ISTANBUL TICARET UNIVERSITY
INSTITUTE OF FINANCE
DEPARTMENT OF FINANCE
FINANCIAL ECONOMICS DOCTORAL PROGRAM

THE IMPACT OF ESG SCORES ON PORTFOLIO PERFORMANCE: EVIDENCE FROM DEVELOPED AND DEVELOPING COUNTRIES

Doctoral Thesis

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200007226

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Thesis Advisor
Prof. Dr. Serkan ÇANKAYA

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ETİK BEYAN SAYFASI

Hazırlamış olduğum tez özgün bir çalışma olup YÖK ve İstanbul Ticaret Üniversitesi Lisansüstü Yönetmeliklerine uygun olarak hazırlanmıştır. Ayrıca, bu çalışmayı yaparken bilimsek etik kurallarına tamamen uyduğumu, yararlandığım tüm kaynakları gösterdiğimi ve hiçbir kaynaktan yaptığım ayrıntılı alıntı olmadığını beyan ederim. Bu tezin ihtiva ettiği tüm hususlar şahsi görüşüm olup İstanbul Ticaret Üniversitesi'nin resmi görüşünü yansıtmamaktadır.

Oğuz ŞİMŞEK

ETHICAL DECLARATION

The thesis I have prepared is an original work and has been prepared in accordance with the Graduate Regulations of YÖK and Istanbul Commerce University. In addition, I declare that I have fully complied with the rules of scientific ethics while doing this study, that I have shown all the sources I have used, and that there are no detailed quotations from any source. All matters contained in this thesis are my personal opinion and do not reflect the official opinion of Istanbul Commerce University.

Oğuz ŞİMŞEK

GENİŞLETİLMİŞ ÖZET

Son yıllarda önemi daha da artan sürdürülebilirlik, insanoğlunun geleceğini içeren konuları barındırması nedeniyle önemli bir konudur. Mevcut ekonomik ve politik sistemlerin temellerinin dünya kaynaklarının bol, çevre ve yaşam dengesi hassasiyetinin düşük bir dönemde gelişmiş olması nedeniyle geleceğimiz tehlike altındadır. Bu sorunun fark edilmesi, anlaşılması ve gereken önlemlerin alınması ciddi öneme sahiptir. Bugün sahip olduğumuz çevre ve iklim sorunları, sosyal ve ekonomik eşitsizlikler politik ve ekonomik sistemlerimizin bir sonucudur. Bu bakımdan son on yılda hükümetler, uluslararası kurumlar ve bilim insanları insan faaliyetleri nedeniyle üzerinde yaşadığımız gezegene verilen hasarın boyutunu anlamak, tespit etmek, verilen hasarın önüne geçebilmek ve gelecekte neler olabileceğine dair tahminlerde bulunmaktadır. Ayrıca mevcut sistemlerimizin sonucu olarak ortaya çıkan hastalıkların, sosyal ve ekonomik eşitsizliklerin etkileri birçok hükümet, uluslararası organizasyonlar, araştırmacılar ve bilim insanları tarafından araştırılmaktadır.

Bugünlerde çeşitli disiplinlerden bilim insanlarının ilgisini daha çok çeken ve değerli bir konu olarak görülen sürdürülebilirlik, finans bilimi için de yüksek öneme sahiptir. Finansal açıdan sürdürülebilirlik, makro düzeyde ülke içerisindeki kaynak ve imkanların gelecek nesillerin de ihtiyaçlarını karşılayabilecek düzeyde kullanımını ve yönetimini içermektedir. Hükümetlere ait çevre, sosyal ve yönetim gibi çeşitli kararların uzun vadedeki etkilerinin karşılanabilir finansal maliyetlere sahip olması önemlidir.

Sürdürülebilir finans mikro açıdan ise ulusal ve uluslararası firmaların içerisinde bulundukları toplum ile uyum içerisinde, çevre konularına hassas, sosyal konulara duyarlı ve yönetim konularında yüksek standartların bulunmasını temel almaktadır. Tüm firmaların değer ve kâr yaratmak ana hedefiyle kurulduğu günümüzde, firmaların çevre ve toplum gibi çeşitli farklı konularda yönlendirilmesi basit bir konu değildir. Bu özellikleri ve amaçları nedeniyle sürdürülebilir finans önemli bir düşünce sistemidir.

Firmaların faaliyetlerini sürdürürken etkileşimde bulunduğu çeşitli alanlar ile ilişkileri önemlidir. Her sektör ve firmanın faaliyetleri ile etkileşimde bulunduğu taraflar üzerinde farklı etkileri bulunmaktadır. Her firmanın toplum ve sosyal yaşam üzerindeki etkisi farklı olabildiği gibi bazı firmaların çevre üzerinde daha çok etkisi bulunurken bazılarının daha az etkisi bulunmaktadır.

Günümüzün sürdürülebilirlik sorunları sanayileşme ile başlayan hükümet ve firma faaliyetlerinin kontrolsüz biçimde üretim ve kâr odaklılığından kaynaklanmaktadır. Yüzyıllardır devam eden üretim odaklı anlayışın, hükümetler ve firmaların çevre, toplum, çalışanlar ve yönetim gibi konuları ikinci planda tutması nedeniyle ortaya çıkardığı iklim değişikliği, kuraklık, pandemiler, yüksek şehirleşme ve tedarik zinciri problemleri gezegenimizi her gün daha fazla yaşanmaz hale getirmektedir.

Firmaların sürdürülebilirlik açısından bu yüksek önemi nedeniyle, faaliyetlerinin çevre ve toplum ile uyumunun ölçülmesi ve değerlendirilmesi önemlidir. Bu kapsamda geliştirilen ESG (Environmental, Social and Governance) skorları firmaların faaliyetleri esnasında çevre, toplum ve yönetim konularındaki performansının değerlendirilmesini içermektedir. Genellikle yıllık olarak hesaplanan ESG skorları, bir firmanın faaliyetleri esnasında çevreye verdiği zararın miktarı ve firma tarafından verilen zararın önlenmesine yönelik çabaların değerlendirilmesini içermektedir. Ayrıca firmanın faaliyetlerini bulundurduğu ülkedeki toplum ile uyumu ve hassasiyetinin de değerlendirildiği ESG skorları, firmaların kurumsal yönetim ilkelerine uyumu ile kurumsal sosyal sorumluluk faaliyetlerinin de değerlendirilmesini içermektedir.

Bu tez çalışmasının ana hedefi firmaların sürdürülebilirlik değerlendirmelerinin, yani ESG skorlarının varlık fiyatlama modelleri üzerinde bir etkisi olup olmadığını anlamak ve sürdürülebilirlik skorlarının varlık fiyatlama modellerine entegrasyonudur. Çünkü artan sürdürülebilirlik bilincinin yaygınlaştırılması, yatırımcıların çevre ve toplum dostu sürdürülebilir firmalara özendirilmesi sürdürülebilir olmayan ya da olmak konusunda yeterli motivasyona sahip olmayan firmaların harekete geçirilmesinde önemlidir. Özellikle büyük ve eski firmaların üretim ve yönetim faaliyetlerinin sürdürülebilirlik doğrultusunda revize edilmesi maliyetli ve zaman alıcıdır. Bundan dolayı firmaların sürdürülebilirlik konusunda isteksiz oluşu ve hatta bazı firmaların yeşile boyama stratejilerine sahip olması kaçınılmazdır.

Sürdürülebilirlik skorları ile varlık fiyatları arasındaki ilişkinin tespiti ve ispatı ile yatırımcıların sürdürülebilirlik temelli yatırım araçlarına, fonlara ve endekslere yönlendirilmesi önemlidir. Her ne kadar hükümetler, bakanlıklar, denetleyici kurumlar ve toplumun firmalar üzerindeki sürdürülebilirlik baskısı bulunsa da bu baskıya ait etki

sınırlıdır. Bu bağlamda firmaların sürdürülebilirliğin bireysel-kurumsal yatırımcılar ve fonlar tarafından talep edilmesinin daha etkili olacağı düşünülmektedir.

Bu amaç doğrultusunda varlık fiyatlama modellerine dahil edebilmek için firmaların ESG skorları kullanılarak iki farklı değişken oluşturulmuştur. ESG skorlarının entegre edilmesinde Nobel Ekonomi Ödüllü ekonomist Eugene Fama ve Kenneth R. French tarafından 2015 yılında yayınlanan "A five-factor asset pricing model" baz alınmıştır.

Bu kapsamda gelişmekte olan ülkelerden Çin, Hindistan, Brezilya, Meksika, Endonezya, Rusya ve Türkiye'de faaliyet gösteren ve verilerine Refinitiv Eikon veritabanı aracılığı ile ulaşılabilen 310 firmaya ait veriler kullanılmıştır. Analiz sonuçlarını gelişmiş ve gelişmekte olan ülkeler kapsamında mukayese edebilmek için gelişmiş ülkelerde faaliyet gösteren firmaların verileri de kullanılmıştır. Bu nedenle Kanada, Fransa, Almanya, İtalya, Japonya, Birleşik Krallık ve Amerika Birleşik Devletleri'nde faaliyet gösteren 1465 firmaya ait veriler de çalışmaya dahil edilmiştir. Toplamda 1765 firmaya ait verilerin kullanıldığı ve analizlerin ülke bazında yapıldığı çalışmada 2010-2022 yılları arasındaki veriler ile analizler yapılmıştır. Firmaların çalışmaya dahil edilmesi ve hariç bırakılmasında baz alınan çalışmadaki yöntemler kullanılmıştır.

Fama ve French 5-faktör modeline entegrasyonu hedeflenen ilk değişken, analizin yapıldığı ülkede faaliyet gösteren yüksek ESG skoruna sahip firmalar ile düşük ESG skoruna sahip firmalardan oluşan portföyler arasındaki yıllık getiri farkını temsil etmektedir. Oluşturulan ilk değişken firmalara ait sadece yıllık ESG skor performansını dikkate almaktadır, bu nedenle ardışık yıllar arasındaki değişimle ilgili bilgi içermemektedir.

Bu nedenle ikinci ESG değişkenimiz, firmaların yıllara özgü ESG skor büyüme/küçülme oranlarını dikkate alarak oluşturulmuştur. İkinci ESG değişkenimiz yıllara göre yüksek ESG skoru büyüme oranına sahip firmalardan oluşan portföy ile düşük ESG skoru büyüme oranına sahip firmalardan oluşan portföy arasındaki getiri farkını temsil etmektedir. Sürdürülebilirlik skorları ile oluşturulmuş her iki yeni değişken ayrı ayrı olarak modele dahil edilmiştir ve analizler yapılmıştır. Her ülkeye ait iki modelin test edildiği bu çalışmada 28 farklı analiz yapılmıştır. Yapılan analizlerin her biri için çeşitli ön testler, varsayımdan sapma testleri yapılmış ve uygun güçlü dirençli tahminciler kullanılmıştır.

14 ülkeye ait yapılan analizler sonucunda ülkelere ilişkin her iki modele ait sonuçlar farklılıklar göstermektedir. Firmaların sürdürülebilirlik skorları ile oluşturulmuş değişkenin dahil edildiği model sonuçları Türkiye, Fransa, Japonya, Birleşik Krallık ve Amerika Birleşik Devletleri için istatistiksel olarak anlamlı sonuçlar vermiştir. ESG skoruna ait bu anlamlı sonuçlar getiriler üzerinde sadece Türkiye ve Amerika Birleşik Devletleri'nde pozitif etkiye sahiptir.

Firmaların ESG skorlarındaki büyüme oranını dikkate alan ikinci ESG değişkeninin dahil edildiği model sonuçları ise Çin, Hindistan, Brezilya, Rusya, Türkiye, Kanada, Fransa, Birleşik Krallık ve Amerika Birleşik Devletleri olmak üzere 9 ülkede istatistiksel olarak anlamlı bulunmuştur. İstatistiksel olarak anlamlı etkiye sahip ikinci değişkene ait sonuçlar yalnızca Hindistan, Kanada ve Birleşik Krallık'ta getiriler üzerinde pozitif etkiye sahiptir.

ESG skorları ile oluşturulmuş değişkenlerin istatistiksel olarak anlamlı fakat getiriler üzerinde negatif etkiye sahip olduğu anlaşılan ülkeler için birden fazla neden bulunabilir. İlk olarak bu ülkelerde sürdürülebilirlik faaliyetlerinin firmalar için maliyet artırıcı etkisinin hisse senedi performansında etkisi olduğu düşünülebilir. Bununla birlikte ilgili ülkelerde yatırımcıların sürdürülebilirlik bilincinin düşüklüğü ESG temelli portföylerin getiri avantajını etkilemiş olabilir. Ayrıca veri, analiz biçimi ve analiz sonuçları bu etkinin görülmesi üzerinde yeterince ayrıntıya sahip olmamış olabilir.

Sonuç olarak, bu çalışma günümüzün artan sürdürülebilirlik bilincinin ve sürdürülebilir finans anlayışının bir parçasıdır. Gelecekte sürdürülebilirlik konusunun önemini daha da artıracağı düşünülmektedir. Bu çalışmaya ait sonuçlar geniş bir veri seti ve zaman aralığını baz almakta ve yıllık ESG skoru kullanmaktadır. Gelecek çalışmalarda farklı veri kaynaklarından farklı veri sıklığı ve zaman aralığı verileri kullanılarak farklı sonuçlar elde edilebilir.

Anahtar Kelimeler: *ESG, Sürdürülebilir Finans, Varlık Fiyatlama Modelleri, Portföy Performansı*

EXTENDED SUMMARY

Sustainability, which has become increasingly important in recent years, is an important issue because it includes issues that include the future of humanity. Our future is in danger because the foundations of the current economic and political systems were developed in a period when the world's resources were abundant, and the sensitivity to the environment and life balance was low. It is of great importance to recognize, understand, and take the necessary precautions for this problem.

The environmental and climate problems and social and economic inequalities result from our political and economic systems. In this respect, in the last decade, governments, international institutions, and scientists have been trying to understand, detect, and prevent the extent of the damage done to the planet we live on due to human activities and make predictions about what may happen in the future. In addition, the effects of diseases and social and economic inequalities that arise as a result of our current systems are being investigated by many governments, international organizations, researchers, and scientists.

Sustainability, which attracts the attention of scientists from various disciplines and is seen as a valuable issue these days, is also of great importance for the field of finance. Financial sustainability includes using and managing resources and opportunities within the country at a macro level to meet the needs of future generations. The long-term impacts of government environmental, social, and governance decisions must have affordable financial costs.

Sustainable finance is based on the micro perspective that national and international companies are in harmony with their society, sensitive to environmental and social issues, and have high governance standards. Today, where all companies are established with the primary goal of creating value and profit, it is not simple to direct companies on various issues such as the environment and society. Due to these features and purposes, sustainable finance is an important thought system.

Companies' relationships with the various areas they interact with while continuing their activities are important. Each sector and company have different effects on the parties they interact with through their activities. Each company's impact on society and social

life may be different. Some companies have more impact on the environment, while others have less impact.

Today's sustainability problems stem from the uncontrolled production and profit-oriented nature of government and company activities that began with industrialization. The climate change, drought, pandemics, high urbanization, and supply chain problems that have emerged due to the production-oriented approach that has been going on for centuries, governments and companies keeping issues such as environment, society, employees, and management in the background, are making our planet more and more uninhabitable every day.

Due to the high importance of companies in terms of sustainability, it is important to measure and evaluate the compliance of their activities with the environment and society. ESG (Environmental, Social, and Governance) scores developed in this context include the evaluation of the performance of companies in environmental, social, and management issues during their activities. ESG scores, which are usually calculated annually, include the evaluation of the amount of damage a company causes to the environment during its activities and the efforts of the company to prevent the damage. In addition, ESG scores, which evaluate the company's compliance and sensitivity with the society in the country where it operates, also include the evaluation of companies' compliance with corporate governance principles and corporate social responsibility activities. The main objective of this thesis is to understand whether the sustainability assessments of companies, namely ESG scores, have an impact on asset pricing models and to integrate sustainability scores into asset pricing models. Because increasing sustainability awareness and encouraging investors to environmentally and socially friendly sustainable companies are important in mobilizing companies that are not sustainable or do not have sufficient motivation to be sustainable. Revising the production and management activities of large and old companies in line with sustainability is exceptionally costly and time-consuming. Therefore, it is inevitable that companies will be reluctant to go about sustainability, and some companies even have greenwashing strategies.

It is important to determine and prove the relationship between sustainability scores and asset prices and to direct investors to sustainability-based investment instruments, funds,

and indices. Although there is sustainability pressure from governments, ministries, regulatory bodies, and society on companies, the impact of this pressure is limited. In this context, it is thought that it will be more effective for companies to demand sustainability from individual and institutional investors and funds.

For this purpose, two different variables were created using the companies' ESG scores to include them in the asset pricing models. The integration of ESG scores was based on "A five-factor asset pricing model," published in 2015 by Nobel Prize-winning economists Eugene Fama and Kenneth R. French.

In this context, data from 310 companies operating in China, India, Brazil, Mexico, Indonesia, Russia, and Turkey from developing countries, whose data can be accessed through the Refinitiv Eikon database, were used. In order to compare the analysis results within the scope of developed and developing countries, data from companies operating in developed countries were also used. Therefore, data from 1465 companies operating in Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States were also included in the study. In the study, data from a total of 1765 companies were used, and the analyses were conducted on a country basis. The analyses were conducted using data from 2010 to 2022. The methods in the study were used to include and exclude companies from the study.

The first variable, which is aimed to be integrated into the Fama and French 5-factor model, represents the annual return difference between portfolios consisting of high ESG score companies operating in the country where the analysis is conducted and low ESG score companies. The first variable created only takes into account the annual ESG score performance of the companies. Therefore, it does not contain information about the change between consecutive years.

Therefore, our second ESG variable is created by considering the companies' ESG score growth/downsizing rates specific to the years. Our second ESG variable represents the return difference between the portfolio consisting of companies with high ESG score growth rates and those with low ESG score growth rates according to the years.

