the less sustainable companies, also registered a considerate net income growth between 2018 and 2019, after a negative growth of 49,94% between 2017 and 2018. The increasing value of the multiple for less sustainable companies, even not significantly, is explained by the fact that both the share price and EPS of the company are decreasing, but the EPS is decreasing at a faster rate.

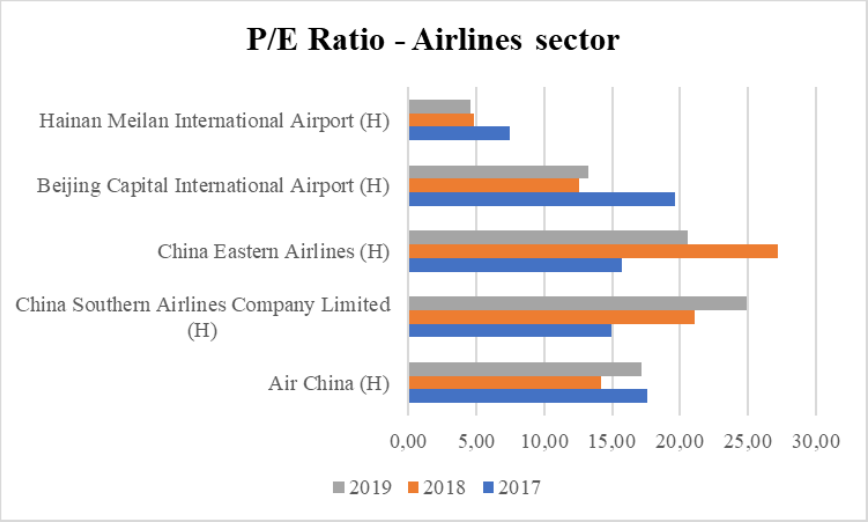
Moreover, for what concerns the revenue growth rate, while the more sustainable companies moved from a growth between 2017 and 2018 to a decrease in growth between 2018 and 2019, the less sustainable companies showed a negative growth in both the two periods considered. The fact that the more sustainable companies registered an increase in net income growth and a decrease in revenue growth could be related to extraordinary items of income that are not attributable to sales revenues or to a decrease of cost.

In conclusion, even with a decrease in 2019, the more sustainable companies showed a higher value in the multiple relative to the less sustainable, which may suggest greater expectation of growth from the market compared to the other group considered, and consequently investors buying company's share expect to gain their returns faster. It may be also considered a better financial performance for the more sustainable companies, as the net income growth rate increases through the years considered.

3.2.3 Price – earnings ratio trends in the Airlines sector

The examination will continue with the analysis of the airlines sector, following the same method used for the other sectors. Starting with the overview of the P/E ratio trends of the single companies belonging to the sample considered, it is analysed whether, over the years, the market expects higher growth from these companies in the future. Table 22 provides the P/E ratio for each company.

Table 22

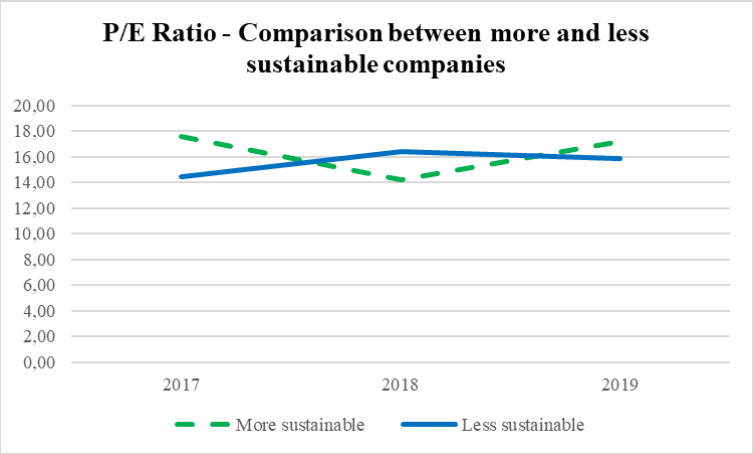


Source: *Investing.com*.

In general, as for the previous sectors, over the years, the trend appears uneven, as some companies recorded a decrease in the multiple trend, some companies registered an increase in the multiple trend, and others recorded an increase in 2019 after a decrease in 2018, while others showed a peak in 2018 and a decrease in 2019. The last data refers to China Eastern Airlines, which among the three years considered, in 2018 registered the lowest EPS (0,16), which eventually increased in 2019 at 0,21.

As for the previous sectors, in the following table, (Table 23) it is provided a comparison between the two groups of companies in which the sector is divided, for which only 1 out of 5 is deemed as more sustainable.