Both new variables created with sustainability scores were included in the model separately, and analyses were conducted. In this study, two models for each country were

tested, and 28 different analyses were conducted. Various pre-tests and deviation-from-assumption tests were conducted for each analysis, and appropriate strong-resistant estimators were used.

The analyses conducted for 14 countries show differences in the results of both models. The model results, including the variable created with the companies' sustainability scores, yielded statistically significant results for Turkey, France, Japan, the United Kingdom, and the United States. These significant results regarding the ESG score positively affect returns only in Turkey and the United States.

The model results, including the second ESG variable, which takes into account the growth rate in the companies' ESG scores, were found to be statistically significant in nine countries: China, India, Brazil, Russia, Turkey, Canada, France, the United Kingdom, and the United States. The results of the second variable with a statistically significant effect have a positive effect on returns only in India, Canada, and the United Kingdom. There may be more than one reason for the countries where the variables created with ESG scores are statistically significant but have a negative effect on returns. First of all, it can be thought that the cost-increasing effect of sustainability activities for companies in these countries affects stock performance. However, the low sustainability awareness of investors in the relevant countries may have affected the return advantage of ESG-based portfolios. In addition, the data, analysis format, and analysis results may not have been detailed enough to show this effect.

In conclusion, this study is part of today's increasing awareness of and understanding of sustainability in finance. It is thought that the importance of sustainability will increase in the future. The results of this study are based on a wide data set and time period and use an annual ESG score. In future studies, different results can be obtained by using different data frequencies and time periods from different data sources.

Keywords: *ESG, Sustainable Finance, Asset Pricing Models, Portfolio Performance*

PREFACE

I want to express my gratitude and respect to my esteemed teacher, Prof. Dr. Serkan ÇANKAYA, who has contributed significantly to this thesis study with his supportive personality, experience, guiding attitude, and advice throughout my doctoral education and thesis writing process. I would also like to express my gratitude and respect to Prof. Dr. Elif GÜNEREN GENÇ for her support, especially in the practical parts of the thesis, and to Prof. Dr. Recep BİLDİK, who contributed to the design of my thesis on sustainability with his valuable knowledge and ideas.

I would like to express my deep respect and heartfelt love to my mother and sisters, who have always trusted and supported me under all circumstances from the first day I started my education until the day I defended my doctoral thesis. Finally, I would like to thank the KAYA family and Serkan KAYA for teaching me the importance of family and supporting me under all circumstances.

I hope that this doctoral thesis, which I completed under the supervision of Prof. Dr. Serkan ÇANKAYA in the field of sustainable finance, will contribute to the understanding of the importance of sustainability and to future studies.

Oğuz ŞİMŞEK

İstanbul, 18 Şubat 2025

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ABBREVIATIONS

APT	: Arbitrage Pricing Model
CAPM	: Capital Asset Pricing Model
CBD	: Convention on Biological Diversity
COP	: Conference on Parties
CRSP	: The Center for Research in Security Prices
CSR	: Corporate Social Responsibility
CO_2	: Carbon Dioxide
ENV	: Environment
ESG	: Environmental, Social and Governance
GHG	: Greenhouse Gas
GOV	: Governance
IEA	: International Energy Agency
IRRC	: Investor Responsibility Research Center
MDGs	: Millenium Development Goals
MSCI	: Morgan Stanley Capital International
Mt	: Mega tons
NDCs	: National Contribution Declarations
SDGs	: Sustainable Development Goals
SOC	: Social
SRI	: Sustainable Responsible Investment
TURKSTAT	: Türkiye Statistical Institute
UK	: United Kingdom
UN	: United Nations
UNEP	: United Nations Environment Programme
UNFCCC	: UN Framework Convention on Climate Change
UNCDD	: Convention to Combat Desertification
US	:United States
VIF	:Variance Inflation Factor
WCED	:World Commission on Environment and Development
WWF	:World Wide Fund For Nature

INTRODUCTION

"Sustainability," which has gone from a marginal topic to a mainstream one in the last few decades, derives from the Latin word 'sustinēre'. This word combines the words "sub" (from the bottom up) and "tenēre" (to hold) and carries the main meanings of "to protect," "to support," and "to sustain."

Although many studies on sustainability assume that this concept first emerged in "The Brundtland Report: Our Common Future" published in 1987, the origins of this concept date back to the late seventeenth century. The concept of sustainability was first used in 1713 by German forester Hans Carl von Carlowitz (1645-1714) in his work "Sylvicultura oeconomica, oder haußwirthliche Nachricht und Naturmäßige Anweisung zur wilden Baum-Zucht".

At a time when silver, copper, tin, and cobalt dominated the local economy, Carlowitz turned to the study of forests when he realized that local industry needed a large and continuous supply of timber. However, he recognized the clear links between the economy and local natural resources, and that an industry could collapse if the authorities did not address and reverse the deforestation trend. In this context, Carlowitz coined the term sustainability (Nachhaktigkeit) to describe the practice of continuously harvesting wood from the same forest and was the first known thinker of the philosophy of sustainability. Carlowitz sketched the entire structure of the modern sustainability discourse with his thinking and work, encompassing environmental, social, and economic impacts.

However, although the idea of sustainability has been put forward, it has never fully gained the importance it needed due to the effects of the Industrial Revolution (1760-1840), the American Revolution (1775-1783), and the French Revolution (1789-1799) in the eighteenth century, as well as the wars in the nineteenth and twentieth centuries. With the need for unlimited resources brought about by dramatic developments around the world, economic models all over the world were developed in a period when environmental concerns were not included, natural resources were abundant, and carbon emissions were limited. (Schoenmaker, D., & Schramade, W. (2018). Principles of

sustainable finance. Oxford University Press.) In short, due to revolutions, wars, and various events, sustainability has never been among people's priorities.

The unlimited use of resources caused severe changes in people's lifestyles, which changed with the Industrial Revolution. With industrialization, population growth in cities accelerated, and carbon emissions increased. Industrialization and the realization of the damage done to nature in the so-called ever-developing world were only understood thanks to dire warnings. Today, the extent of climate change is not a cause but a consequence. The fact that people have consumed air, water, and soil with the industrial revolution only because of the economic development perspective stands as the biggest problem that todays and future generations need to solve.

Global warming and its effects disrupt the entire balance, affecting all financial systems. The simplest example of climate change is the disruption of agricultural activities, the inability to meet the demand for agricultural products in cities, and the disruption of the supply-demand balance. Over time, this situation causes various inequalities between people and societies.

When we consider the developments within the scope of sustainability, the United Nations Conference on the Human Environment was held in Stockholm between June 5 and 16, 1972. This conference is of great importance as it was the first major international meeting to address environmental issues with a global agenda. With this meeting, the foundations of international cooperation between environmental protection and sustainable development were laid.

By the mid-20th century, environmental problems arising from the rapid consumption of natural resources due to industrialization and urbanization had attracted society's attention. Here, with the Stockholm Conference, the understanding that these problems should be addressed globally was organized. The conference primarily aimed at three main issues. Firstly, it aimed to emphasize the effects of environmental problems on human life and to ensure international cooperation on environmental management and protection. Secondly, to promote the balance between development and environmental protection at the global level, and finally, to develop sustainable policies considering developing countries' development needs (United Nations, 1972; Sohn, L.B., 1973).

The conference resulted in the Stockholm Declaration, a 26-article document that sets out the responsibilities of states in environmental protection. It was stated that people have the right to live in a healthy environment, but this right should be ensured in line with the principles of sustainable development. In addition, the United Nations Environment Program (UNEP), one of the most concrete outcomes of the conference, was established to monitor environmental problems and develop solutions. With the Stockholm Conference in 1972, the awareness of sustainability began to emerge, especially in developed countries, but it remained an afterthought in developing countries.

Ongoing developments in the 1970s and 1980s, as global environmental problems, economic crises, and inequalities increased, the relationship between environment and development needed to be addressed. In this context, in order to popularize the concept of sustainable development at the international level, the World Commission on Environment and Development (WCED) published "Our Common Future" more commonly known as the "Brundtland Report" in 1987. The primary purpose of this report was to balance environmental protection and economic development and to emphasize joint action to protect the development rights of developing countries and to prevent environmental problems. The first definition of sustainable development, which is frequently used today, was stated in the Brundtland Report as "Sustainable development is a form of development that meets the needs of the present without jeopardizing the ability of future generations to meet their own needs" (WCED, 1987).

Among the main issues emphasized and recommended in the Brundtland Report, it is stated that for development to be sustainable, economic growth should be achieved by protecting natural resources. This growth should be achieved through global cooperation and solidarity between developed and developing countries. In order to advance all these processes, sustainable use of natural resources has been proposed by promoting renewable energy sources in the use of energy and resources. In addition, in the Brundtland Report, where it is emphasized that poverty or income inequality prevents sustainable development, it is clearly stated that social justice should be ensured in eliminating environmental problems. Finally, the report emphasized ozone depletion, global warming and food security and stated that measures should be taken to address these issues (World Commission on Environment and Development [WCED], 1987).

At this time, regarding global warming, rich countries, which are responsible for most of the greenhouse gas emissions, started to focus their attention on climate change, which was considered to be sufficient. Greenhouse gases were known to cause temperature rises, but it was assumed that they could be seen as periodic changes. After the mid-18th century, when plants and other things absorbed the same amount of carbon as carbon dioxide emitted and the earth's carbon balance was in equilibrium, the effects of climate change were clearly understood in the late 20th century.

Another historical development considered an important sustainability milestone is the United Nations Conference on Environment and Development, known as the Rio Conference or Earth Summit, held in Rio de Jenario, Brazil, between June 3-14, 1992. This conference is the cornerstone of today's environment and development policies. Organized on the occasion of the 20th anniversary of the first Conference on Human and the Environment held in Stockholm, Sweden, in 1972, this global conference was attended by political leaders, scientists, and non-governmental organizations from 179 countries and focused on the impact of socio-economic activities on the environment (United Nations, 1992).

The Rio Declaration emphasized the principle of "common but differentiated responsibilities" in this meeting, which aimed to achieve consensus between developed and developing countries on development and environmental protection issues. It was accepted that although global problems concern all countries, developed countries bear a greater responsibility due to their intensive industrialization activities in the past. In addition, this declaration, consisting of 27 principles, determined the rights and responsibilities of states in relation to environment and development. One of the most important outcomes of the Rio conference was "Agenda 21", a bold program of action calling for new strategies to invest in the future to achieve overall sustainable development in the 21st century (United Nations, 1992). Agenda 21 addressed important issues such as water resource conservation, poverty alleviation, sustainable consumption, and forest management and emphasized the important role of local governments in implementing these plans.

Various conventions, such as the Framework Convention on Climate Change (UNFCCC), the Convention on Biological Diversity (CBD), and the Convention to

Combat Desertification (UNCCD), were also signed at the Rio Conference. The Framework Convention on Climate Change, which aims to combat global warming and climate change, laid the foundation for subsequent agreements such as the Paris Climate Agreement (2015). The Convention on Biological Diversity aims at the conservation and sustainable use of biological diversity and the equitable sharing of the benefits derived from genetic resources. The Convention to Combat Desertification, which aims to combat drought and desertification, promotes sustainability, especially in arid regions such as Africa.

With the Rio Conference or Earth Summit, developing countries expressed concern that environmental policies might hamper their development priorities while developing countries demanded greater environmental responsibility. The conference strengthened global cooperation on environment and development and made sustainable development a central international policy agenda. Another negative point about the conference was that the implementation of the targeted policies was weakened by the lack of financial support, especially for developing countries, and the non-binding nature of most of the targets.

Despite the criticisms and difficulties associated with the conference, the Rio Conference is important both in terms of the inclusion of civil society organizations and the private sector in sustainable development processes and in terms of forming the basis for international agreements developed in the following years in areas such as climate change, biodiversity, and desertification. In 1997, 5 years after the 1992 Rio Conference, the United Nations General Assembly decided to convene a special session to discuss progress. At the 19th Special Session of the General Assembly, also known as “Rio+5”, the countries that took on the challenge of achieving the goals of Agenda 21 reviewed the progress made.

With the developments and international conferences, it has become clear over time that sustainability is not only an environmental issue but also a life system. The planet and societies cannot prosper unless environmental, social, and regional problems are addressed as a whole.

The year 2000 was a symbolic event, celebrated as the beginning of a new millennium, and provided an opportunity for the United Nations to present a new

understanding of development in line with the changing realities and needs of the new century world. The Millennium Summit, which took place in New York from September 6-8, was the most comprehensive meeting of heads of state and government of all time. It ended with 189 member states adopting the Millennium Declaration, which included eight Millennium Development Goals (MDGs). The Millennium Development Goals included eradicating extreme poverty and hunger, achieving gender equality and empowering women.

They also identified key issues such as reducing child mortality, improving maternal health, and achieving universal primary education. Finally, development goals such as combating HIV/AIDS, malaria, and other diseases, ensuring environmental sustainability, and developing global partnerships were established. The Millennium Declaration and the Millennium Development Goals, which set out a universal framework for development, were adopted by governments at the UN Millennium Summit in 2000 and targeted in 2015 and are recognized as a tool that enables developing countries to cooperate with developed countries for our common future. The "World Summit on Sustainable Development" was held in Johannesburg between August 26 and September 4 in 2002 to follow up on the outcomes of the Rio Conference and to harmonize the efforts of countries and relevant stakeholders to achieve the Millennium Development Goals.

In 2005, the World Summit held on 14–16 September brought together more than 70 heads of state and government, and world leaders agreed to intervene on various fronts to address major global challenges. Governments made strong commitments to achieve the development goals in the Millennium Declaration and pledged an additional $50 billion annually to combat poverty. Governments also pledged their commitment to finding innovative sources of development finance, taking additional measures to ensure long-term debt sustainability and liberalizing trade.

As a continuation of these efforts, 20 years after the 1992 Rio conference, the UN Conference on Sustainable Development (Rio+20) was held in Rio de Janeiro from 20–22 June 2012. One of the main objectives of this Rio conference was to strengthen policies for sustainable development and poverty eradication, which had been on the agenda of previous summits and conferences, to assess the implementation of Agenda 21, and to outline a roadmap for the future. Secondly, it aimed to promote a green economy, ensure

the balance between the environment and economic growth and lay the foundations for Sustainable Development Goals (SDGs).

As a result of Rio+20, held between June 20-22, international commitments towards sustainable development were reaffirmed with the declaration titled "The Future We Want." In the declaration, a process was officially initiated to establish sustainable development goals (SDGs), and it was stated that the elimination of poverty and a green economy were the main priorities. In addition, more effective participation of civil society, the private sector, and all other stakeholders in sustainable development processes was encouraged and supported. Rio+20 is a turning point in terms of strengthening global cooperation, encouraging green economy practices, and developing the institutional infrastructure of sustainable development processes.

On September 25-27, 2015, the United Nations Sustainable Development Summit was held in New York and aimed to determine the sustainable development goals of world leaders. At this summit, the Sustainable Development Goals (SDGs), which include sustainable development goals until 2030, were accepted. Unlike previous United Nations meetings, the United Nations Sustainable Development Summit addressed the global sustainable development framework more inclusive, long-term, and comprehensively. The new plan, titled 2030 Agenda for Sustainable Development by 2030: Transforming Our World, includes a declaration, 17 sustainable development goals and 169 targets. The 17 sustainable development goals adopted at the summit provide an important framework for measuring and comparing countries' progress in sustainability. The Sustainable Development Goals represent a multi-dimensional development vision that addresses social equality, environmental protection, and economic growth together.

The most important features distinguishing the 2015 United Nations Sustainable Development Summit from previous meetings begin with transitioning from the Millennium Development Goals to the Sustainable Development Goals. The Millennium Development Goals, determined in 2000, focus on fundamental issues such as poverty, education, health, and gender equality and aim mainly at developing countries. The goals determined in 2015 have created a more comprehensive structure than the Millennium Development Goals. The universal Sustainable Development Goals, which cover both developing and developed countries, address sustainability issues with a broader

perspective. Each of the 17 goals, which address social, economic, and environmental dimensions with a much broader scope, has been detailed and made more concrete with 169 sub-goals.

Compared to previous conferences and summits organized by the United Nations, monitoring and reporting processes have been made more systematic since 2015, and countries have been asked to regularly create and submit progress reports and explain how they have taken steps towards the goals. In addition to governments, the private sector, civil society organizations, local governments, and individuals were also encouraged to participate in the process, emphasizing the importance and necessity of the contribution of the entire society. The Sustainable Development Goals, which will continue until 2030, cover a 15-year period starting from 2015 and have been presented with a long-term vision.

Approximately two months after the United Nations Sustainable Development Summit, the Paris Agreement was signed at the 2015 Paris Climate Change Conference (COP21) and ratified by 187 parties. The Paris Agreement was established with the participation of more than 195 countries to limit the negative effects of climate change and control the increase in global temperatures.

The Paris Climate Agreement's primary goals include keeping the global temperature increase below 2°C and, if possible, limiting it to 1.5°C. Scientists and the World Meteorological Organization see 1.5°C as a limit and state that if this limit is exceeded, the effects of climate change will become much more dangerous. In addition, the Paris Agreement includes the goals of adapting to climate change and creating resilient societies. According to the agreement, it is envisaged that developed countries will provide financial support to developing countries in the fight against climate change. This support will be used to reduce greenhouse gas emissions and finance climate change adaptation projects. Today, the amount of greenhouse gases that the world releases into the atmosphere in general every year is 51 billion tons, and it probably decreased by around 5% in 2020 due to the significant slowdown of economies by COVID-19 (Gates, B., 2021:12; Eryar Ünlü, 2022:39). Although it is planned to be increased after 2025, it is aimed for developed countries to provide 100 billion dollars of climate finance annually by 2020.

The Implementation Principles of the Paris Agreement are established with four different mechanisms: National Contribution Declarations (NDCs), Transparency and Accountability, Loss and Damage Mechanism, and Market and Non-Market. According to the agreement, each country is required to submit National Contribution Declarations (NDCs) that include its own targets against climate change according to climate conditions and economic situation. These Declarations, which include a commitment to reduce greenhouse gas emissions, are reviewed every five years and, if necessary, more ambitious targets are determined. In this context, countries follow various strategies such as emission reduction, energy efficiency, and turning to renewable energy.