Table 23 – Airlines sector

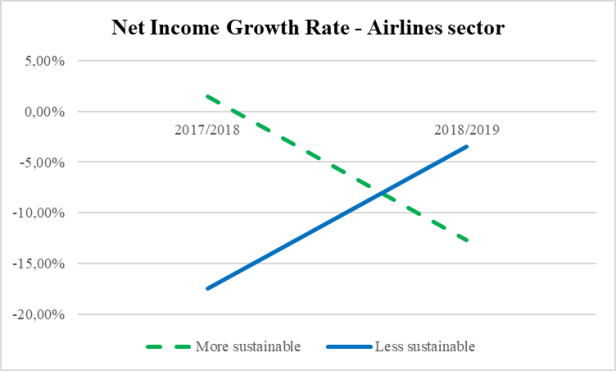


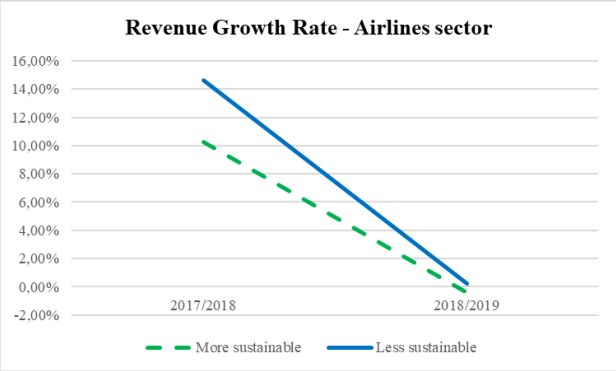
Source: *Investing.com*.

In general, what emerges from the Table is for both groups a value of the multiple lower relative to the previous two sectors considered, as the multiple value ranges between 14 and 18 for both groups. The trend appears to be the opposite for the two group of companies over the years: in the first phase, the more sustainable companies (data corresponding to Air China) showed a higher value than the less sustainable, moving to a decrease in 2018 (due to the drastic fall of Air China's price – from 9,48 to 6, 82) relative to the less sustainable companies increase in the multiple value. Finally, the more sustainable companies end in 2019 with a higher and increasing value compared to the less sustainable that are recording a decrease in the multiple. In this case, the data considered may not be enough to declare whether the market expect better performances from more sustainable than less sustainable. The only consideration to be done it could be related to the last year value in which more sustainable companies present higher value of the multiple, even though the gap between the two groups is not that significant. It may be ventured, in this case, that there could be a correlation between the deletion from the FTSE4Good Emerging Index of some of the companies of the less sustainable group and the fact that they demonstrated a lower value in the following year; however, it is unlikely.

As for the previous sectors, to verify whether the groups of more sustainable companies showed a better financial performance than the less sustainable, the analysis will proceed with the comparison of the growth rate of the two groups, proposed in Table 24.

Table 24 – Growth Rates in the Airlines sector





Source: *Investing.com.*

As the Table show, more sustainable companies registered a negative growth for both rate moving from 2018 and 2019, which is in line with the increase in value witnessed for the multiple, since a decreasing income have implication on the increase in the ratio. As for the less sustainable companies, it is registered a significant net income growth between 2018 and 2019, in line with the decrease of the multiple for the correspondent year, while it is registered a significant decrease in revenue growth, which may be related to cost reduction or to extraordinary items of income that are not attributable to sales revenues.

In the case of airlines sector, according to the data collected, there is no strong evidence to state that more sustainable companies are both rewarded by the market and registered a better financial performance trend than less sustainable companies. This may also be linked to the fact that it is difficult to assess the sustainable effect of the companies operating in this sector as it is a highly polluting one, and it is still striving to find effective solutions for environmental protection.

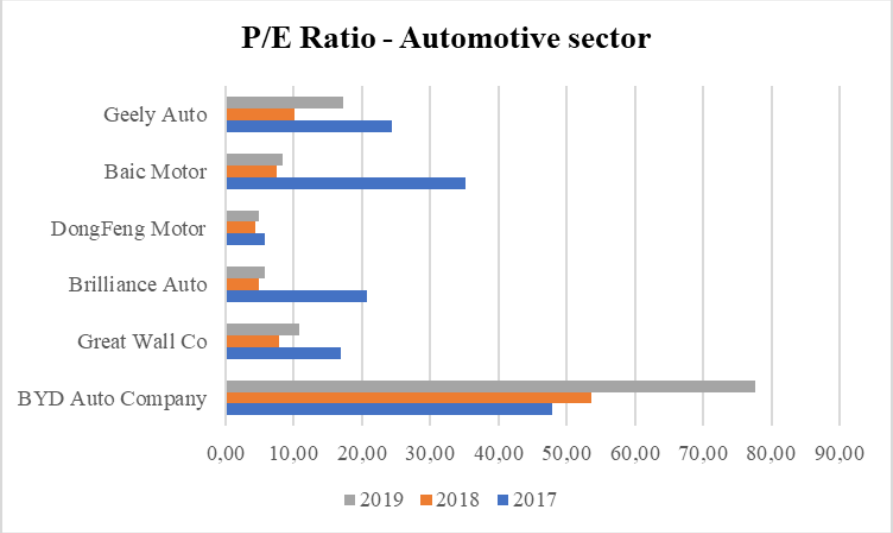
3.2.4 Price – earnings ratio trends in the Automotive sector

A different consideration must be done before analysing this sector's performance: as already said, none of these companies is included or has been included in any sustainability index even though the sector is increasingly improving in its commitment to environmental protection and especially climate change. The little international recognition may be related to low guidance and support that the central government has reserved over the years towards the environmental aspect in the industry.

For this reason, a different criterion to distinguish more sustainable from less sustainable companies has been used in order to proceed with the analysis: after an analysis of each company's websites and sustainability report and the acknowledgment for some of them of the lack of up-to-date information, it has been decided that the companies with better ESG communication will be considered as more sustainable companies. In this case, only one company has demonstrated to be the best ESG performer, with timely and good communication of its sustainability efforts compared to its peers: BYD Auto Company.

After the establishment of the two groups, the analysis will proceed as for the previous sectors, with a first overview of the single companies' P/E ratio trends over the years, shown in Table 25.

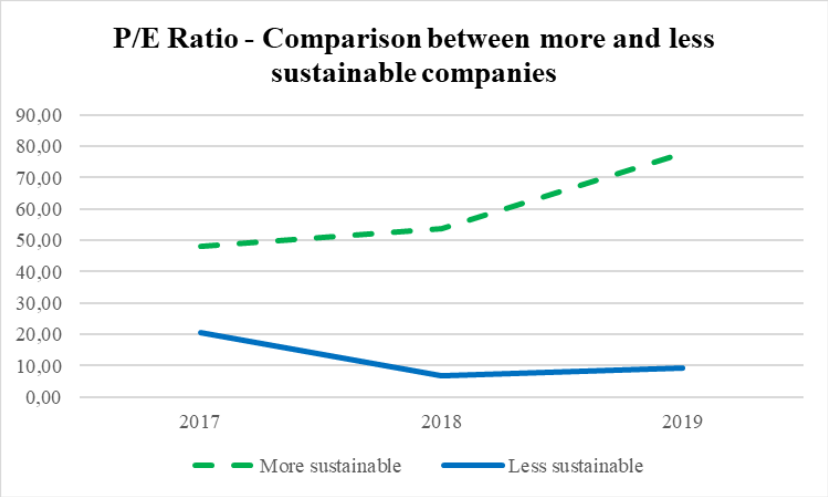
Table 25



Source: *Investing.com*.

At a first view, most companies registered a significant high value in the first period considered with a significant decrease in the multiple in the following period, with a final upturn in the last period considered. Only one company showed an increasing trend in the multiple throughout the years considered which is BYD Auto Company, the more sustainable company. This first observation is confirmed in the comparison of the ratio trend between the less and more sustainable companies, which is proposed in Table 26.

Table 26 – Automotive sector



Source: *Investing.com*.

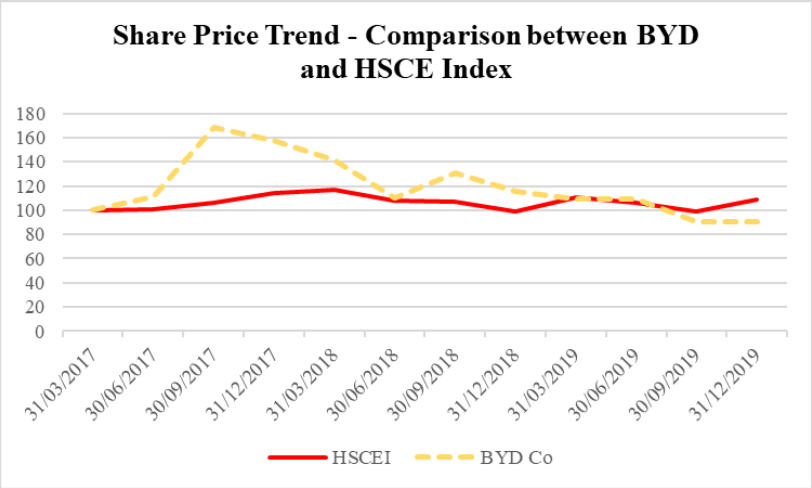
As the Table show, more sustainable companies demonstrate higher value of the multiple throughout the period considered and with an increasing trend, while the less sustainable companies registered a slightly increasing value of the multiple after a decline from 2017 to 2018. However, the higher value of the multiple for more sustainable companies may be mainly depended on the drastic decrease registered over the years of the company's EPS, which simultaneously has registered a decline of the price, not as fast as the EPS.

Hence, in Table 27 is proposed a comparison between the share price trends of BYD Auto Company (representative of the more sustainable companies) and of the share price trends of the Hang Seng China Enterprises Index[157] (HSCEI) to evaluate whether the price trends of the company are aligned to the trends of the index. The period considered is the same on which is based the entire analysis, however, in this case, to better assess the differences between the two trends, the results are provided quarterly from 2017 to 2019, not an annually. To compare these data, these have been converted in base 100: 100 is the value given to the price of both the index and the company at the 31st March

[157] The Hang Seng China Enterprises Index is a stock market index of the Hong Kong Stock Exchange for H shares only.

2017, to the prices of the following months it has been given a proportional value according to the decrease or increase of the price.