The loss and damage mechanism, which was developed especially for developing countries most affected by climate change, aims to provide support against the damages caused by climate change. This mechanism, established by the Paris Agreement, aims to increase solidarity between countries and the responsibility of developed countries on developing countries. The Paris Agreement also includes economic mechanisms that encourage emission reduction. The agreement also allows for market mechanisms that include carbon markets and emissions trading. With this, countries can obtain carbon credits through efficient projects that reduce carbon emissions or trade between countries that reduce carbon emissions. Each country can act according to its capacity for the agreement's applicability, but countries are expected to fulfill their commitments.

Despite providing a historical consensus, the Paris Agreement also includes some difficulties and criticisms. The lack of legal bindings for countries to fulfill their commitments may lead some countries to fall short in climate action. Since the commitments are based voluntarily, they may not be determined or ambitious enough. In addition, the financial support that developed countries will provide will not be sufficient, and poor countries may experience financial difficulties in adapting to climate change and reducing emissions. Finally, it is suggested that National Contribution Declarations may be insufficient in limiting climate change, and it seems difficult to limit the temperature increase to 1.5°C or 2°C. Despite some of its shortcomings, the Paris Agreement is an important turning point in the global fight against climate change and provides a superstructure that ensures that each country takes responsibility for combating climate change within its own borders. As a structure that encourages climate action in

solving the climate crisis, the Paris Agreement is considered a critical step toward achieving a sustainable future.

1. SUSTAINABLE FINANCE and ESG PRACTICES

Sustainability in finance involves direct and indirect methods by various stakeholders such as governments, companies, and investors to shape their financial decisions and actions in line with the Sustainable Development Goals determined at the United Nations Sustainable Development Summit in 2015. In this context, the first step is to support and encourage the creation of sustainability indices and the establishment of sustainability funds by governments and their various institutions. In addition, financial auditing and regulatory authorities also report sustainability through credit rating companies and include it in credit ratings. In this context, as of 2022, there are approximately $30 trillion in investments within the financial ecosystem within the scope of Sustainable Responsible Investments (SRI). (Global Sustainable Investment Alliance, 2022). Investments are expected to reach approximately $40-50 trillion by 2025.

It is crucial to raise investors' awareness, whether they are corporate or individual, about sustainability. Ensuring that investors consider sustainability in their investment decision processes is of great importance in line with the Sustainable Development Goals (SDGs). For this purpose, ESG Scores have been developed so that investors can measure sustainability in their investment decisions. ESG is an acronym developed in a report prepared by 20 financial institutions in 2004 in response to the call of United Nations Secretary-General Kofi Annan and refers to how companies and investors integrate environmental, social, and governance concerns into their business models. The difference between the ESG concept and the Corporate Social Responsibility concept is that while Corporate Social Responsibility refers to companies' efforts to be more socially responsible and better corporate citizens, the concept of ESG directly includes governance (Gillan et al., 2021:2).

ESG scores of companies are measured and published by independent data providers, rating agencies, and financial analysis firms. Examples include organizations such as MSCI (Morgan Stanley Capital International) ESG Research, Sustainalytics, FTSE Russell, Refinitiv Eikon and Bloomberg. When determining ESG scores, performance in three main areas is taken into account: environmental, social, and

governance. ESG scores are created using data collected from publicly available data of companies, voluntary disclosures made to companies such as Bloomberg and Reuters, non-governmental organizations, stock market movements, news sources, and corporate social responsibility reports. ESG scores and their sub-divisions (Environment, Social, Governance) each take a value between 0-100.

1.1. Theoretical Perspective of ESG Performance

ESG (Environmental, Social, and Governance) scores of businesses are recognized as an outcome of their sustainability efforts. Although corporate social responsibility and sustainability activities entered literature in the 1980s, research related to ESG scores began to emerge in the 2000s. With the growing awareness of sustainability, businesses' ESG performance has gained significance and is currently being analyzed by investors, researchers, and academics.

The activities concerning and affecting businesses have predominantly originated from financial operations. However, sustainability represents non-financial activities that influence businesses. The rapid rise in the importance of these non-financial activities in a short period highlights their critical role in maintaining relevance in the future. Nonetheless, incorporating ESG performance into business literature from a theoretical perspective has been a gradual process.

Over time, several significant theories have been proposed in the field of business management. Environmental and social factors often drive the emergence and evolution of these theories. Fundamentally, each theory identifies, addresses, and proposes solutions to a problematic issue. Furthermore, foundational theories provide insights for other societal stakeholders while simultaneously fostering criticisms by approaching the problem from different perspectives. In this regard, theories such as shareholder theory, stakeholder theory, agency theory, resource dependence theory, and legitimacy theory are noteworthy examples within the domain of business management.

These evolving theories may also stem from human-driven factors. Due to the dynamic nature of the human element in business management, ethical issues have been brought to the forefront. For instance, agency theory addresses problems arising from the principal-agent relationship in business management and proposes solutions to mitigate

them. Similarly, resource dependence theory emphasizes the significance of external factors affecting businesses and explores related control and strategy issues. In this thesis, businesses' sustainability and ESG performance are grounded in shareholder, stakeholder, legitimacy, and value creation theories. These theories aim to explain the integration of ESG performance, its interconnections, and its alignment with the fundamental goal of long-term value creation.

1.1.1. Shareholder Theory

Shareholder Theory, which is based on the idea that the primary objective of a firm is to maximize shareholder value, was introduced by Nobel Prize-winning economist Milton Friedman. The origins of this theory trace back to Friedman's 1970 publication, *Capitalism and Freedom*, in which he argued that a firm's sole social responsibility, under specific conditions, is to maximize profitability.

The perspective of this theory offers an economic and philosophical framework that emphasizes a company's primary duty to its shareholders, focusing on profit maximization on their behalf (Clarke & Friedman). This theory asserts that social responsibility initiatives are the individual responsibility of shareholders rather than the company itself. As such, it has become one of the foundational principles of corporate philosophy and has maintained its influence over the years. Consequently, a firm operating under shareholder theory typically seeks to increase profitability and enhance return on investment. This approach can ultimately yield benefits such as higher returns and financial stability for shareholders.

However, significant differences exist between the corporate social responsibility (CSR) activities of the time when this theory was proposed and those of today. During the period in which the theory emerged, the belief that businesses were not responsible for certain social activities, which were relatively less complex compared to today, was understandable. Since the 1970s, particularly after the 2008 financial crisis, perceptions have shifted. The collapse of the U.S. real estate market, which lacked ethical and risk awareness, exposed the dangers of unchecked profit-seeking behavior (Özelli, 2021).

The criteria for evaluating businesses have evolved over time. The profit-oriented perspective of the 1970s has transformed due to environmental and social developments. CSR activities have expanded over time to encompass environmental, social, and

governance issues. In contrast to the past and to shareholder theory, today, businesses' involvement in CSR activities is regarded not as an option but as an obligation.

Nonetheless, shareholder theory posits that initiatives like ESG activities could impose financial burdens that might jeopardize the business and decrease its market value (María Miralles-Quirós et al., 2018). In this context, studies examining the relationship between corporate sustainability and financial performance and reporting adverse outcomes support shareholder theory.

At the same time, shareholder theory plays an essential role in aligning the interests of company management with those of shareholders. Managers more incentivized to increase firm value tend to make decisions that align more closely with shareholder interests. However, it has been observed that in some businesses conducting various CSR activities, managers may make decisions that do not align with shareholder interests. The potential misuse of CSR activities by managers for their own benefit is a critical issue. In this regard, the concept of greenwashing, where businesses merely appear to engage in CSR activities, has emerged.

In conclusion, the evaluation of businesses' performance today is no longer limited to simple, one-dimensional financial perspectives such as profit. Instead, their relationship with the environment, sensitivity to social issues, and intentions to conserve natural resources hold significant importance. Furthermore, businesses are expected to stand out by engaging in activities that align with the social structure of the communities in which they operate. Companies that sincerely embrace and adapt to societal sensitivities are more readily accepted. From a management perspective, the relationships businesses establish with their employees, the rights they provide, and their adherence to justice are aspects closely monitored by the investment world.

This study aims to determine whether the inclusion of a new factor derived from ESG scores in asset pricing models impacts returns. Additionally, it seeks to identify whether ESG activities support shareholder theory or generate positive returns for shareholders.

1.1.2. Stakeholder Theory

Stakeholder Theory, whose introduction to literature dates back to the early 20th century, was initially used to define four groups in businesses: shareholders, employees, customers, and the public (Dodd, 1932:1145-63). The term "stakeholder" was first formally defined in 1963 by the Stanford Research Institute as "groups without whose support the organization would cease to exist." Over time, this concept has been interpreted in different ways, but at its core, the term "stakeholder" is fundamentally concerned with the idea of "sustainability." It suggests that organizations cannot survive without the support of essential groups. While no universal definition of the concept exists, researchers and scholars have provided various definitions and examined it through different approaches. Some of these approaches emphasize the interests and rights of stakeholders, while others focus on the mutual relationships and interactions between stakeholders and organizations.

Despite differing perspectives, Freeman's (1984) book *Strategic Management: A Stakeholder Approach* is regarded as a cornerstone in stakeholder theory literature. Freeman defined stakeholders as individuals or groups who can affect or be affected by the achievement of an organization's objectives. Over time, the term "stakeholder," initially used to define a specific group, has evolved into a broader management concept.

Freeman, who believed that businesses must integrate their social responsibilities with their operations to ensure long-term sustainability, introduced stakeholder theory as a critique of shareholder theory. In contrast to shareholder theory, which posits that the sole purpose of a company's operations is to generate profits for shareholders, stakeholder theory argues that companies must also address the interests of employees, customers, suppliers, and society at large (Freeman, 1984). Freeman further asserted that what makes capitalism work is the ability of shareholders, financiers, customers, employees, and communities to accomplish together what no one could achieve alone. He warned that focusing solely on shareholders' interests' risks losing what makes capitalism effective (Freeman, 1984:128). Moreover, Freeman emphasized that businesses neglecting societal concerns and issues such as stakeholder and consumer trust are bound to experience decline in the short term, and that meeting stakeholders' expectations ultimately serves the interests of the business (Freeman, 1984:176).

The essence of stakeholder theory lies in the assertion that businesses are responsible not only to shareholders but also to a broader range of stakeholders, including customers, suppliers, employees, the environment, governments, and society, all of whom must derive value from the business (Jensen, 2010). Unlike shareholder-centered theories, stakeholder theory advocates for business management that prioritizes the interests of all stakeholders, not just shareholders (Donaldson & Preston, 1995).

Today, stakeholder theory explains the operational dynamics of the business world and how they should function while highlighting the importance of all stakeholders and how they should be addressed. Stakeholders are divided into two categories: primary and secondary stakeholders. Primary stakeholders include employees, shareholders, customers, suppliers, and creditors, whose relationships with the business are contractually defined. Secondary stakeholders, on the other hand, include groups indirectly affected by business operations, such as society, governments, regulators, the media, and special interest groups (Vracheva & Mason, 2015).

While stakeholder theory is widely accepted and supported, studies critiquing it have reported that corporate social responsibility (CSR) activities can have negative impacts on business performance. However, financial crises, environmental disasters, and global pandemics have underscored the importance of stakeholder management. During the 2007–2009 financial crisis, diverse stakeholders such as investors, employees, and debtors were deeply affected. Institutions like banks, driven by short-term profit maximization rather than the long-term well-being of stakeholders, caused significant harm to stakeholders (Fassin & Gosselin, 2011). Reports have also criticized credit rating agencies for failing to adopt a more comprehensive sense of responsibility, contributing to the Great Recession by disregarding stakeholder interests (Federal Reserve History, 2013). Similarly, during the COVID-19 pandemic, businesses with positive relationships with their employees were less adversely affected by changing work conditions. Employee well-being, as stakeholders, has been shown to enhance business efficiency. Furthermore, growing environmental awareness and developments related to climate change have compelled businesses to operate in ways that align with societal sensitivities, making concepts like environmental and social performance increasingly significant (Kealy, 2020).

At the United Nations Conference, the increasing stakeholder pressure was highlighted by emphasizing the limited supply of resources and their unsustainable use, as pointed out by the World Wide Fund for Nature (WWF, 1980) and Sachs (2015). The Brundtland Report also addressed the environmental threats posed by resource scarcity, underscoring the importance of natural resource conservation and global sustainability (World Commission on Environment and Development, 1987).

As a result of these developments, alongside United Nations conferences, published reports, and growing academic interest, attention to environmental, social, and governance (ESG) issues has increased. With the growing significance of corporate sustainability, publishing financial results alone is no longer sufficient for businesses (Black, 2021). Sustainability, initially considered in environmental terms, has evolved over time into an inclusive approach that connects environmental, social, and financial objectives. Researchers seeking to understand better the relationships among these outcomes have adopted stakeholder theory as a foundational framework (Paul, 2015). This is because stakeholder theory recognizes not only financial outcomes but also non-financial CSR activities as value-enhancing for stakeholders (Rezaee, 2016).

What began as environmentally focused sustainability efforts has expanded to encompass CSR activities. Over the years, the evolution of CSR activities has led to the emergence of the ESG concept. In this context, stakeholder theory asserts that businesses must adopt a more inclusive approach to manage various risk factors related to environmental, social, and governance issues while considering the sensitivities, expectations, and interests of all stakeholders affected by their activities (Carroll & Shabana, 2010).

CSR and ESG activities represent the practical application of stakeholder theory, with some studies demonstrating that these activities are fundamentally rooted in stakeholder theory (Okeke-Okiche, 2024; Saini et al., 2023; Tsang et al., 2023). While CSR encompasses nonprofit activities, ethics, and environmental sustainability from a narrower perspective, ESG includes broader criteria to measure businesses' sustainability and their relationship with society (Ikwue et al., 2023).

Thus, the aforementioned practices align with stakeholder theory by recognizing the mutual dependency between businesses and society and striving to create value for all

stakeholders rather than solely for shareholders (Okeke-Okiche, 2024:21). Within the framework of stakeholder theory, prioritizing stakeholders through ESG activities, integrating environmental and social concerns into decision-making processes, and implementing transparency in corporate governance principles ensure long-term trust and success for businesses (Ajayi, 2024:9).

Despite the importance of sustainability for businesses, managers often face challenges in implementing these practices due to their economic implications. Some past studies have shown that sustainability activities result in significant costs. Although integrating sustainability practices into business plans is generally accepted as ensuring long-term prosperity, short-term costs can financially strain businesses. Additionally, sustainability claims may lead to concerns about "greenwashing," where businesses falsely portray themselves as more responsible than they truly are in environmental, social, or governance matters, potentially distancing them from CSR and ESG initiatives (Gatti et al., 2019).

In conclusion, while Friedman's shareholder theory emphasizes maximizing shareholder value as the primary objective, Freeman's stakeholder theory advocates for creating value for all stakeholders through CSR and sustainability (ESG) activities. By examining the relationship between stock prices and data obtained from businesses' sustainability activities, this study will also determine whether these activities align with stakeholder theory.

1.1.3. Legitimacy Theory

Since the 1970s, legitimacy theory, which is fundamentally based on the concept of social contract, has become more prominent in business management literature. The social contract approach posits that individuals form a contract with society, defining their mutual rights and responsibilities, while businesses are responsible for serving society and acting in accordance with societal expectations (Rousseau, 1762). Over the years, corporate legitimacy has been evaluated through practices such as environmental impact, corporate social responsibility (CSR), and ethics. Dowling and Pfeffer (1975), who laid the theoretical foundation of legitimacy theory, defined legitimacy as the congruence between an organization's actions and the social values, norms, and expectations of the society in which it operates. The theory emphasizes that for businesses, legitimacy is

essential to maintaining public support, without which their sustainability is jeopardized. More broadly, legitimacy theory asserts that while pursuing profit, companies also have responsibilities and impacts on the environment and society (Leung, 2023).

The loss of legitimacy is associated with the emergence of legal, economic, and other social sanctions. However, while organizational legitimacy is conceptually defined and widely recognized, empirically determining it remains challenging (Terrebery, 1968:608). Legitimacy theory is critical for businesses as all organizations depend on societal support. Companies that fail to align with societal values and expectations face challenges such as consumer and employee boycotts or regulatory actions. Conversely, businesses integrated with society may gain a competitive edge, attracting more investment and customers due to enhanced trust. This is particularly significant during periods of macroeconomic volatility, as stakeholders, including society, employees, and investors, expect businesses to uphold their legitimacy. Organizations with a strong foundation of legitimacy can preserve their reputation and mitigate financial and other risks during such times.

With the evolution of CSR, business activities concerning environmental, social, and governance issues are increasingly scrutinized and monitored by stakeholders. Adverse developments related to businesses' products or operations can rapidly spread to consumers and stakeholders, often escalating quickly.

As the concept of sustainability gains prominence, businesses' reporting of environmental and social activities is rooted in legitimacy theory. With advancing technology, companies focus on transparency, communication, reform, and stakeholder engagement to preserve legitimacy. Strategies such as public disclosures to build trust, revising unethical practices, aligning operations with societal expectations, and involving stakeholders in decision-making processes strengthen legitimacy.

Today, the growing importance of sustainability and ESG (Environmental, Social, and Governance) concepts offer valuable tools for assessing and understanding corporate legitimacy. ESG scores, calculated as the average of a company's Environmental, Social, and Governance metrics, aim to represent and support corporate legitimacy. Additionally, the Controversy score, developed alongside ESG scores, measures the frequency and

magnitude of negative news and information about a business, providing insights into its societal legitimacy.

From an environmental perspective, examining and reporting businesses' activities under categories such as resource usage, emission levels, and innovation significantly influence their legitimacy among stakeholders. Efforts to reduce environmental harm through innovative solutions, efficient resource use, and compliance with environmental laws and regulations strengthen legitimacy by meeting societal expectations and sensitivities. Furthermore, aligning with governmental environmental policies reinforces businesses' legal legitimacy.

Socially, businesses that prioritize concepts such as employee rights, human rights, community relations, and product responsibility enhance their legitimacy through sustainable and well-intentioned solutions. Failure to meet specific standards related to employee rights, safety, and satisfaction often results in the rapid spread of negative information, amplified in the digital age by social media, which creates significant public pressure and challenges to legitimacy. Moreover, businesses risk legal consequences if operational negligence, such as workplace injuries or fatalities, occurs due to financial priorities or irresponsibility.

In terms of governance, businesses' adherence to corporate governance principles, equitable treatment of stakeholders, and the effectiveness of CSR strategies are key factors in understanding and evaluating their legitimacy. Governance is often assessed based on a company's board of directors' structure, size, and policies. Features such as the number of board members, gender diversity, CEO-chair duality, experience, and independence are frequently examined in research and correlated with financial performance. Consequently, businesses that prioritize transparency and stakeholder communication reinforce their legitimacy.

Businesses regularly share information to re-establish, maintain, and sustain legitimacy (Deegan, 2019). In summary, companies frequently implement CSR activities and sustainability initiatives to enhance their corporate reputation. Integrating ESG activities into annual reports allows stakeholders to better understand business operations, strengthening relationships between businesses and stakeholders. Furthermore,

sustainability reports and disclosures signify businesses' commitment to societal responsibility.

1.1.4. Value Creation Theory

This theory focuses on the strategies and methods businesses use to enhance their value in the context of corporate governance, strategic management, and financial decisions. Fundamentally, the theory asserts that business decisions should aim to increase shareholder value and improve efficiency by effectively utilizing resources. Moreover, within the scope of the theory, it is expected that businesses manage uncertainties and risks through effective risk management and enhance transparency and efficiency through robust corporate governance practices.

The value-driven mindset in finance literature dates back to the 1950s when the notion that the primary objective of businesses is to maximize shareholder wealth gained importance. Furthermore, studies on capital structure emphasized the significance of financial strategies in enhancing corporate value (Modigliani & Miller, 1958). In subsequent years, the Agency Theory was developed to address the conflicts of interest that arose in maximizing shareholder value, leading to the emergence of shareholder-focused and performance-based management models. With advancing technology and globalization, value-enhancement strategies were revisited, and the importance of customer-focused strategies increased.

With the rise of corporate social responsibility (CSR) awareness, non-financial factors have gained importance in evaluating businesses. Relationships with the societies in which businesses operate have become significant from environmental and social perspectives. Additionally, the way businesses are managed, their adherence to corporate governance principles, and their relationships with employees have become evaluation criteria. Consequently, CSR and sustainability initiatives substantially impact enhancing corporate value and achieving a competitive advantage. Therefore, Value creation theory posits that CSR and sustainability activities improve businesses' operational, managerial, market value, and financial performance.

There is significant literature supporting the notion that CSR and sustainability initiatives enhance the value of businesses (Friede et al., 2015; Malik, 2015; Velte, 2017;

Alshehhi et al., 2018; Yoon et al., 2018; Fatemi et al., 2018; Whelan et al., 2021; Naeem et al., 2022). The findings indicate that sustainability initiatives and disclosures positively impact firms' financial performance and market value. In this respect, value creation theory aligns with legitimacy theory. Businesses that strengthen their relationships with society through sustainability activities, demonstrate environmental sensitivity, maintain a commitment to their employees, and adhere to corporate governance principles are more widely accepted by society, which subsequently increases their corporate value. Moreover, increased transparency resulting from sustainability practices and reporting makes businesses' activities and strategies more comprehensible to society, employees, investors, and other stakeholders, thereby positively influencing them financially.

However, some studies suggest CSR and sustainability activities negatively affect the financial performance and market value of businesses (Vance, 1975; Alexander & Buchholz, 1978; Aupperle et al., 1985; Horvathova, 2010; McWilliams & Siegel, 2000; Brammer et al., 2006; Barnett, 2007; Marsat & Williams, 2011; Nollet et al., 2016; Garcia & Orsato, 2020). These findings indicate that sustainability initiatives may adversely impact corporate value or financial performance. The debate over the role of sustainability activities in value creation continues today, as they are often criticized for increasing business costs. This thesis examines the explanatory effect of businesses' sustainability scores on stock prices and determines whether these findings align with the value creation theory.

1.2. Factors Making Sustainability Critical

This section will explain why sustainability, which is based on the philosophy of meeting today's needs without compromising the ability of future generations to meet their own needs, is important and why it should be adopted. In addition, studies conducted by governments and private institutions in developing and developed countries within the scope of sustainability will be discussed. In addition, laws and regulations, programs, and other studies conducted within the scope of sustainable finance will be examined.

1.2.1. Sustainability Related Global Problems

Today, climate change disasters, wars, genocides, corruption, and many other problems are the result of ongoing economic and political systems. Although current

systems have made the planet we live in technological, science has advanced, and the speed of human access to information has increased, human activities are also making the planet uninhabitable. In this context, sustainability offers a new life system and an understanding of a more livable planet in general terms, which does not only include environmental or financial issues.

In this context, the sustainable development program and goals prepared by the United Nations offer a new, sustainable, fair, and clean world order plan. The United Nations Sustainable Development Plan is a moderate program based on realistic foundations and does not promise a world with perfect balance in the future compared to today. In this context, the goals and objectives determined by the United Nations will be discussed.

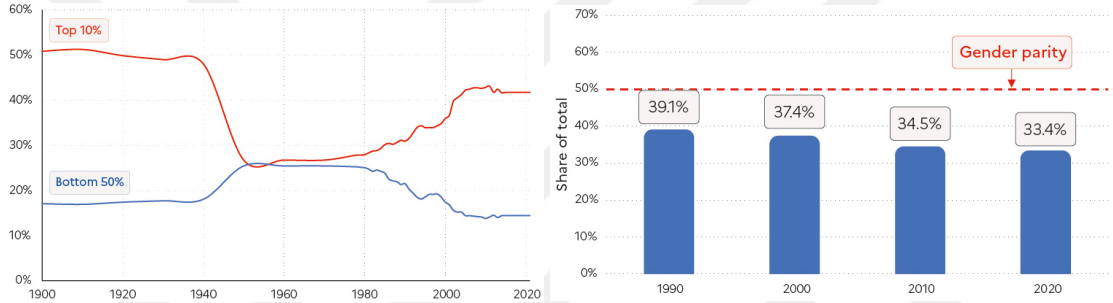
1.2.1.1. Problems Based on Poverty, Health, Education, Equality and Economic Development

The most obvious indicator of inequality is poverty, the first target to be eliminated. According to the United Nations, if trends continue until 2030 due to current economic systems, 575 million people in the world will live in extreme poverty. Poverty, which increases social disruptions, inequalities, and health problems, also prevents economic development with these effects.

Today, the majority of the impoverished population lives in Sub-Saharan Africa and South and East Asia. In order to prevent poverty all over the world, it is vital to create economic opportunities and increase education and health services. In this context, income justice is the basic indicator that determines general justice and poverty. According to United Nations data, if necessary and sufficient inequality measures cannot be taken by 2030, it is predicted that 600 million people will face hunger. The extent of inequalities in education is also dramatic. Due to ongoing economic and political inequalities, according to 2030 estimates, 300 million students will be deprived of basic numerical skills and literacy skills. However, if additional measures are not taken, 84 million children and young people will not have the opportunity to study. Due to the significant development levels between countries, citizens of countries living in poverty and inequality are forced to migrate. This situation is seen as a last resort for people who migrate. It is known that only 7 thousand people died during migration in 2022. It is a

basic human right for every citizen of a country to be able to live in prosperity in the country of their birth and not be forced to migrate. Migration, which is mainly caused by economic reasons, also has serious negative effects on the country of migration because the integration of migrants into society and economy and the provision of health and education services are issues of great importance.

The income distribution information regarding developed and developing countries covered in this thesis is given below for evaluation and comparison. While income information is measured after the operation of retirement and unemployment insurance systems and before income tax, household wealth is the sum of all financial and non-financial assets excluding debts.

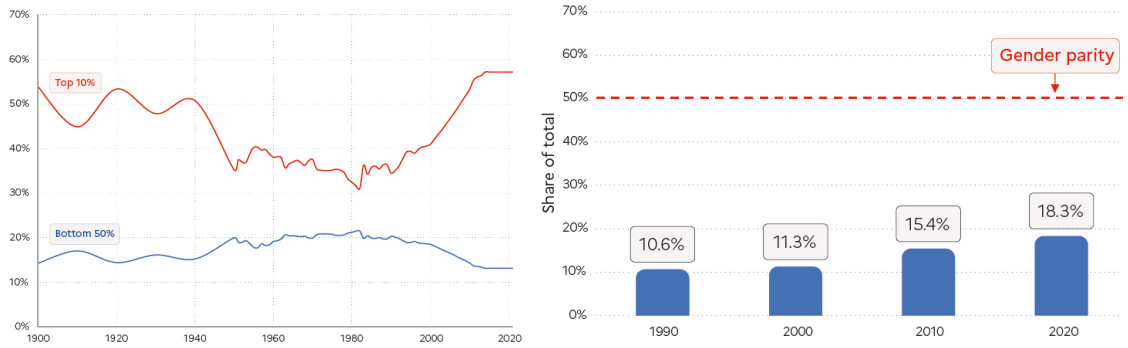


Resource: The World Inequality Report, 2022

Figure 1. Top %10 and Bottom %50 Income Shares & Female Labor Income Share in China

In China, where the average national income of the adult population is approximately 89,000 Yuan, the bottom 50% earn 25,520 Yuan. The top 10%, who earn 14 times more on average (370,210 yuan), account for 42% of the income in 2021. While reforms in the 1980s led to a rapid increase in average incomes and increased inequality until the mid-2000s, investments made after 2005 helped keep inequality under control.

In addition, the top 10% own almost 70% of the total national wealth, and the share of women's income in the labor force was around 33% in 2020. Moreover, around 700 million people share only 15% of the national income when considered together with the population. This is the most important trigger for education, transportation, health, and poverty problems. Wealth inequality in China is higher than in India and comparable to levels of inequality in the United States (71%). Wealth inequality has been increasing since the 1990s. (Chancel, Piketty, Saez, & Zucman, 2022)



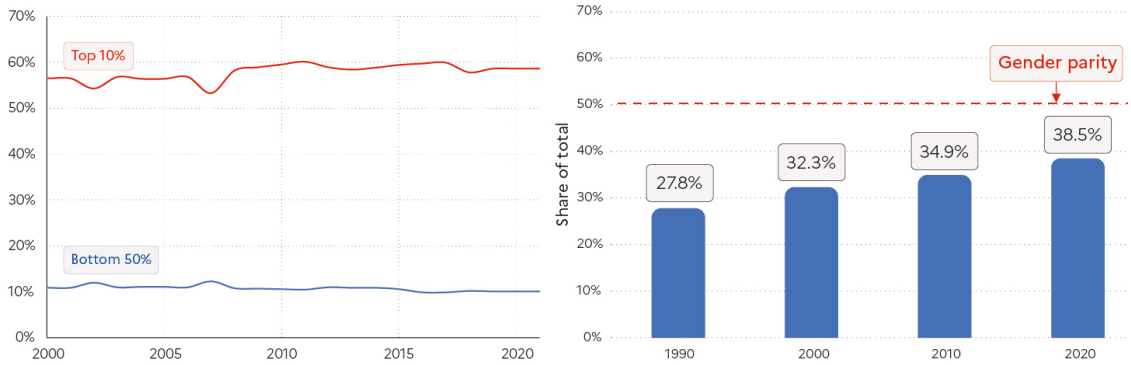
Resource: The World Inequality Report, 2022

Figure 2. Top %10 and Bottom %50 Income Shares & Female Labor Income Share in India

In India, where the average income is 200 thousand rupees, the top 10% earn more than 20 times more than the bottom 50% (54 thousand rupees for the bottom 50% and 1 million 170 thousand rupees for the top 10%).

India, a country with a tiny wealthy elite but a huge poor and unequal segment, has seen very high-income inequality until the 1950s. After independence, the share of the top 10% fell to 35%, and from the 1980s to the present, deregulation and liberalization policies have led to one of the most serious increases in inequality. In India, where the wealthiest 10% owned 65% of total household wealth in 2021, the share of women in labor income is only 18%. Although there is a significant increase compared to 1990, this rate is low (Chancel, Piketty, Saez, & Zucman, 2022).

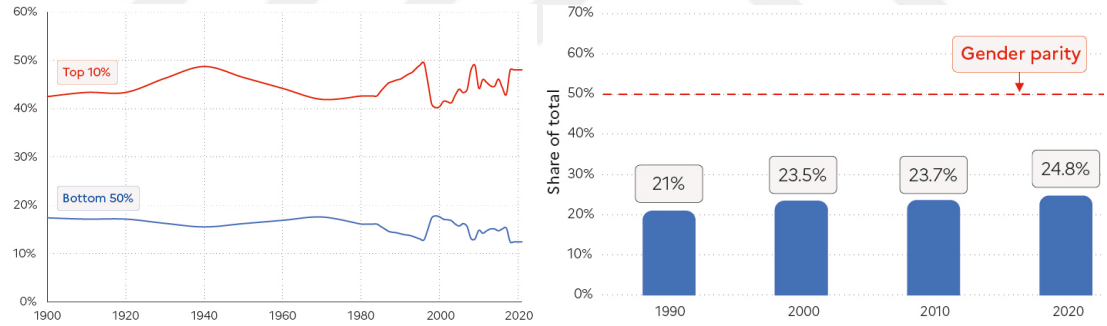
When the data is evaluated with the country's population, approximately 750 million people (half of the population) share only about 15% of the total income. This situation shows how far India, which is a developing country and whose people have the lowest living standards, is from sustainability. In light of the information presented, it is clear that time and effort are needed for all people living in India to have access to opportunities such as equal, quality education and high health standards. Therefore, governments need to revise their economic and political systems in line with the Sustainable Development Goals.



Resource: The World Inequality Report, 2022

Figure 3. Top %10 and Bottom %50 Income Shares & Female Labor Income Share in Brazil

In Brazil, one of the most unequal countries in the world, the top 10% earn about 30 times more than the bottom 50% (average 44 thousand Brazilian Reals, bottom 50% 8800 Reals, top 10% 255 thousand Reals). This data shows that the top 10% share about 60% of the total national income, while the bottom half of the population shares 10%. In addition, the richest 10% own 80% of total household wealth, and women's share of labor income is about 39% (Chancel, Piketty, Saez, & Zucman, 2022).

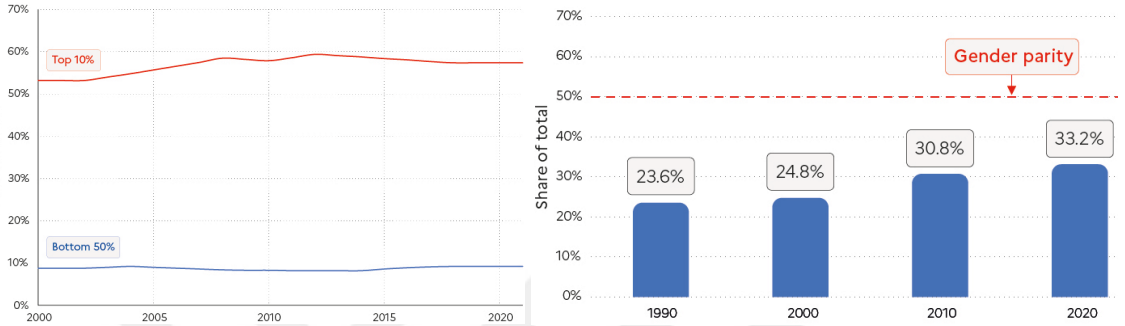


Resource: The World Inequality Report, 2022

Figure 4. Top %10 and Bottom %50 Income Shares & Female Labor Income Share in Indonesia

Indonesia, which has a population of approximately 280 million, also has a very high rate of income inequality. As can be seen from the graph above, 50% of the total population shares only 12% of the total income, while the top 10% receives approximately 50% of the total income. In a country where the average income is 69 million Indonesian Rupiah, there is a 19-fold difference between the top 10% and the bottom 50% (the income for the bottom 50% is 22.5 million Rupiah). In Indonesia, where there are millions of poor people, the share of women in the economy is approximately

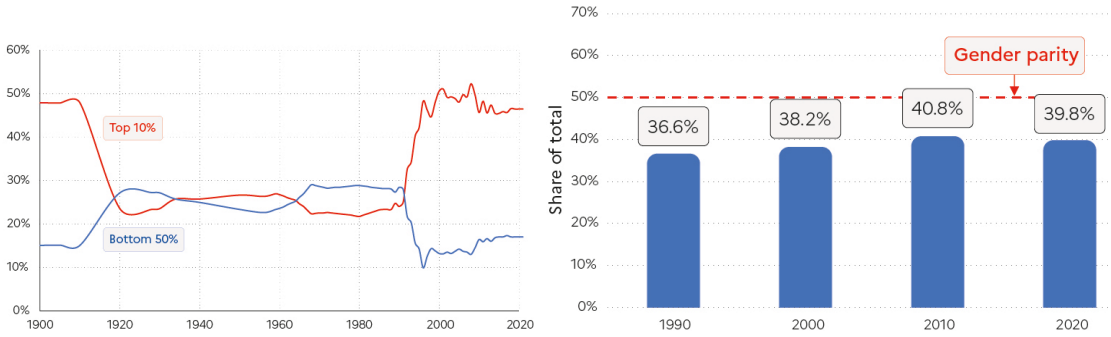
25% (Chancel, Piketty, Saez, & Zucman, 2022). This data provides important clues in diagnosing the problems that must be addressed. Clearly, countries where equal opportunities are not provided among young people and quality education and health services are not widespread will not be able to make a difference in making the world more livable and sustainable. It is important to make an assessment that is in line with the Sustainable Development Goals and to implement realistic policies.