Table 27

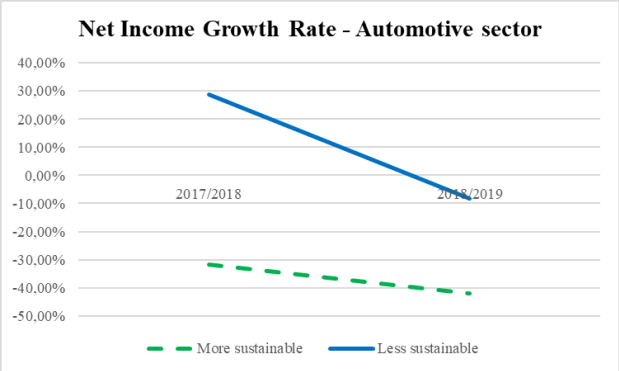


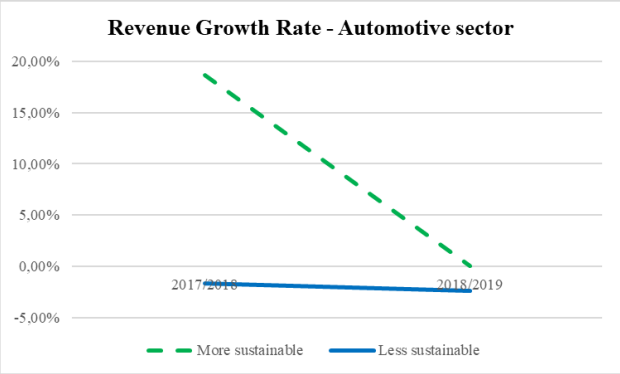
Source: *Investing.com*.

In Table 27, it is possible to see that the company's share price is more volatile, as until the second quarter of the year 2018 the company has overperformed compared to the index, with extraordinary peak registered in the third quarter of 2017. However, after a period in which the company's share prices aligned to the prices of the index, in the last period, specifically from the third quarter of 2019, the company has underperformed compared to the index.

According to these data, the company may not be keeping pace with the index, before drawing any conclusions, it is important to look at the marginality indices to complete the analysis, and compare the financial performance of the two groups of companies to assess which one registered the best one. In Table 28 is shown the comparison.

Table 28 – Growth Rates in the Automotive sector





Source: *Investing.com*.

As the Table shows, both rates for both groups registered a negative growth in the period between 2018 and 2019. In particular, the further decrease in net income growth registered by more sustainable is in line with the increasing trend found in P/E ratio of the group. As for the less sustainable companies, the net income growth rate trend also appears in line with multiple trend, as the period going between 2017 and 2018 registered a growth of 28,71%, period in which the multiple is decreasing, and then registered a negative growth of -8,20% between 2018 and 2019, which corresponds to the multiple slight increase in 2019. According to this data, both groups do not present a positive financial performance as there is a significant decrease for both rates of the two groups.

Nonetheless, comparing all the findings, it can be said that overall more sustainable companies are registering a positive dynamic: looking at the multiple, more sustainable companies have registered an increasing trend throughout the three years considered, which depended both on the considerable decrease of the EPS and the share prices of the company included in the group. However, even though the price performance registered in the last period of 2019 by the more sustainable companies is not aligned to the index, due to the fact that the EPS of the more sustainable companies decreased at a faster rate compared to their share prices, it is possible to state that the market still values the future dynamics of the company, as it is not affected by the decline of the EPS. In addition to this, the decrease in both revenue and net income growth rates, in which the more sustainable companies registered in both cases a negative growth, it is in line with the multiple trend.

In general, it is possible to state that the more sustainable companies are registering a positive dynamic, since even though they are not well-performing financially, the market has begun to reward this group's sustainable approach, as the sector is in a turning point in which more producers are moving towards new-energy cars. Even though there is a mixed evidence of the results, these are justified by the fast and incredible changes occurring in the sector as whole.

3.2.5 Conclusive observations

The analysis by sector of the companies included in the sample served to evaluate the financial performance of mainland Chinese companies listed in Hong Kong and whether the market for the different sectors has expectation of higher growth for the more sustainable companies chosen for each sector, thus establishing and recognising the sustainability commitment of this group as a value driver for the market.

Overall, the examination showed mixed evidences for the market and financial dynamics of the companies considered, which may lead to the conclusion of no significant advantage in being sustainable for the considered companies. However, looking more carefully at the single cases considered, some encouraging signals can be found from more sustainable companies of two different sectors: the shipping and port operation sector and the automotive sector.

As regards the shipping and port operation sector, even if the multiple showed discontinuous values, the more sustainable companies demonstrated higher values relative to the other group, which combined to the positive performance of growth according to the marginality indices, are evidence of the higher growth expectations in the future for a group of well-performing companies, not only from a financial point of view, but also from a sustainable point of view. Indeed, it must be considered the sector in which these companies operate, as the sustainability theme has different impacts according to the business. In this case, sustainability may be a relevant element for differentiation in the market, as the sector is highly polluting but, at the same time, is strongly engaging in finding solutions for better ESG risk management, particularly related to environmental protection, which it is the main focus of the examination.

As regards the automotive sector, it has been found another positive dynamic: the increasing trend of the multiple is indicative of the market appreciation for the more sustainable companies and the expectations of higher growth in the future, regardless of their poor financial performance. In this case, it is important to take in consideration the relevance that sustainability is lately acquiring in a sector highly polluting, which is moving towards greener solutions for their products since it values sustainability as an element to attract more consumers.