Resource: The World Inequality Report, 2022

Figure 5. Top %10 and Bottom %50 Income Shares & Female Labor Income Share in Mexico

Mexico, with a population of approximately 130 million, is one of the most unequal countries in the world. The average national income is 230,000 Mexican pesos, while the top 10% earn about 1.3 million pesos, while the bottom 50% earn 43,000 pesos, a difference of more than 30 times. In Mexico, where the top 10% of the population receives about 60% of the income, the bottom 50% only shares 10% of the income, the women's share is about 33%. Although women's labor income has increased by 9% since 1990, the poorest half of the population has negative net worth (Chancel, Piketty, Saez, & Zucman, 2022).



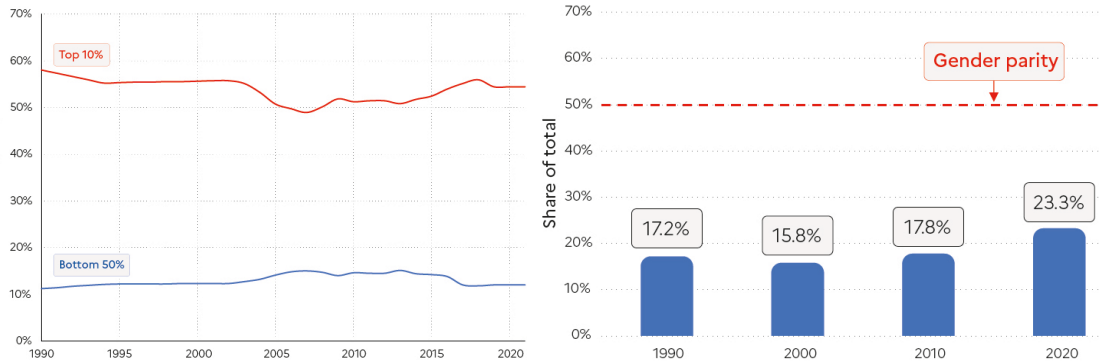
Resource: The World Inequality Report, 2022

Figure 6. Top %10 and Bottom %50 Income Shares & Female Labor Income Share in Russia

In Russia, which has a population of approximately 150 million, the share of women in labor income is equal to 40%, which is well above the world average of 35%. As a historical reflection of the USSR's encouragement of women into the labor market, women in Eastern European countries receive a higher income share than the rest of the world (Chancel, Piketty, Saez, & Zucman, 2022).

In a country where the average national income is 900 thousand rubles, the bottom 50% earn 300 thousand rubles, while the top 10% earn 4 million rubles, which means a difference of approximately 14 times. Our graph of income distribution is quite interesting. This interestingness stems from the effects of the revolution in 1917 and the dissolution of the Soviet Union in 1991. It is understood that inequalities have emerged due to the effects of sudden privatizations and deregulation, especially since the early 2000s (Chancel, Piketty, Saez, & Zucman, 2022).

The Russian invasion of Ukraine, which has continued since 2014 and was declared a "special military operation" by the Russian President in 2022, painfully reveals how far we are from sustainability today. While the damage done to people and nature only enriches companies and people operating in the arms industry, we, as all societies, are losing our future and civilization.



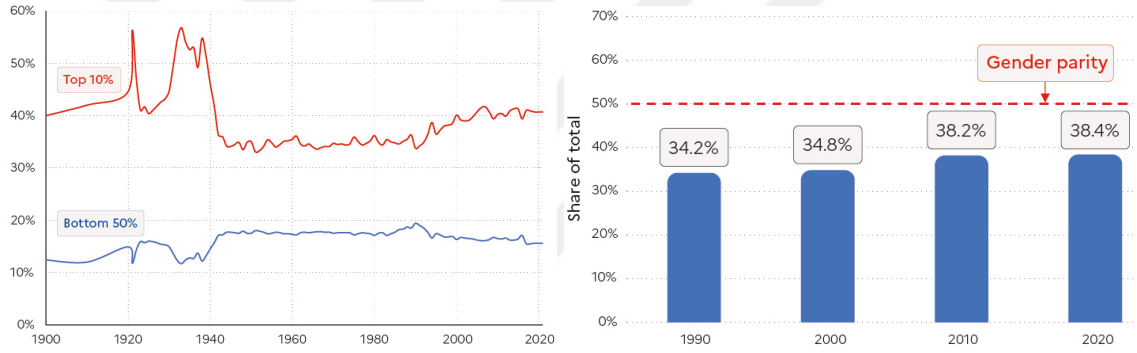
Resource: The World Inequality Report, 2022

Figure 7. Top %10 and Bottom %50 Income Shares & Female Labor Income Share in Türkiye

Approximately 85 million people live in Turkey, where the share of women in total labor income as of 2020 was 23%. This rate for women is higher than the average for MENA countries (15%) but lower than that of neighboring countries, Greece (37%) and Bulgaria (43%).

In Turkey, the top 10% receive approximately 55% of the income, while the bottom 50% receive 12%, which is a difference of approximately 23 times. In Europe, this ratio is around 9 times. In addition, wealth inequality in Turkey appears less equal than in countries with comparable wealth levels. In 2021, the wealthiest 10% of the population owned approximately 70% of total household wealth, while the bottom 50% owned only 5% (Chancel, Piketty, Saez, & Zucman, 2022).

Although these economic data seem to present inequality from a single perspective, they also present inequalities and imbalances in education, health, gender equality, and economic growth. In Turkey, where the majority of the population lives in cities, high inflation in recent years has seriously damaged the social sustainability of society.

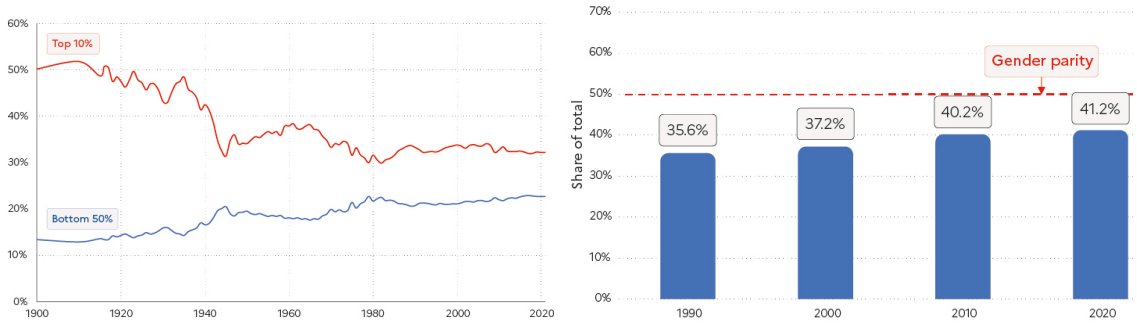


Resource: The World Inequality Report, 2022

Figure 8. Top %10 and Bottom %50 Income Shares & Female Labor Income Share in Canada

In Canada, where approximately 15% of annual income is shared by the top 50% of the population, 40% of income is shared by the top 10%. In a country where the average income is 66 thousand Canadian dollars, the bottom 50% earn approximately 20 thousand Canadian dollars, while the top 10% earn 267 thousand Canadian dollars. Income inequality has increased in Canada for the last 40 years, with a 13-fold difference between the bottom and top groups (Chancel, Piketty, Saez, & Zucman, 2022).

In Canada, with a population of 40 million, the share of women in the labor force is 38%. This rate belongs to Canada, where the share of women in labor income has been growing moderately since 1990. It is similar to the USA and Western Europe and lower than Eastern Europe (41%).

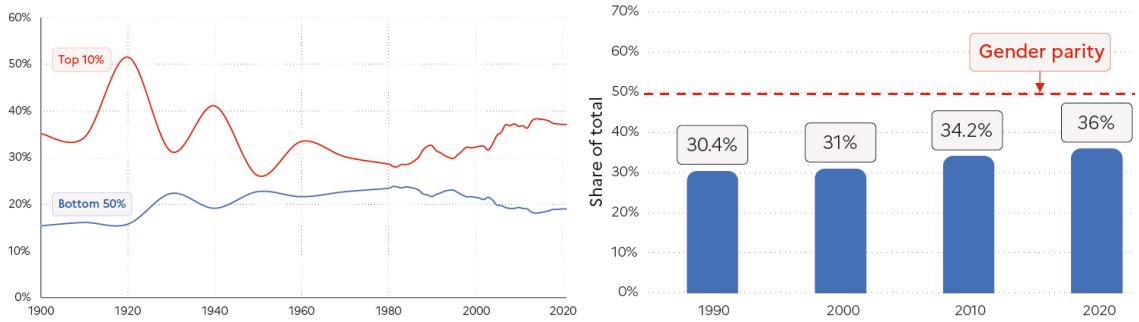


Resource: The World Inequality Report, 2022

Figure 9. Top %10 and Bottom %50 Income Shares & Female Labor Income Share in France

In France, where income inequality has decreased since the early 1900s, as of 2021, the difference between the top 10% and the bottom 50% (17 thousand Euros and 123 thousand Euros) is 7 times. In France, where the average income is 36 thousand Euros, income justice is better than in some European countries, including Germany. The historical flow of income distribution seen in the graph is explained by the effects of the First and Second World Wars, the development of the social state concept, especially after the Second World War, and pro-labor policies.

However, wealth inequalities are much higher in France than income inequalities. In 2020, the wealthiest 10% of the population owned 60% of the total household wealth. While the wealth inequality situation in France is lower than in China and the USA, it is comparable to that in European countries. In addition, the share of women in labor income in France has increased since 1990 and was 41% in 2020. This rate is higher than in many countries, especially the UK and Western Europe (Chancel, Piketty, Saez, & Zucman, 2022).

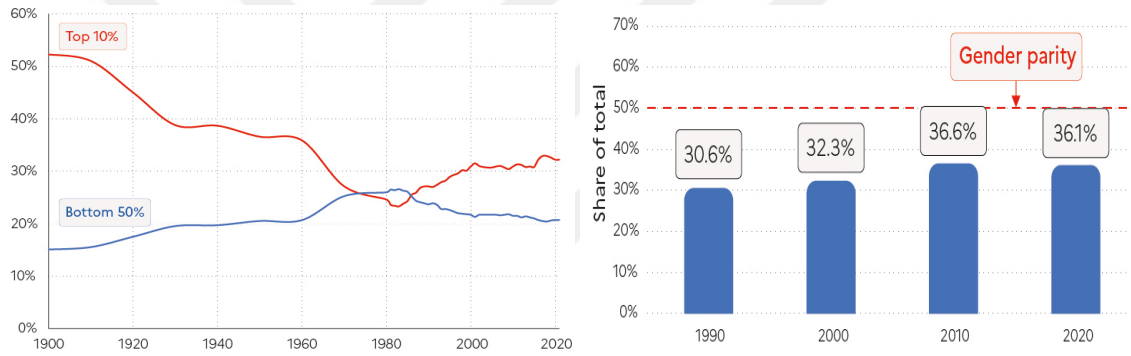


Resource: The World Inequality Report, 2022

Figure 10. Top %10 and Bottom %50 Income Shares & Female Labor Income Share in Germany

In Germany, income inequality decreased significantly between 1920 and 1970 but increased significantly after 1980, partly due to liberalization policies. Today, in Germany, where the average national income of the adult population is 40 thousand Euros, there is a 10-fold difference between the bottom 50% and the top 10% (15 thousand Euros and 148 thousand Euros). This income gap rate for Germany is higher than for France but lower than for the US and China. In addition, in Germany, where the female labor force income rate is 36%, this rate has increased compared to 1990 levels.

In addition, Germany is the country with the highest CO2 emissions in the European Union. In Germany, where the top 10% emit 6 times more than the bottom 50%, the government has committed to reducing emissions by 55% by 2030 compared to 1990 levels (Chancel, Piketty, Saez, & Zucman, 2022).

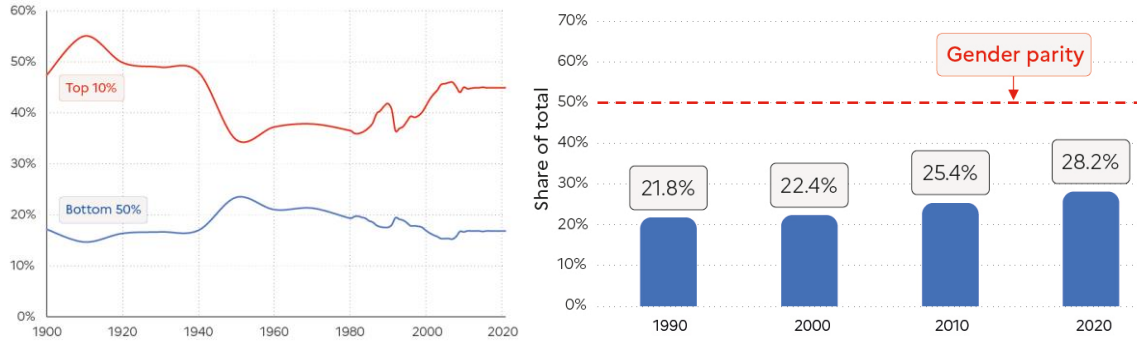


Resource: The World Inequality Report, 2022

Figure 11. Top %10 and Bottom %50 Income Shares & Female Labor Income Share in Italy

With the effective policies developed after World War II, income justice was greatly achieved in Italy between 1965 and 1985. However, after 1985, the income shares of the top 10% increased significantly while the share of the bottom 50% decreased.

In 2020, the average income of the bottom 50% was 12 thousand Euros, while the income of the top 10% was 94 thousand Euros. In Italy, where the top 10% earn 8 times more than the bottom 50%, the average national income is around 27 thousand Euros. As of 2020, the wealthiest 10% of the population shared 32% of the income in Italy, while the poorest 50% shared 22% of the total income. Additionally, the share of women in the labor force has increased compared to the 1990 level and is at 36% in 2020 (Chancel, Piketty, Saez, & Zucman, 2022).

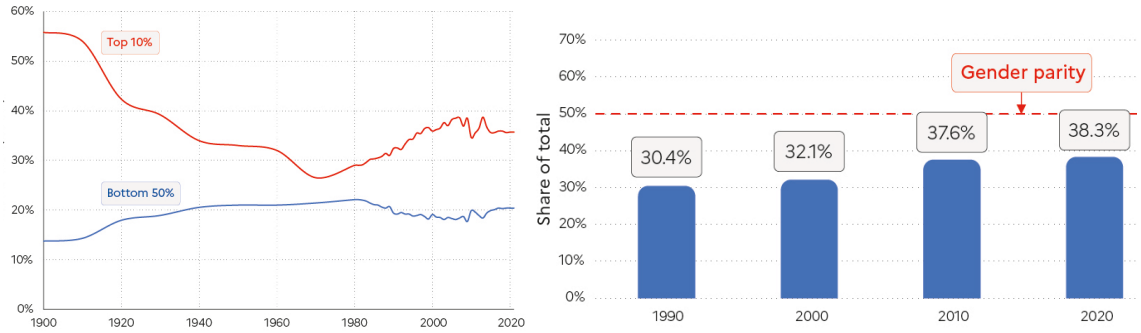


Resource: The World Inequality Report, 2022

Figure 12. Top %10 and Bottom %50 Income Shares & Female Labor Income Share in Japan

Following World War II, with the integration of various capital control policies, income inequality in Japan was kept at a low level between 1950 and 1980. However, as of the 1980s, inequalities increased with the effects of financial liberalization and liberalization. Moreover, with the bursting of the asset price bubble and the stagnation in average incomes, the level of inequality has increased even more since 1990.

In 2020, the average income of the adult population in Japan was 4.5 million Japanese Yen. There is a 13-fold difference between the bottom 50% and the top 10%. In Japan, a rich country, the distribution of wealth is very unequal; in 2021, the richest 10% of the population owned 58% of the total household wealth. In addition, the share of women in labor income was 28%. This rate is high when evaluated regionally for Japan but lower than in Europe (Chancel, Piketty, Saez, & Zucman, 2022).



Resource: The World Inequality Report, 2022

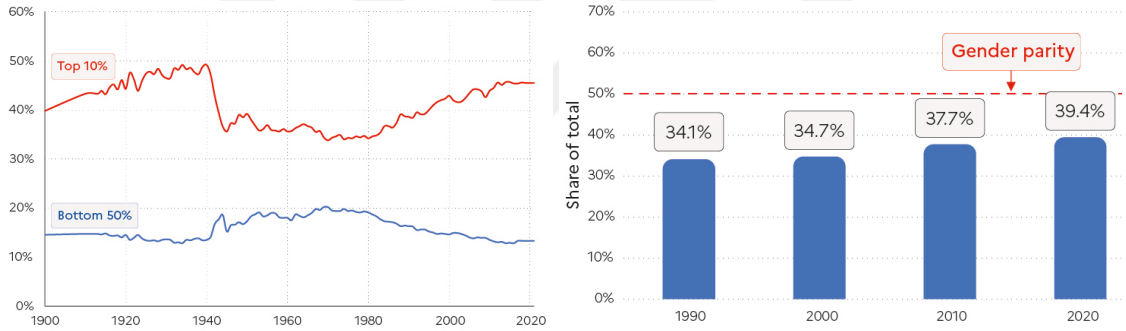
Figure 13. Top %10 and Bottom %50 Income Shares & Female Labor Income Share in U.K

In the United Kingdom, where 36% of the income is received by the richest 10% of society, 20% of the income is shared by the poorest 50% of society. In the United Kingdom, where the average national income is 33 thousand pounds, the top 10% earn

117 thousand pounds per year, while the bottom 50% earn 13 thousand pounds, which is a difference of 9 times. This difference between the two groups is lower than in countries such as the USA and China, as well as Germany and Poland, but higher than in countries such as France and Sweden.

When the graph is examined historically, military and economic developments between 1910 and 1940 seriously affected the incomes of the top 10%. After this, inequalities decreased much more with the development of the welfare state in the 1950s and high average income growth rates. The neoliberal turn in the early 1980s caused the share of the top 10% to increase significantly.

Compared to 1990, the female labor income shares in the United Kingdom increased by 8% and reached 38% in 2020. This rate for the United Kingdom is lower than that of France and Eastern Europe but is on par with that of Western Europe (Chancel, Piketty, Saez, & Zucman, 2022).