For the other two sectors considered, the evidence is less significant, as no relevant results are found to state that sustainability is an element of differentiation for the companies considered. However, some justifications may be advanced relative to these companies' dynamics.

As regards the telecommunications sector, the more sustainable companies have registered lower level of the multiple compared to the less sustainable companies, with a positive performance according to the growth rates. The mixed outcome of the analysis maybe explained by an appreciation from the consumer market that is buying more the more sustainable companies' products, and a not yet rewarding by the investment market for their sustainability approach, which could be related to the nature of the business that is constantly and rapidly upgrading thanks to the introduction of new high technologies.

Last, as regards the airlines sector, the non-significant difference in the values of the multiple between the two groups and the decrease in growth according to the marginality indices are not deemed as strong evidence to state that more sustainable companies operating in this sector are registering positive dynamics, which also makes it difficult to assess the sustainable effect of these companies, which are highly polluting, and still striving to find effective solutions for environmental protection.

Overall, through the examination it was possible to observe some positive and encouraging signals of market reward for those companies with a stronger ESG performance. The correlation between their sustainability commitment and the better dynamics of growth may be also indicative of the effectiveness of the imposition of more stringent ESG requirements by the Hong Kong Stock Exchange. Even with some discordant evidence, the attention on ESG practices of the H shares may

be the distinctive element that determines better performances and higher expectations of growth for these companies.

For this reason, the analysis will continue and conclude with the examination of the P/E ratio and growth rates of the same companies included in the previous analyses but considering their A shares. It is interesting to analyse these companies so to assess whether there is a market distortion due to lack of information, since the A shares in China are mainly traded by mainland Chinese citizens due to the limitation imposed by the government to foreigners' access to these shares, which may also allow to understand whether it exists a certain degree of awareness in the market.

3.3 Price – earnings ratio trends of mainland Chinese companies in their A shares

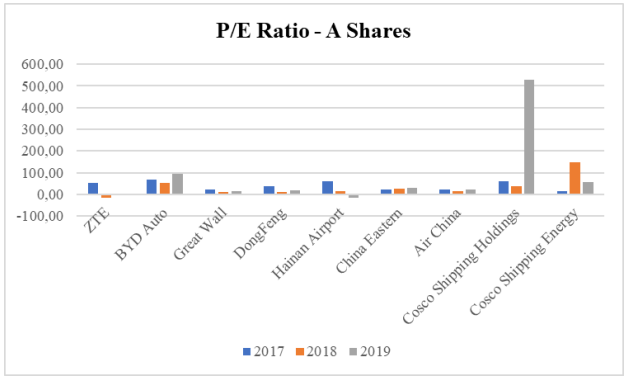
The analysis will now be concluded with the evaluation of the P/E ratio trends of mainland Chinese companies from the sample previously considered listed in one of two mainland Chinese stock exchanges, this examination will allow us to understand whether the mainland Chinese companies have registered better expectations and better financial performance in Hong Kong (H shares) or in mainland China (A shares). The comparison among the companies will also aim at understanding whether Chinese investors have a certain degree of sustainable awareness, as the A shares are mainly traded by mainland citizens due to the limitations imposed by the central government to foreigners.

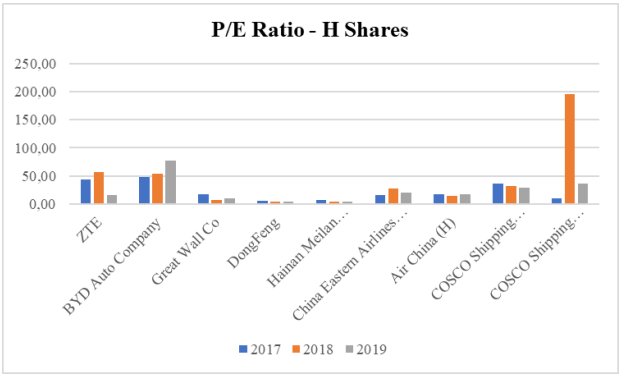
The sample of companies is reduced as not all the companies previously considered are also listed in mainland Chinese stock exchanges: of the 25 previously considered companies, only 12 companies are dual listed, however, for lack of data, only 9 are considered in this part of the analysis. The companies here analysed are: ZTE, BYD Auto Company, Great Wall Motor Co., DongFeng Motor Group, COSCO Shipping Holdings, COSCO Shipping Energy Transportation, Air China, China Eastern Airlines, and Hainan Meilan International Airport[158].

[158] As a reminder, among these companies, only the H shares of ZTE, COSCO Shipping Holdings, COSCO Shipping Energy Transportation, Air China are included in the FTSE4Good Emerging Index.

Table 29 shows the comparison between the P/E ratio trends of the H shares against the P/E ratio trends of the A shares considered in the three years studied above.

Table 29





Source: *Investing.com*.

In general, the multiple of the A shares companies demonstrate lower values than the H shares, with a significant peak for two companies in two different years (COSCO Shipping Holdings in 2019 and COSCO Shipping Energy Transportation in 2018), however this is mainly related to the EPS effect, as it was very low for both companies in these years (respectively 0,01 and 0,03).

For some A shares the trend appears the same as in the H shares, for instance Hainan Meilan Airport show a decreasing trend both in the A shares and the H shares, while Air China, after a period of decrease in the multiple in 2018 from 2019, the trend is again rising in 2019.

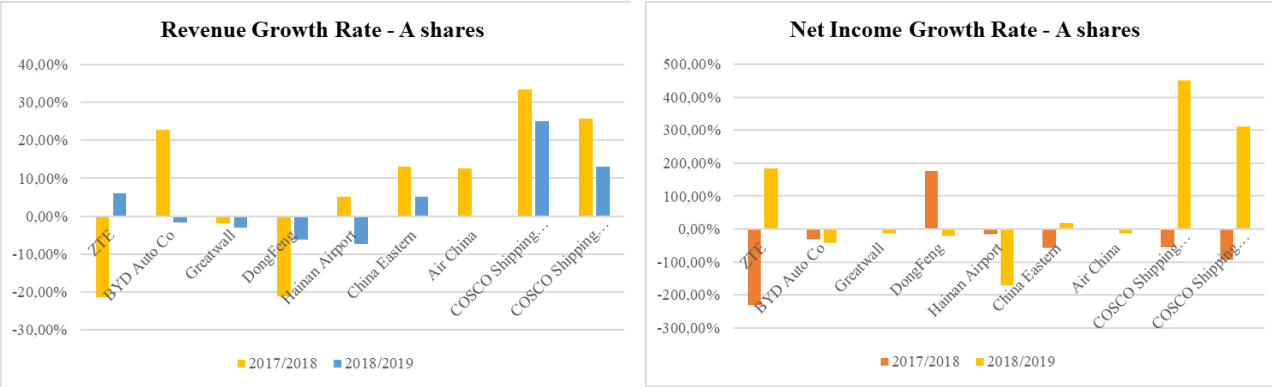
Other A shares have registered negative values of the multiple, which is not significant to the examination as the companies have registered a loss (ZTE in 2018 and Hainan Meilan Airport in 2019).

As for the considerations made in relation to the companies analysed before, these sample of A shares do not show expectations of growth in the future from the market, having both lower values than the H shares, and showing a decreasing trend over the years considered.

As for the previous sample, the analysis will now end with the examination of the A shares growth rates relative to the net income and revenue in the years considered so to analyse whether these

companies have registered a positive financial performance. Table 30 show the two respective growth rates.

Table 30



Source: *Investing.com.*

Looking at the rates, it is possible to assess a positive performance in ZTE case as both rates are increasing in the last period considered (between 2018 and 2019) which results perfectly in line with the decreasing trend of the multiple.

Other two companies may have showed a positive financial performance (COSCO Shipping Holdings and COSCO Shipping Energy Transportation) as it is registered a consistent net income growth between 2018 and 2019, while the revenues are decreasing in the same period relative to increase registered between 2017 and 2018, which, as said before, may be related to decline in costs or to extraordinary items of income that are not attributable to sales revenues. In the case of COSCO Shipping Energy Transportation, the net income growth is perfectly in line with the decrease registered in the multiple in the last year considered. COSCO Shipping Holdings registered an incredible increase in 2019 for the multiple which is not only attributable to the low EPS but also to the increased share price (from 4,04 from 2018 to 5,27 in 2019).

The rest of the companies registered a negative financial performance as some of them showed a decrease in growth from the previous year, while others showed a negative growth in both rates.

In conclusion, this brief overview of A shares was relevant to assess whether Chinese investors own a degree of awareness and appreciation for these companies' sustainability commitment. However,

the data did not provide a positive outcome, as the A shares analysed show lower value of the multiple compared to the H shares, confirming at least that mainland Chinese companies listed in Hong Kong have better expectations of growth. However, the differences registered among the shares could be related to the major visibility that Hong Kong holds internationally, and the easier access that provides to foreign investors relative to the A shares. It could be also suggested that the difference registered may be related to the lack of knowledge of Chinese investors or to the low quality of ESG information disclosure due to the voluntary basis.

In conclusion, this last examination served to prove that businesses from mainland China that are more conscious towards sustainability, are better rewarded in a market with higher standards and requirements related to this theme, not only to the level of being included into international sustainability indices, but also from a financial point of view.

The overall analysis conducted on the sample of 25 mainland Chinese companies listed in Hong Kong from four different sectors in the period considered (2017 - 2019) to verify whether the market rewarded a more sustainable approach of these companies has finally reached mixed but, in some cases, encouraging results. The market seems to value more sustainable companies from sectors that demonstrate higher attention on these themes, as it must be taken into consideration that the level of attention on sustainability varies from sector to sector.

As listed companies in Hong Kong in the three years considered were required to report ESG related information according to "comply or explain" provisions, some of the "more sustainable" groups seem to have benefited from the almost mandatory regulations and the consequent improvement of sustainable standards to possess in order to enter the stock market, while some of the "more sustainable" groups have not demonstrated strong evidence of positive dynamics which may be related to the fact that sustainability is a non-distinctive and attractive element of differentiation for investors of those sectors.

Conclusions

With the present work, it has been tried to assess the degree of awareness that both Chinese companies and the investment markets have about sensible themes as sustainability.