Resource: The World Inequality Report, 2022

Figure 14. Top %10 and Bottom %50 Income Shares & Female Labor Income Share in U.S

In America, one of the countries with the highest income inequality, in 2020, the top 10% shared 45% of the income, while the bottom 50% shared approximately 13% of the total income. In a country where the average adult income is 77 thousand US dollars, the bottom 50% earn around 21 thousand dollars per person, while the top 10% earn approximately 350 thousand dollars. This shows a 17-fold difference between the top and bottom segments. This imbalance difference in America is higher than in Europe, where the average varies between 6 and 10, and even China, which has an average of 14.

When the graph on income justice is examined, it is seen that income inequality decreased after World War II due to the impact of strong capital control policies and

substantial progressive taxation. However, after 1980, due to factors such as privatization, income inequality started to increase again, and it has increased more dramatically since the 2000s. In addition, wealth inequality levels have reached their highest level in the last century. In 2020, the wealthiest 10% of the population owned 71% of total household wealth. Finally, in the United States, women's share of labor income has increased by approximately 5 points in the last 30 years and has reached 39%. This rate is above China, which has a rate of 33%, and is similar to Canada and Russia (Chancel, Piketty, Saez, & Zucman, 2022).

1.2.1.2. General Assessment of Problems in the Countries

The economic equality rates, the basic and simple indicators for the inequalities addressed in line with the Sustainable Development Goals, were evaluated above within the scope of countries. Today, it is seen that economic inequality is high even in countries defined as developed countries. Even in the developed country of Italy, which has the lowest level of inequality, there is an 8-fold difference between the top 10% and the bottom 50% of the population. This situation implies not only the difference in economic conditions but also at least an 8-fold difference between education, health, food, and housing activities in that country. In addition, developed countries such as Germany, which have higher economic prosperity and lower inequality levels compared to developing countries, owe this prosperity to long-standing emission levels. The high carbon emission reduction commitments of developed countries today are not at a level that will compensate for the emission amounts they have made in the past. The situation is no better for developing countries. Countries with high populations, such as China and India, are the countries with the highest emission amounts today. Income inequality data for these countries show significant differences in the access of those living in the country to basic needs such as quality education, health services, healthy food, and water.

1.2.1.3. Climate, Natural Resources, Energy, Consumption and Society-Based Problems

With global temperatures rising to 1.45°, 2023 was the hottest year on record for the World Meteorological Organization, and the world was forced to watch the climate crisis unfold in real-time. While vast communities worldwide struggle daily with weather conditions that destroy lives and livelihoods, the goal of keeping global temperatures to

1.5° cannot be achieved with any delay or indecision. While disasters worldwide caused the deaths of approximately 43,000 people each year between 2013 and 2022, 129 governments reported that national disaster risk reduction strategies had been adopted and implemented in 2023.

When the fundamental problems regarding natural resources are addressed, more than 1.4 billion people were affected by drought between 2002 and 2021, while 2.4 billion people lived in water-stressed countries in 2022. Again, as of 2022, 2.2 billion people do not have access to safe drinking water, while 3.5 billion people are deprived of safe sanitation. Compared to 2015, the proportion of the population using safely managed drinking water increased by 14% to 73% in 2022. Similarly, access to sanitation increased by 12 percentage points to 57%. However, achieving universal access to safe water and sanitation services requires much more progress than current rates.

In addition, deforestation, increasing species extinction rates, and stagnating protection of essential biological areas are other major threats to our planet's sustainability. The world's total forest area continues to decline, albeit at a slower rate than before 2000. All governments must be more motivated and committed to addressing urgent global crises such as climate change, biodiversity loss, desertification, pollution, drought, and deforestation.

The oceans, the largest ecosystem covering 70% of the Earth's surface, are also in danger. The oceans, which provide food and livelihoods for more than three billion people, are of great importance due to trends such as declining fish stocks, marine pollution, ocean acidification, and habitat destruction. Ocean acidification will continue as long as carbon dioxide emissions continue. These challenges require more systematic and strong sustainable fishing practices, marine conservation efforts, and global cooperation for the long-term sustainability of the seas.

In our world, where 675 million people live in the dark today, affordable, sustainable, and modern energy for everyone is the most important problem to be solved. As a result of our current economic and political systems, a significant part of the world lives in energy abundance and consumption, while a significant part lives in the dark. Global electricity access is at 91% in 2022, with the number of people without access reaching 685 million due to situations such as COVID-19 and the Ukraine conflict. The

share of renewable energy sources in energy consumption was approximately 19% in 2021, but the growth rate is considerably slower than in 2015. The electricity sector, where renewables and load-driven resources contribute 28% of total electricity consumption, but insufficient progress in the heating and transportation sectors requires stronger policies and actions.

Finally, we need peace and prosperity in every sense around the world. Due to wars and regional conflicts, 110 million people were forced to flee their country or region due to violence, persecution, conflict, and human rights violations in 2023. There is a high need for activities to strengthen global peace and security frameworks to build peaceful and inclusive societies.

1.3. Development and Importance of Theory of Investment

Investment and finance theory has been developing continuously since the early 1900s. Investment and finance, which has a much more critical position today with the impact of social events, wars, crises, technology, and science, has been substantial for humanity since its existence. The history of finance theory, which can be divided into five main sections from a historical perspective, has been shaped by social events and developments. In this section, the development of investment theory will be explained in a chronological flow.

1.3.1. Traditional Portfolio Theory

As of the twentieth century, small firms came together and carried out consolidation activities, large-scale holdings were formed, and growth in the American domestic market was realized in direct proportion to this. In this period, financial management was handled in three basic concepts, namely income-expenditure, and financing, and the issues of how the capital structure should be and how the optimal capital structure should be were dealt with. Although the concept of risk was not fully understood in this period, the advantages of portfolio formation were recognized, and the aim was to bring together the assets that would provide the highest return in the portfolio formation process.

Until the 1950s, crises, wars, and other vital developments deeply affected financial markets, investors, and economies. The First World War and the crisis of 1929 and its aftermath brought to the forefront the need to take into account important issues that had not been taken into account before, while capital restructuring, the concept of liquidity, and financial recovery became the priority issues. Until the early 1950s, the traditional portfolio management approach was not based on mathematical foundations, and diversification was adopted without considering the relationships between securities to reduce portfolio risk. The modern portfolio management approach has revealed that the risk undertaken cannot be reduced by diversification alone without considering the relationship between the assets to be included in any portfolio.

1.3.2. Modern Portfolio Theory

In the early 1950s, Harry Markowitz laid the foundations of Modern Portfolio Theory with his article' Portfolio Selection' and his book 'Portfolio Selection: Efficient Diversification of Investments' published in 1959. Today, he is considered the founding father of this theory. Markowitz's work's most crucial enlightening point is that he first introduced the concept of risk into a financial model. Secondly, he introduced and utilized the concept of rational investors in his work.

Markowitz was the first to address the relationship between the securities in a portfolio, and the direction and degree of this relationship may lead to a decrease or increase in the portfolio's risk. For this reason, he argued that only diversification is not a sufficient method to reduce risk and that the correlation between the assets in the portfolio should also be examined. In this context, he developed the Mean-Variance model based on expected return-variance.

1.3.2.1. Mean-Variance Theory

In the article 'Portfolio Selection' published by Harry Markowitz in 1952, he states that rather than evaluating securities on their own, decisions should be made by considering their relationship with other securities in the portfolio. Markowitz, who considers the variance of returns of securities as a risk, argues that diversification should be made to prevent this risk.

Markowitz, who actually worked in the field of linear programming, accidentally had a conversation with a broker he worked with and decided to apply linear programming to the problems faced by stock market investors. In this context, he used linear programming to construct what is now known as Mean-Variance Optimisation.

Mean-variance theory is based on several basic assumptions. The first and most important of these assumptions is that investors are rational individuals. This assumption implies that investors want to maximize their expected utility and avoid risk. On the basis of this assumption, investors should invest in assets with maximum expected return and minimum risk at a certain level of risk. Another important assumption of Markowitz's model is that expected returns are normally distributed. This explains the assumption that under normal conditions, returns in a given period are distributed around the mean value. Another assumption is that investors have a one-period investment horizon. This last assumption is used for generalization purposes to prevent time variation that would affect the model's validity. Since Markowitz used the word variance instead of risk in his study, risk and variance have become synonymous words. Therefore, the variance of returns is defined as a value that investors do not desire and try to minimize.

Portfolio return is defined as the weighted average of the returns of the assets in the portfolio.

$$R_p = \sum_{i=1}^{n} w_i R_i$$

R*p* = portfolio return,
W*i* = weight of asset *i* in the portfolio,
R*i* = the expected return of asset *i*,
n = number of assets in the portfolio.

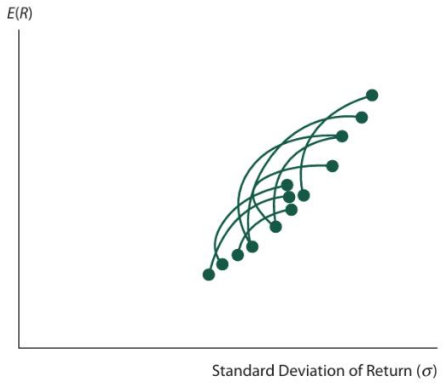
Portfolio Variance (Risk Measure) is calculated by taking into account the variance and covariance of the assets in the portfolio.

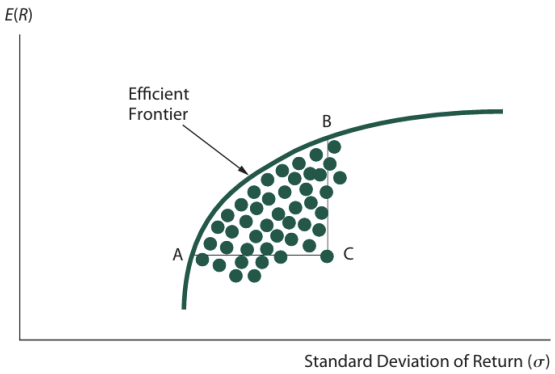
$$\sigma_p^2 = \sum_{i=1}^{n} \sum_{j=1}^{n} w_i w_j \sigma_{ij}$$

σp^2 = variance of portfolio,
σij = covariance between asset *i* and asset *j*

wi,wj = represents the weight of the related assets in the portfolio.

There are many assets that investors can invest in financial markets. In addition, many portfolios have been formed with various weights of these assets. All these various investment opportunities that investors can invest in are called opportunity sets. Among all investment instruments, an investor will prefer the portfolio that will provide the highest return at a given risk level or the portfolio with the minimum risk under a given return condition. The curve formed by the best-expected return and the lowest risk data for all possible investment choices for the investor is defined as the efficient frontier. The efficient frontier includes portfolios that are determined depending on the investor's approach between risk and return.





Resource: Frank K. Reilly, Keith C. Brown, Investment Analysis and Portfolio Management, International Thomson Publishing, s. 229

Figure 15. Oppurtunity Set

Figure 16. Efficient Frontier

When the expected return and risk of assets are associated with investors' risk perception and attitude towards risk, the most appropriate portfolios for investment are selected. Indifference curves are used to understand the relationship between investors and risk.

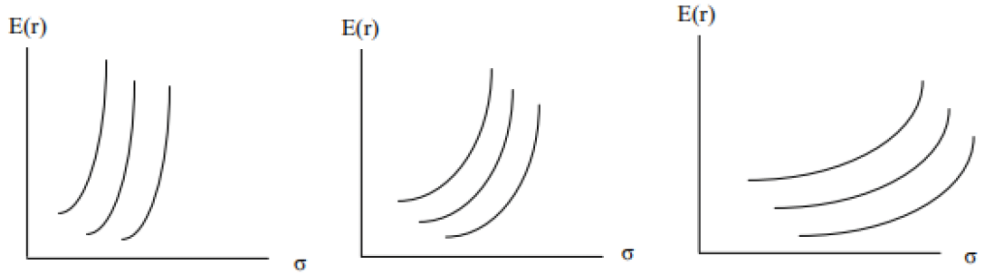
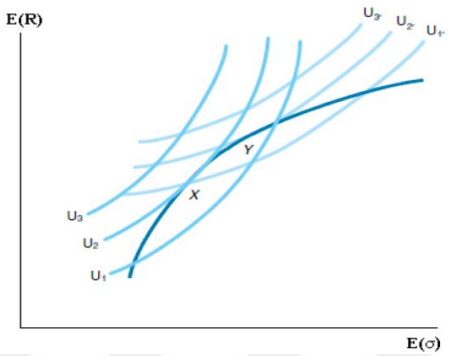


Figure 17. Indifference Curves

Investors who adopt higher returns and lower risk levels are defined as risk-averse investors. The indifference curves of this group have a steeper slope. The indifference curves of investors with moderate return and moderate risk expectations are shown in Figure B. The indifference curve of low-risk averse, i.e., adventurist investors, is more sloping, as shown in Figure C. The utility function is formed according to investors' attitudes towards risk. Therefore, the indifference curve is different for each investor.



Resource: Frank K. Reilly, Keith C. Brown, Investment Analysis and Portfolio Management, International Thomson Publishing,, 6. Baskı, 1999, s. 230

Figure 18. Optimal Portfolio Selection

Due to the utility maximization objective, investors have the aim to invest in the uppermost point between the indifference curves. Therefore, the point where the indifference curves are tangent to the efficient frontier is referred to as the optimal portfolio. As seen in the figure above, the portfolio that provides the highest utility for an investor is on the efficient frontier. When the indifference curves labeled U3, U2, and U1 express the attitude toward risk for each investor, investor U3 is more risk-sensitive than investor U2.

Markowitz's Mean-Variance Model, which evaluated covariance on financial decisions for the first time until the 1950s, formed the basis for many studies in the following years. Markowitz's Mean-Variance Model was criticized for being based on the assumption that investors only invest in risky assets. Because in the real world, there are also entirely risk-free assets that investors can invest in.

Until modern portfolio theory, the relationship between risk and return was not quantified; portfolio diversification techniques were applied based on average returns. Markowitz laid the foundations of Modern Portfolio Theory and introduced a systematic approach that considers risk factors in portfolio selection. In the following years, studies

such as the Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Model (APT) have been carried out on the subject.

1.3.2.2. Single Index Model

The acceptance and application of the Mean-Variance model has been widely accepted and appreciated over time, but it has also brought various criticisms. The difficulty of calculating the risk of each security is an important detail when evaluated together with the periodical conditions. In addition, researchers and scientists have criticized the limitations imposed by various assumptions of the Mean-Variance model over time. Multiple studies have been carried out to accelerate investors' investment processes and increase their applicability. In this context, another study of high importance in the literature is the Capital Asset Pricing Model (CAPM).

1.3.2.2.1. Capital Asset Pricing Model (CAPM)

When firms' risk factors were included in asset pricing models, it was realized that it was not sufficient to take into account only firms' risk factors and that returns were also affected by market movements. In addition, the Mean-Variance Model was criticized for the difficulty and time-consuming nature of calculating the risk of each asset included in the portfolio separately and the correlation with other assets.

In this context, the CAPM (Capital Asset Pricing Model), introduced by William F. Sharpe in 1964 and subsequently developed, is an important study that establishes the relationship between asset expected return and market risk.

Modern Portfolio Theory was developed by scientists such as Sharpe, Lintner, and James Tobin, and the relationship between the risk and return of an asset has gained a more comprehensive scientific basis. The only suggestion of Markowitz's work for risk control was to diversify an investment universe of risky assets, but this approach was too short-sighted. This is because investors have too many options, and most investors hold a portion of their principal in cash or buy cash-equivalent assets such as bonds and bills to reduce the risk of their portfolios.

As an equilibrium model, the CAPM investigates whether the securities planned to be invested in yield a return commensurate with the risk. In other words, the Capital

Asset Pricing Model is a model that calculates the expected rate of return on an asset for investment. While Treynor, who revealed the importance of market risk, placed it at the center of the model, Sharpe, and Lintner, as a result of independent studies, concluded that risk-adjusted return is a better alternative to the mean-variance approach in portfolio construction (Tekbaş, 2022:217).

The Capital Asset Pricing Model (CAPM) provides a risk measure that is acceptable to all investors when determining the risks of assets. Moreover, it gives the opportunity to measure the return that assets should provide according to their risks. The Capital Asset Pricing Model, which accepts the assumptions of Markowitz's Mean-Variance model, also includes some other assumptions.

The first assumption is that capital markets are efficient. This implies that the prices of investment instruments fully reflect their expected returns relative to their risk. In addition, investors have no tax, transaction cost, or short-selling constraints. There is also no inflation in the markets, and investors can borrow and lend at the same interest rate. As a final assumption, all investment instruments are infinitely divisible, meaning that investors can buy and sell any amount of investment instruments.

The capital market theory was developed by adding risk-free assets to the Modern Portfolio Theory, the foundations of which were laid by Markowitz. Accordingly, with the inclusion of risk-free assets in the model, it is argued that investors should make their optimal portfolio choices from the portfolios on the capital market line. According to the Capital Asset Pricing Model, the expected return on an asset is a function of the risk-free interest rate, the systematic risk premium, and the market portfolio. In this context, according to the CAPM, the factor that determines how much the expected return will be higher than the risk-free interest rate is the Beta coefficient (Karan, 2018:202). Expected returns depend on the time value of money and the market risk premium beta. Beta value expresses the sensitivity of a security to the market portfolio.

Beta value is expressed mathematically as follows.

$$\beta_i = \frac{\mathrm{Cov}(R_i, R_m)}{\mathrm{Var}(R_m)}$$

Variables in the equation;

βi = sensitivity of the asset to systematic risk,
Ri = return of asset,
Rm = return of market potfolio,
Cov(Ri,Rm) = covariance between asset return and market return,
Var(Rm) = variance of market portfolio return

Accordingly, the Capital Asset Pricing model expresses the return-risk relationship as follows:

$$E(R_i) = R_f + \beta_i \times (E(R_m) - R_f)$$

ERi = expected return of the asset,
Rf = risk-free interest rate (usually government bond interest rate is used),
ERm = expected retun of the market portfolio,
β = systematic risk of the asset
(Rm) - (Rf) = market risk premium (the difference between the market return and risk-free asset return).