This examination has started with the acknowledgement of the increasing attention devoted to environmental protection, with deep concerns for climate change, which has implied internationally a greater commitment to address these problematics. As it has been said, throughout the years, the need to find a common solution to tackle climate change has generated in the international community a successful engagement, culminating in the Paris Agreement on climate change.

Moreover, the introduction of the concept of "sustainable development" and the UN SDGs have reinforced in people, companies, governments and society at large the importance of an integrating perspective, in which the economy cannot be prescinded from environmental and social externalities. The need for governments, companies and consumers to jointly work to transit towards a sustainable economy has been emphasized in the first chapter, as it has been recognized the influence on each other of these actors' mutual relationships, and the efficiency reached when there is a common point of view.

This, together with other initiatives launched by major international institutions have influenced different sectors to embrace sustainability as a priority, considering the role that they might have in educating other actors. The financial sector has been the considered means in this paper, through which the aim was to move the attention away from the shareholders maximization of interests and move to the stakeholders' benefit, which is the one that needs to be maximized, by increasingly incorporate non-financial externalities into daily financial operations.

In the paper, it has been recognized the key educational role assumed by Stock Exchanges, which, more than governments regulations or other financial institutions' guidance, have proved to be internationally guides to companies for the adoption of greener approach. The different initiatives launched by stock exchanges in the world has served to raise awareness especially of those companies

with less consciousness towards sustainability, thus playing a fundamental role in greening mainstream financial markets. As a matter of fact, stock exchanges function as drivers for the standardisation and growth of environmental reporting also through the introduction in listing rules of environmental related requirements for reporting practices.

Therefore, the paper has acknowledged the role of stock exchanges in the latest rising trend in the market: ESG related practices.

With ESG criteria, the emphasis is moved to the long-term value creation of a company, as a company is now more often required to disclose its efforts related to ESG risk management, so to assess the impact that environmental and social externalities may have on a company financial performance.

As it has been stressed, there are different practices related to ESG reporting, as until now it does not yet exist a globally common and uniform standard. That is why the role of stock exchanges is particularly validated, as they set standards that have the aim of not only raising awareness and educating their issuers and investors, but also the role of putting their listed companies in the situation of attracting more investors that value sustainability.

As a matter of fact, the relevance acquired by this new trend internationally, has created for a country striving to face environmental issues a way to assume a frontrunner position in the global fight to address climate change. The focus on China and its commitment to the environmental protection has been relevant to understand the world's second largest economy efforts to the international cooperation in the matter.

In the paper, it has been stressed the major relevant role that the Chinese government has in influencing and guiding society through the implementation of greener regulations, and it has been acknowledged to what extent the top-down approach in the sense of impositions of governmental rules is quite relevant to the market. The observed evolving role of the central government through the enforcement of stricter environmental regulations (as the latest Five-Years Plans and the Environmental Protection Law), has been important to understand the major relevance of the government in the functioning and the purpose of the market which, as it has been stressed, is greater

than the demand of domestic investors who have a very low understanding of ESG investing. However, the heavy regulations imposed by the government with no actual mandatory requirements for ESG reporting practices have determined for the examination to move the analysis to mainland Chinese companies listed in the Hong Kong Stock Exchange.

As a matter of fact, it has been ascertained the greater engagement of the Exchange in the promotion of ESG disclosure compared to the two mainland Chinese stock exchanges (Shanghai e Shenzhen), as Hong Kong upgraded its listing rules in 2016 introducing the "comply or explain" provisions for ESG factors to be disclosed so to complete the financial information provided in a company's annual report.

Moreover, for its greater international visibility, the Exchange has historically functioned for China as a means to attract foreign investors to trade H shares, as the A shares were not accessible for non-Chinese investors. In this new context, in which the Exchange has demonstrated stronger understanding and commitment to ESG reporting, mainland Chinese companies could have used this new trend to their own advantage and attract more sustainable-oriented investors.

Therefore, the examination has proceeded with the analysis of 25 mainland Chinese companies listed in Hong Kong to investigate whether the internalisation of externalities resulted in a positive financial performance for these companies but also to verify whether the market showed higher expectations of growth from best ESG performing companies.

As a matter of fact, the decision of analysing these companies dividing them into two groups ("more sustainable" and "less sustainable" companies) to be compared, depending on whether or not they were constituents of any sustainability index, was driven by the expectations that the market would have appreciated more "more sustainable" companies than the other group, so to confirm the theory that a sustainable approach may lead to a better financial performance. Through the analysis of the P/E ratio trends, for which it was expected an increasing trend of the multiple, it was assessed whether the market expected higher growth in future for more sustainable companies, while through the analysis of the net income and revenue growth rate, it was compared the financial performance of the

two groups considered for each sector, for which higher growth from the more sustainable companies would have meant better financial performance. The combination of the two results would have led to the conclusion of positive dynamics for this group of companies, which would have been linked to their sustainable approach.

Overall, in the three years considered, the examination showed mixed evidences for the market and financial dynamics of the companies considered, which may lead to the conclusion of no significant advantage in being sustainable for the considered companies. However, looking more carefully at the single cases considered, some encouraging signals can be found in the results from more sustainable companies of two different sectors: the shipping and port operation sector and the automotive sector.