The Capital Asset Pricing Model, which assumes investors only consider systematic risk, is based on the idea that investors can eliminate unsystematic risks, i.e. firm-specific risks, through diversification. The Model is still widely used and accepted today and is preferred due to its simplicity and applicability. However, it is often criticized for considering only systematic risk as important and only one risk factor, Beta, for risky assets.

1.3.2.3. Multifactor Models

Over time, investors and researchers have considered that other factors should be included in the models to understand better the factors affecting stock prices and to predict expected returns more accurately. However, the development of asset pricing models has progressed slowly over time. For a certain period of time, investors, researchers, and scientists have tried to find a single explanatory factor that explains stock and asset prices. The realization of multiple factors affecting asset prices and the incorporation of these factors into asset pricing models is another milestone in the finance literature.

1.3.2.3.1. Arbitrage Pricing Model (APT)

The Capital Asset Pricing Model (CAPM) has been criticized for using a single factor in explaining the expected returns of assets, the limitations arising from

assumptions and the difficulties encountered during empirical applications, and new models have been tried to be developed. In this context, Arbitrage Pricing Theory (APT) is an asset pricing model developed by Stephen Ross in 1976. This study, which contains fewer restrictive assumptions compared to the Capital Asset Pricing Model, can be applied to short and long-term studies. Unlike the CAPM, the APT considers more than one risk factor to determine the prices of assets in capital markets and assumes that investors utilize arbitrage opportunities (Ross, 1976:342).

Arbitrage refers to the process of buying a financial asset in a cheap market and selling it in an expensive market by taking advantage of price differences in different markets simultaneously (Kıyılar and Akkaya, 2016: 85). Arbitrage Pricing Theory is an alternative to the Capital Asset Pricing Model. Accordingly, while CAPM uses only a single risk factor, Beta (β), Arbitrage Pricing Theory utilizes multiple macroeconomic and financial factors. Moreover, APT argues that each investment instrument may be sensitive to different factors at different rates.

According to the Arbitrage Pricing Theory, the expected return on an asset:

$$E(R_i) = R_f + \beta_1 F_1 + \beta_2 F_2 + ... + \beta_n F_n$$

According to the given formula:

$E(R_i)$ = expected return of asset *i*,
R_f = risk-free interest rate,
$F_1, F_2, ..., F_n$ = risk premiums of macroeconomic factors,
$\beta_1, \beta_2, ..., \beta_n$ = the sensitivity of the asset to the relevant factor.

Arbitrage Pricing Theory has three basic assumptions: first, asset returns are determined by more than one factor and are based on the assumption that capital markets are perfectly competitive. Second, investors prefer higher returns when market conditions become uncertain. Finally, investors in the market utilize arbitrage opportunities, and therefore, there is no arbitrage opportunity.

APT, which allows investors to take into account macroeconomic variables with the possibility of factor selection other than Beta, also does not require a specific market portfolio. Arbitrage Pricing Theory is considered a good alternative to CAPM with this structure. However, Arbitrage Pricing Theory also has various disadvantages in terms of

not determining which factors are important and the need for more data and calculations in testing different factors.

The necessity of determining the factors by empirical methods has paved the way for the Arbitrage Pricing Theory to pave the way for multifactor models in finance theory. The Arbitrage Pricing Theory, which led to the development of comprehensive models such as the Fama and French 3-Factor Model (1993), the Carhart 4-Factor Model, and the Fama and French 5-Factor Model, is an important model that complements the shortcomings of the CAPM and allows more different factors to be taken into account. Researchers, institutional and individual investors, fund and portfolio managers still use it.

1.3.2.3.2. Fama and French Three Factor Model

Although investors have used the Capital Asset Pricing Model (CAPM) for many years to explain the relationship between risk and expected return in numerous empirical studies, time has revealed its inadequacies. In 1993, Eugene Fama and Kenneth R. French developed the 3-factor Model to better explain the change in asset prices with the study 'Common Risk Factors in the Returns on Stocks and Bonds'.

The 3-Factor Model developed by Fama and French uses 3 factors to explain stock returns. The Model is as follows.

$$E(R_i) = R_f + \beta_m(E(R_m) - R_f) + \beta_s SMB + \beta_v HML$$

According to the model:

E(Ri) = expected return of asset i,

Rf = risk-free interest rate,

E(Rm)−Rf = market risk premium,

SMB (Small Minus Big) = difference between the stock returns of small firms and the stock returns of large firms,

HML (High Minus Low) = difference between the returns of firms with high book-to-market ratio and returns of firms with low book-to-market ratio,

$\beta m, \beta s, \beta v$ = sensitivity coefficients of the factors.

When we consider the main factors of the model and their meanings, firstly, the Market Risk Factor includes the market risk premium, which is the only single factor of the CAPM and reflects the effect of market risk on the investor's expected return. Firms with higher beta values are more sensitive to market movements and generally tend to offer higher returns.

Secondly, when the model's Size Factor (SMB - Small Minus Big) is evaluated, it briefly expresses the return difference between small-scale and large-scale firms. The inclusion of firm size as a factor in asset pricing models was made by Banz (1981). Banz added firm size to the Capital Asset Pricing Model by working on stocks traded on the New York Stock Exchange. The results obtained from this study indicate that there is a negative relationship between firm size and returns. Subsequent studies in this direction also show that small-sized firms have higher average returns than large-sized firms. This is also related to small firms demanding higher returns as they are less liquid and carry higher risk.

Finally, HML (High Minus Low), referred to as the Value Factor, represents the difference in returns between firms with a high book-to-market value ratio and firms with a low book-to-market value ratio. After Rosenberg et al. (1987) first determined that the book-to-market value factor is correlated with returns, Fama and French added it to the model in their 1993 study. The addition of the size and value factors to the Capital Asset Pricing model provided a significant development. It prioritized the development of factor models in the following period.

The Fama and French 3-factor model, which is still frequently used in empirical studies by researchers, academics, and graduate students, provides statistically significant and positive relationships to explain returns in studies on various data sets.

1.3.2.3.3. Carhart Four Factor Model

Over the years, investors, researchers, and scientists have realized that the momentum effect, i.e., the idea that stocks that have been profitable in the past will also be profitable in the future, has an important and substantial impact on stock returns. Therefore, Mark Carhart included the momentum factor (MOM) in the model he developed with his study 'On persistence in mutual fund performance' in 1997 and created the Carhart 4 Factor model. The concept of momentum, which is expressed as persistence in stock returns, also forms the basis of behavioral finance.

Carhart's 4 Factor model, which adds the Momentum Factor (MOM) to the Fama and French 3 Factor model, is as follows.

$$E(R_i) = R_f + \beta_m(E(R_m) - R_f) + \beta_s SMB + \beta_v HML + \beta_c MOM$$

In the model:

E(Ri) = expected return of asset i,

Rf = risk-free interest rate,

(Rm)−Rf = market risk premium,

SMB (Small Minus Big) = difference between returns of stocks of small firms and large firms,

HML (High Minus Low) = difference between returns of firms with high book-to-market ratio and returns of firms with low book-to-market ratio,

MOM = difference between firms with good return performance and poor return performance within a specified period,

βm,βs,βv,βc = expresses sensitivity coefficients of factors.

In addition to the Fama and French 3 Factor model, the model examining the Momentum effect also focuses on investor psychology and market movements. Because investors generally give more priority to stocks that earn more and can make their investments in these stocks. In addition, the momentum effect can continue for a long

time due to positive feedback. Due to these features of momentum, it is vital for investors who do technical analysis and follow trends.

Today, the Momentum effect, which is frequently used in stock analysis and academic research, is quite popular. Carhart takes his place among the most important names in finance theory with the Momentum Factor, which reveals an important insight into investor behavior, especially in terms of behavioral finance.

1.3.2.3.4. Fama and French Five Factor Model

The development of technology and financial markets, changes in investors' expectations and behaviors, and the need for new factors and models to explain stock returns are also changing. Although the 3-factor model developed by Fama and French and Carhart's 4-factor Model were deemed sufficient and frequently used by investors, researchers, and scientists, more comprehensive and up-to-date models are needed over time. Each Model addresses current issues related to the period in which it was developed and incorporates these into the asset pricing model.

Over time, as different factors affecting stock prices emerge and are recognized by researchers, investors, and scientists, these factors are included in the models. Given that the characteristics, activities, and investment decisions of companies are correlated with returns, it has been understood that new factors should be included in the models. Fama and French included firm profitability and investments in the Model in 2015 to meet this requirement. Fama and French created the 5-factor Model with two additions to the 3-factor Model they developed earlier.

Using the same dataset as in their earlier three-factor models, Fama and French found statistically more significant results with their five-factor model, expressed below.

$$\mathbf{R_{it}\text{-}Rf_{it}}=\alpha_i+\beta_i(Rm\text{-}Rf)_{it}+s_iSMB_{it}+h_iHML_{it}+r_iRMW_{it}+c_iCMA_{it}+\varepsilon_i$$

$\mathbf{R_{it}\text{-}RF_{it}}$= The expected excess return of security/portfolio i over the risk-free rate,

$\mathbf{Rm_{it}\text{-}Rf_{it}}$ = The expected excess return of the market portfolio over the risk-free rate,

$\mathbf{SMB_{it}}$ = The return difference between portfolios of small-cap stocks and large-cap stocks *(Small Minus Big),*

$\mathbf{HML_{it}}$ = The return difference between portfolios of stocks with high and low book-to-market ratios *(High Minus Low),*

$\mathbf{RMW_{it}}$ = The return difference between portfolios of stocks with high and low profitability *(Robust Minus Weak),*

$\mathbf{CMA_{it}}$ = The return difference between portfolios of stocks with high and low investment levels *(Conservative Minus Aggressive),*

$\boldsymbol{\beta_i}$= sensitivity of the excess returns of portfolio i to the excess returns of the market,

$\mathbf{s_i}$= sensitivity of the excess returns of portfolio i to the SMB factor,

$\mathbf{h_i}$= sensitivity of the excess returns of portfolio i to the HML factor,

$\mathbf{r_i}$= sensitivity of the excess returns of portfolio i to the RMW factor,

$\mathbf{c_i}$= sensitivity of the excess returns of portfolio i to the CMA factor,

$\boldsymbol{\alpha_i}$= the difference between the actual return and the return predicted by the model,

$\boldsymbol{\varepsilon_i}$= the residuals

In their 2015 study, Fama and French tested the FF5F model, which includes the market factor, firm size (SMB), book-to-market ratio (HML), profitability (RMW), and investment (CMA) factors of firms traded on the NYSE, AMEX, and NASDAQ stock markets. During the portfolio formation phase, they followed the same methodology as in their 1993 study, where they introduced the FF3F model.

The firm size factor, SMB, essentially considers the market capitalization of firms. Market capitalization for a firm is calculated as the product of the number of outstanding shares and the stock price, commonly denoted as MCAP, Market Capitalization, or MV (Market Value). In Fama and French's studies (1993 and 1995), firms were ranked annually based on their market capitalization at the end of year "t" and divided into small and big groups. The classifications were determined using market capitalization figures

as of the end of June of the corresponding year, and these figures were utilized to construct portfolios for the period from July of the year “t” to June of the year “t+1.”

The value factor, HML, is calculated based on firms’ book-to-market ratios. Firms classified by market capitalization were further ranked by their book-to-market ratios and divided into three groups: 30% Low (L), 40% Medium (M), and 30% High (H). The book-to-market ratio for each firm in a given year was calculated by simultaneously dividing the equity value at the end of year “t-1” by the market value.

One of the two new factors included in Fama and French’s five-factor model, the Profitability Factor (RMW), essentially represents the operating profitability ratio. Firms previously grouped by market capitalization were further categorized into three groups based on the ratio of operating profit to equity value: 30% Weak (W), 40% Medium (M), and 30% Robust (R). The annual profitability ratio for each firm was calculated by dividing the operating profit of year “t-1” by the equity value of year “t-1.”

The second new factor included in Fama and French's 2015 model is the Investment Factor, referred to as CMA. Also known as the investment ratio, this factor is calculated based on the asset growth rate of firms. It is determined by dividing the difference in total assets between years "t-1" and "t-2" by the total value of assets in year "t-2." As previously explained, this factor is divided into three groups. Firms with a low investment ratio are classified as 30% Conservative (C), medium-sized firms as 40% Medium (M), and firms with a high investment ratio as 30% Aggressive (A). For each firm, the investment ratio for year "t" is calculated by dividing the total asset difference between years "t-1" and "t-2" by the total asset value in year "t-2."

The Fama and French 5-Factor model has completed the deficiencies of the CAPM and 3-Factor models while offering a more advanced analysis model. By including company policies in the model, investors have been given the insight that factors such as market risk and factors related to company policies should be considered. With the Fama and French 5-Factor model, multi-factor pricing models' importance has increased and guided today's investment strategies. The Fama and French 5-Factor model, which is frequently used by large investment companies, investors, and academics today, continues to develop.

Various studies are being conducted on adding the sixth factor to the Fama and French 5-factor models. The need to add a new factor arises from various investor and company behaviors in various countries and markets. Momentum, Volatility, Liquidity, Credit Risk, and ESG factors are frequently used in empirical applications.

It is frequently used because the momentum effect permanently impacts stock returns. The volatility factor is included in studies as the sixth factor due to the hypothesis that risk and return are not linear. Also, the liquidity factor is frequently included in studies examining the effect of stock liquidity on returns. Due to various characteristics specific to firms, the effect of credit risk on pricing often finds its place in asset pricing models. Sustainability is also included in asset pricing models as it has become a topic that has gained importance and interest in recent years. Researchers, investors, and scientists use ESG scores to represent firms' sustainability activities and understand whether they really have an impact on asset prices. The addition of the ESG factor to the Fama and French 5 Factor model is important because today, institutional investors especially attach more and more importance to the ESG factor. In addition, understanding how social responsibility activities affect market pricing and proving it with empirical applications is of great importance in increasing investor, researcher, and public awareness.

1.4. Transition of Sustainability to the Asset Pricing Models

For more than a century, researchers, scientists, company managers, and finance professionals have been investigating which factors affect asset prices, why they are effective, and how effective they are. In the early twentieth century, when the foundations of investment theory were laid, investors knew the advantages of creating portfolios, but this included the goal of providing the highest return in the full sense.

Over time, with the understanding of risk factors specific to companies and markets, studies on adding risk factors to asset pricing began. The Great Depression and financial crises of 1929 enabled the inclusion of previously unconsidered issues in the studies conducted within this scope. Various developments were made in the 1950s with the understanding of the importance of the risk factor.

During these dates, investors turned towards positive theories that addressed the effects of these decisions on firm value, as opposed to normative questions such as "what investment, financing, and dividend policies should be" for firms. In the 1950s, during the period considered as the birth of modern finance, two important studies were conducted in 1952 and 1958. Modigliani and Miller's study titled "The Cost of Capital, Corporation Finance and the Theory of Investment" argued that under certain assumptions, firms' capital structure and market value had no effect. In later years, authors who conducted another study, including taxes, stated that borrowing positively affected firm value. Although the study by Modigliani and Miller was criticized for assuming of perfect market conditions, it made important contributions to finance theory. Because the M&M theorem was an important step in effectively analyzing firms' capital structure decisions.

“Portfolio Selection,” developed by Harry Markowitz in 1952, is one of the cornerstones of modern finance theory. Markowitz, who suggested that portfolio success depends not only on return but also on risk, considered the correlation of assets in a portfolio. Markowitz, who provided a scientific framework for portfolio management, has great importance in finance theory because he provided mathematical modeling of the concept of risk. Markowitz formed the basis for the Capital Asset Pricing Model (CAPM) and other asset pricing models that were later developed due to the quantification of risk and return, making finance theory a more objective and calculable discipline.

In the periods when the risk factor of firms was also included in asset pricing models, it was understood over time that it was not enough to consider only the risk factor of firms and that returns were also affected by market movements. In this context, CAPM (Capital Asset Pricing Model), which William F. Sharpe put forward in 1964 and later developed, is an important study that establishes the relationship between the expected return on assets and market risk. CAPM, which forms the basis of asset pricing theory and is a reference to models developed later, has high importance in finance theory.

In the following years, it was understood that a single factor was insufficient to explain the return on asset prices, and different new factors were needed. The reason for this was that investor and firm behaviors had different effects on returns in developing financial markets. The emergence and importance of concepts such as market efficiency,

agency problems, asymmetric information, and insider trading made it difficult to bring the difference between expected and realized returns closer to zero. In addition, a series of anomalies emerged as investors perceived random market movements as regular and rational, and these anomalies formed market characteristics over time.

In the field of finance, which has been progressing in line with the developing market and firm dynamics, the Arbitrage Pricing Model was developed by Stephen Ross in 1976. Unlike the CAPM, the study, which adopted a multi-factor approach in explaining asset returns, explains that the price of an asset can be affected by more than one macroeconomic and firm-specific factor. Arguing that macroeconomic factors such as inflation rates, exchange rates, and economic growth can also be included in asset pricing models, APT assumes that there is no arbitrage in the markets, which is the opportunity to make a profit without taking risks at low cost.

With the simultaneous development of financial markets and multi-factor asset pricing models and technology, investors, researchers, and company managers have conducted various studies to determine the factors that affect asset prices. In 1993, Eugene Fama and Kenneth R. French's study titled "Common Risk Factors in the Returns on Stocks and Bonds" tried to explain anomalies in stock returns as an alternative to CAPM. The study, based on three fundamental factors: market risk, firm size, and value factor, explained a large part of the change in stock returns. This study, which guides investment strategies, has focused investment strategies on small firms and value stocks on a scientific basis.

Changes in financial markets and stock returns are highly related to investor psychology and behavior, and studies in finance theory have moved in this direction. The study "On Persistence in Mutual Fund Performance" by Mark M. Carhart used the Momentum factor, which is considered an important anomaly in finance literature. The Momentum factor, which represents the tendency of stocks with high return performance in the past to continue to show high performance in the future, is an important point in understanding the importance of behavioral finance.