As regards the shipping and port operation sector, even if the multiple showed discontinuous values, with a peak in 2018, the more sustainable companies demonstrated higher values relative to the other group, which combined to the positive performance of net income growth in the last period considered (from 2018 to 2019), are evidence of the higher growth expectations in the future for a group of well-performing companies, not only from a financial point of view, but also from a sustainable point of view. In this case, sustainability may be a relevant element for differentiation in the market, as the sector is highly polluting but, at the same time, is strongly engaging in finding solutions for better ESG risk management, particularly related to environmental protection, which it is the main focus of the examination.

Another positive dynamic has been found in the case of the automotive sector: the increasing trend of the multiple for the more sustainable companies throughout the years is indicative of the market appreciation for this groups of companies and the expectations of higher growth in the future, regardless of their poor financial performance. In this case, it is important to take in consideration the relevance that sustainability is lately acquiring in a sector highly polluting, which is moving towards greener solutions for their products since the business values sustainability as an element to attract more consumers.

For the other two sectors considered, the evidence is less significant, as no relevant results are found to state that sustainability is an element of differentiation for the companies considered. However, some justifications may be advanced relative to these companies' dynamics.

As regards the telecommunications sector, the more sustainable companies have demonstrated lower value and a decreasing trend of the multiple compared to the less sustainable companies, however, with a positive performance according to the growth rates in the last period considered (from 2018 to 2019). The mixed outcome of the analysis maybe explained by an appreciation from the consumer market that prefers the "more sustainable" companies' products, and a not yet rewarding by the investment market for their sustainability approach. In this case, it may be considered the nature of the business as the telecommunications sector is consumers' demand driven, and, at the same time, it is constantly and rapidly upgrading their products with new high technologies to better meet its customers' needs.

This may justify the mixed outcome of the value of the multiple, the financial performance and the sustainability approach of these companies, as end-users seem to appreciate companies with a higher sense of sustainability by buying their products, while the investment market is still not validating specifically this group of companies, which may imply that sustainability is a non-distinctive element of differentiation for investors in this sector.

Last, as regards the airlines sector, the non-significant difference in the values of the multiple between the two groups and the decrease in growth according to the marginality indices are not deemed as strong evidence to state that more sustainable companies operating in this sector are registering positive dynamics, which also makes it difficult to assess the sustainable effect of these companies, which, even though are included in sustainability indices, are highly polluting, and still striving to find effective solutions for environmental protection.

To conclude the examination and investigate whether there could have been a market distortion caused by lack of information, it has been analysed the trend for the multiple and the growth rates of

9 of the mainland Chinese companies considered in the previous sample but listed in mainland Chinese stock exchanges, to understand whether the mainland Chinese companies have registered better expectations and better financial performance in Hong Kong (H shares) or in mainland China (A shares), where ESG reporting is still largely on a voluntary basis.

The analysis showed negative dynamics for the market expectations of growth, as no companies have registered an increasing trend throughout the years considered and the value of the multiple was very low, and in some cases insignificant as it was registered a loss.

The analysis of the growth rate also showed negative financial performance for most companies included in this group of companies, except for two companies that have registered a net income growth between 2018 and 2019.

Overall, the analysis found both poor expectations of growth and poor financial performances for the companies considered: this last examination served to prove that businesses from mainland China that are more conscious towards sustainability, are better rewarded in a market with higher standards and requirements related to this theme, not only to the level of being included into international sustainability indices, but also from a financial point of view. However, it must be also stressed that the reason behind these poor expectations is that A shares are still very limited to be traded by foreign investors, and that there may be a correlation between the low values of the multiple and the fact that Chinese investors still do not have enough understanding of ESG investing.

To sum up, the examination has tried to verify whether and to what extent there is an acknowledgement of the market for the sustainability actions of mainland Chinese companies listed in Hong Kong. From the data collected in the H shares, it is possible to conclude that some encouraging and positive signals exist in businesses where higher attention on sustainability seemed to be the key element of differentiation in the market. In these cases, the increasing trends of the multiple have shown that the market has higher expectations of growth in the future for “more sustainable” companies than the “less sustainable” companies, even if with poor financial

performance in the present, thus rewarding the future expectations of change in sectors moving towards the transition to a sustainable economy.

It must be considered that the found results are relative evidence, as they are referred to the a part of the companies examined and, due to the limitation in the number of companies included in the examination and the short period considered, have to be analysed with the limitations of the case. It is also relevant to look at this data from the companies' business point of view, as sustainability is a concept to which is provided different attention from sector to sector, which may explain why some companies have not reported the expected results. It must be finally suggested to look at these results through the method used in the paper to separate "more" or "less" sustainable and, consequently, to what extent this comparison has implied for these companies to register these data.

In conclusion, it can be stated that the analysis has provided some encouraging signals for those sectors with greater attention on sustainability, also implying that mainland Chinese companies have benefited from stricter ESG requirements of the Hong Kong Stock Exchange. The long-term expectations of growth for these companies can be seen as signals of an initial transition occurring in China towards a more sustainable economy, in which more conscious platforms and companies can serve as guide to advance in the process of the establishment of a green financial system in the country.

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