In the 1990s, the widespread idea that the sole purpose of companies in society is not to produce production and profit led to the importance of corporate social responsibility. The examination of the activities of large companies on a national and

international scale and their harmonious relations with their employees and society have become the criteria for evaluating companies over time. In addition, important studies have been conducted, and developments have been made in the field of behavioral finance with the understanding of the great importance of investor psychology and the behavior behind the movements in financial markets and stock returns. New measurement technologies and methods have been developed to determine the effects of various financial decisions and events on the human brain.

The historical development of finance theory develops with the characteristics of the period in question. Finance theory, which has renewed and developed itself in accordance with the developments in financial crises, recessions, wars, and many other issues since the 1900s, will maintain these characteristics and remain current in the future. Since the issue of sustainability, which has been understood increasingly in recent years, has had an important impact on all segments of society, finance has also been affected by this. Including sustainability-related company activities in asset pricing models will balance the motivation of companies to continue their activities while remaining indifferent to social problems. Finance theory, which has covered events and developments in society throughout history through the work of investors, researchers, and scientists, will develop mechanisms that also include the most important issue of today: sustainability.

In this context, important studies are being carried out within the scope of the sustainable finance concept. Banks, financial rating institutions, international investors, portfolio management companies, and funds are currently examining companies' sustainability studies and activities. In this direction, various sustainability reports of companies and ESG scores of companies provide evaluation and rating services among companies. It is important to prioritize environmentally and socially friendly companies that prioritize sustainability and are managed at high standards in the context of corporate governance principles. If there is not enough pressure on the activities of companies in environmental, social, and governance issues, global warming, climate events, social inequalities, and other global problems that are increasingly showing their effects worldwide, it will reach unstoppable levels. For these reasons, sustainability activities and company scores will inevitably be included in asset pricing models with various methods.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

In recent years, numerous studies have examined the relationship between sustainability and various financial indicators, such as firms' financial performance, firm value, profitability, and stock prices. ESG scores, which represent the quantitative measure of sustainability for firms, are frequently utilized in academic research in this context. In the literature review section, academic studies exploring the relationship between sustainability, sustainable responsible investment (SRI), and ESG scores with firms' stock prices and performance are presented in chronological order.

Table 1. Literature Review

No	Author(s), (Year)	Sample / Time Range	Objective(s)	Finding(s)
1	Gompers et al., (2003)	1500 US firms / 1990-1999	Estimating the relationship between corporate governance and stock prices with an index	According to the investment strategy that buys (sells) the 10% stocks with the highest (lowest) index score according to the constructed index generated statistically significant positive abnormal returns for the period analyzed.
2	Derwall et al., (2005)	US firms / 1995-2003	To test whether Socially Responsible Investing (SRI) leads to superior or inferior stock performance.	It was concluded that the top portfolio outperformed the bottom portfolio between 1995 and 2003, and it was stated that adopting an environment-based approach to investments could be beneficial.
3	Kempf and Osthoff, (2007)	S&P500 and DS400 indices firms / 1992-2004	Measure the portfolio performance of stocks with high social responsibility ratings.	Authors suggest that it would be advantageous for investors to adopt the Socially Responsible Investment (SRI) approach.
4	Galema et al., (2008)	KLD Research and Analytics database US firms / 1992-2006	Investigating the effect of Socially Responsible Investment (SRI) on abnormal returns using different variables in the KLD Research and Analytics database	Different SRI variables could have positive or negative effects on stock returns.
5	Statman and Glushkov, (2009)	DS 400 and S&P 500 companies / 1992-2007	Measure the abnormal returns of high and low socially responsible portfolios with different models.	Authors find that some socially responsible portfolios perform better than traditional ones but worse than non-socially responsible portfolios.
6	Manescu, (2011)	US Companies /1992-2008	Analyze whether it is mispricing or compensation for risk	During the period July 1992–June 2008, only community relations had a positive effect on

			that underlies the positive or negative abnormal returns earned by firms with high ESG scores.	stock returns, potentially due to mispricing. Some evidence of mispricing is also provided by the positive estimated effect of employee relations on stock returns during July 1992–June 2003, and the weak negative estimated effects of human rights and product safety on stock returns during July 2003–June 2008.
7	Balatbat, M., Siew, R., & Carmichael, D., (2012)	Australian Securities Exchange / 2008-2010	Examining the impact of ESG (environmental, social and governance) practices on the financial performance of companies	The correlation between financial performance and ESG scores is weakly positive. Also, weak negative association between errors in analyst forecasts and ESG scores. Contrary to expectations, portfolio returns of ESG leaders are found to be lower compared with ESG laggards.
8	Managi, S., Okimoto, T., & Matsuda, A., (2012)	S&P 500 Index, FTSE 100 Indices, Tokyo Stock Price Index / 2001-2008	Compare the financial performances of socially responsible firms and traditional firms by examining the socially responsible investment indices and traditional indices in the USA, Japan, and England.	It was found that socially responsible investment indices' performance was not different from the traditional indices in general.
9	Humphrey and Tan, (2014)	S&P500 index / 1996-2010	Whether the Socially Responsible Investment (SRI) approach provides a superior stock performance by using the data of stocks.	Authors find no difference in the return or risk of screened and unscreened portfolios. They conclude that a typical socially responsible fund will neither gain nor lose from screening its portfolio.
10	De and Clayman, (2015)	Thomson Reuters ESG database (restricted to U.S. companies) and the different Russell indexes. / 2007-2012	Study covers the understanding of whether firms with higher ESG scores mean higher market returns.	Study revealed that there is an ex-post correlation and that companies with higher returns generally have higher ESG scores.
11	Dimson et al., (2015)	613 US firms / 1999-2009	Examining the effects of ESG on stock returns using corporate social responsibility commitments linked to Environmental, Social, and Governance concerns.	Adopting the ESG improvement practices of the companies will benefit the companies in terms of stock performance.

12	Halbritter and Dorfleitner, (2015)	U.S. market /1991-2012.	Examining the effect of ESG scores on stock returns.	The effect of ESG scores on stock returns depends on the database and time frame used, and portfolios that buy company stocks with high ESG scores and sell low ones do not achieve abnormal returns.
13	Sahut and Pasquini-Descomps, (2015)	US, UK and Switzerland / 2007-2011	Study investigates how news-based scores in ESG may have influenced the monthly stocks' market returns	Using linear regression, it was found that there was no significant relationship between monthly stock returns and ESG scores for the USA and Switzerland. In contrast, a negative relationship was found between ESG performance and stock returns in the UK.
14	Auer ve Schuhmacher, (2016)	Asia-Pacific region, the United States and Europe/ 2004-2012	Using monthly stock data authors whether top ESG portfolios outperform bottom ones, and the authors created a portfolio containing 5% stocks with the highest ESG score.	Regardless of geographic region, industry or ESG criterion, active selection of high- or low-rated stocks does notprovide superior risk-adjusted performance in comparison to passive stock market investments.
15	Celik et al., (2017)	S&P 500 / 2002-2016	Examine the relationship between company scores (Corporate Governance Score, Economic Score, Environmental Score, and Social Score) and stock returns, both at portfolio-level analysis and firm-level cross-sectional regressions	Portfolio-level analysis results indicate that there is no significant relation between company scores and stock returns; firm-level analysis indicates that economic, environmental, and social scores have effect on stock returns, however, significance and direction of these effects change, depending on the included control variables in the cross-sectional regression.
16	Limkriangkrai et al., (2017)	Australia / 2009-2014	Investigate the independent effects of environmental (E), social (S), corporate governance (G), and the composite ESG ratings on stock returns and corporate financing decisions	Authors find different inferences: firms with low E and high G ratings tend to raise less debt. Firms with high G ratings hold less cash, while those with low G ratings have lower dividend payouts. S ratings have no impact on corporate financing decisions.
17	Lundin and Olandersson, (2019)	Swedish Stock Exchange /2006-2013	Study investigates the relationship between sustainability rating and profitability of companies.	According to the findings there is no relationship between sustainability and profitability.

18	Afrooz and Kruusman, (2019)	Nordic Stock Exchanges / 2008-2017	Investigate the relationship between firms ESG scores, as well as how separate E, S and G scores relate to stock price jumps.	There is no statistically proven significant relationship between firms' overall sustainability performance or the ESG score and the number of stock price jumps. However, some significant results have been found at the country level and for individual E, S and G scores however.
19	Breedt et al., (2019)	Most liquid stocks in the USA, Europe, Australia, Canada and Japan	Evaluating whether ESG factors can take precedence over other well-known investment factors in order to measure the abnormal returns of stocks	The inclusion of ESG factors in a worldwide neutral portfolio does not provide additional returns, as they are covered by other well-known stock factors. The authors nevertheless stated that the inclusion of ESG factors in the portfolio will not adversely affect returns, and ESG should not be viewed as a unique factor.
20	Zehir, E., and Aybars, A. (2020)	Stocks operating in Europe and Turkey / 2004-2018	Analyzing the performance of portfolios based on environmental, social and governance (ESG) scores	Results show that there is no relationship between socially responsible investing (SRI) and portfolio performance.
21	Boido,C. et al., (2022)	Stocks operating in Europe / 2016-2021	Do portfolios of stocks with higher ESG scores outperform portfolios of stocks with lower ESG scores?	The findings show that portfolios composed of issuers with a better ESG profile deliver higher returns, lower risk and higher efficiency, regardless of the provider chosen.
22	Fu, J. (2024)	China / 2019-2022	The study investigates how stock returns and volatility can be related to ESG.	Study shows that both the composite ESG score and individual scores have a negative impact on stock returns.

In a study examining the relationship between corporate governance and stock prices, Gompers et al. (2003) created an index based on various corporate governance provisions from the Investor Responsibility Research Center (IRRC) to estimate the level of shareholder rights of 1500 US firms in the 1990s and the meantime; they have created an investment strategy that buys (sells) 10% shares with the highest (lowest) index score. The results obtained from the study show that this strategy has gained statistically significant positive abnormal returns for the analyzed period.

To test whether Socially Responsible Investing (SRI) leads to superior or inferior stock performance, Derwall et al. (2005) used a portfolio construction approach using US stock data. Instead of using ESG scores in the study, the authors used corporate eco-

efficiency ratio scores, which measure the environmental performance of companies as the value added to the waste generated by the company's activities. During the portfolio creation phase, after the stocks were ranked at the top according to their eco-efficiency scores, a portfolio consisting of a long position in the top 30% and a short position in the bottom 30% was created. As a result of the study, it was concluded that the top portfolio outperformed the bottom portfolio between 1995 and 2003, and it was stated that adopting an environment-based approach to investments could be beneficial.

Using stocks traded in the S&P500 and DS400 indices between 1992 and 2004, Kempf and Osthoff (2007) adopted a portfolio-construction method that involves buying the top 10% of stocks with a high social responsibility ratings and short selling the bottom 10%. The results of the study, in which the Carhart 4-factor model was used to estimate the abnormal returns, and the social ratings were obtained from the KLD Research and Analytics databases, showed that this "high-low" strategy, which was applied, provides an positive abnormal return of approximately 9% per year. According to the results obtained, the authors suggest that it would be advantageous for investors to adopt the Socially Responsible Investment (SRI) approach.

Contributing to the literature by explaining that there is no causality between stock returns and ESG scores in previous studies, Galema et al. (2008) investigated the effect of Social Responsible Investment (SRI) on abnormal returns using different variables in the KLD Research and Analytics database. In their study, using Fama and Macbeth (1973) regression and control variables, they found that only employee relations scores had a statistically significant effect on abnormal returns, and they also stated that different SRI variables could have positive or negative effects on stock returns. In addition, the authors found that some Socially Responsible Investment (SRI) variables reduce the book value/market value ratio of firms, and the HML (high minus low) factor from Fama and French measures the difference between low and high book value/market value stocks, they concluded that abnormal returns do not contain SRI effects.

Using the portfolio creation method with KLD Research and Analytics ratings, Statman and Glushkov (2009) tried to measure the abnormal returns of high and low socially responsible portfolios with the CAPM, Markowitz (1959), Fama and French (1993) 3-factor model and Carhart (1997) 4-factor model. Comparing the performance of

socially responsible portfolios with traditional and non-socially responsible portfolios, the authors find that some socially responsible portfolios perform better than traditional ones but worse than non-socially responsible portfolios.

The relationship between ESG scores and stock returns was analyzed by Manescu (2011), using data on stocks traded in the USA between 1991 and 2006. In order to examine the effect of ESG scores on stock returns, seven variables related to ESG, namely corporate governance, community relations, diversity, environment, employee relations, human rights, and product safety, were used together with the Fama and MacBeth (1973) model. According to the results obtained from the study, it has been reported that only community relations have a significant effect on stock returns.

Emphasizing the sample period of the study covered the same period with global financial crisis and stating that the results may have been affected by the crisis, Balatbak et al. (2012) examined the relationship between ESG scores and financial performances of the top 300 companies from various sectors operating on the Australian Stock Exchange during the 2008-2010 period. The study's findings show a weak but positive relationship between ESG scores and financial performance. However, there is a weak and negative correlation between the errors in analyst estimates and ESG scores, while the food-beverage, travel, and entertainment sectors show statistically significant results.

Managi et al. (2012) compared the financial performances of socially responsible firms and traditional firms by examining the socially responsible investment indices and traditional indices in the USA, Japan, and England. In the study, the Markow switching performance measurement model was used, and it was found that socially responsible investment indices' performance was not different from the traditional indices in general. On the contrary, Statman and Glushkov (2009) assert a return advantage for socially responsible portfolios by analyzing the return of the stocks that KLD rated over 1992-2007.

Humphrey and Tan (2014) investigated whether the Socially Responsible Investment (SRI) approach provides a superior stock performance by using the data of stocks traded in the S&P500 index between 1996 and 2010. In the study, value-weighted portfolios containing Socially Responsible Investment (SRI) stocks and portfolios that exclude stocks related to undesirable activities, such as gambling and alcohol (known as

sin stocks), were constructed. The authors used the CAPM model, Markowitz (1959), and Carhart (1997) models for both portfolios, and they could not obtain positive and statistically significant abnormal returns. In addition, the authors found no significant difference between portfolios with and without socially responsible stocks.

Investigating whether firms with higher ESG scores mean higher market returns, De and Clayman (2015) revealed that there is an ex-post correlation and that companies with higher returns generally have higher ESG scores. In addition, the authors found a strong negative relationship between firms' ESG scores and volatility. In short, stocks of firms with high ESG scores are less volatile.

The effects of ESG on stock returns were examined by Dimson et al. (2015) using corporate social responsibility commitments linked to Environmental, Social, and Governance concerns for US firms between 1999 and 2009. In the study provided by a large (unspecified) investor whose commitments are dedicated to responsible investments, this investor indicated whether they have the necessary ESG practices that firms must adopt in order to have a satisfactory ESG score. In the study, monthly stock data were obtained from The Center for Research in Security Prices (CRSP) and authors created a portfolio that sell those stocks when they reached an ESG score level determined by the unidentified asset manager. The results obtained from these portfolios have provided positive abnormal returns and this shows that adopting the ESG improvement practices of the companies will benefit the companies in terms of stock performance.

Using three different databases, namely Asset4, Bloomberg, and KLD, Halbritter and Dorfleitner (2015) examined the effect of ESG scores on stock returns and they used monthly data of stocks operating in the USA between 2002-2012. For the sake of robustness, the authors divided the data set into two time periods, 2002-2006 and 2007-2012, and used the Fama and Macbeth (1973) model and the pillars of the ESG to estimate excess returns. According to the results obtained from the study, it has been reported that the effect of ESG scores on stock returns depends on the database and time frame used, and portfolios that buy company stocks with high ESG scores and sell low ones do not achieve abnormal returns.

Sahut and Pasquini-Descomps (2015), who analyzed the relationship between ESG scores and monthly performances of stocks using linear and non-linear models in

the USA, UK, and Switzerland, used data from 2007-2011 in the study. In the analysis using linear regression, it was found that there was no significant relationship between monthly stock returns and ESG scores for the USA and Switzerland. In contrast, a negative relationship was found between ESG performance and stock returns in the UK. The study also examined the relationship between ESG pillars and market returns of stocks and found that the relationship between sub-breakdowns and market returns essentially depends on the year and the sector. Finally, the authors examined the non-linear effect of the ESG score on stock performance for Switzerland using kernel regression. The results showed that there is a non-linear correlation between ESG performance and market performance.

Using monthly stock data for the USA, Asia Pacific, and Europe, Auer and Schuhmacher (2016) investigated whether top ESG portfolios outperform bottom ones, and the authors created a portfolio containing 5% stocks with the highest ESG score. This high ESG portfolio was compared with the portfolio of 5% stocks with the lowest ESG score in terms of average return and Sharpe Ratio, and the results showed that for all three regions analyzed, the top ESG portfolios did not outperform the bottom one.

The relationship between sustainability and stock returns using the data of all companies included in the S&P500 index between 2002-2016 was analyzed at both firm and portfolio levels by Celik et al., (2017). According to the findings obtained from the study, it was reported that there is no relationship between the sustainability scores and the stock returns at the portfolio level. At the firm level, the stock returns can be affected by the sustainability score.

Examining the effects of ESG pillars Environment, Social and Governance on stock market returns in Australia between 2009 and 2014, Limkriangkrai et al. (2017) used the Fama-French-Carhart four-factor model and a risk adjustment variable to predict the excess returns of stocks. Concluding that ESG scores have no effect on stock returns, the authors also compared the performance of stocks with high ESG scores with stocks with low ESG scores. According to the results obtained from the study, it is stated that there are no abnormal returns for high ESG, Environmental, Social, and Governance stocks.

Lundin and Olandersson (2019), examining the impact of sustainability on profitability using 2006-2013 data of 303 companies operating on the Swedish stock exchange, used the environmental and social scores of companies evaluated with the Folksam index. According to the findings obtained from the study, there is no relationship between sustainability and profitability.

Afrooz and Kruusman (2019), who carried out a study on the four best Scandinavian countries in terms of ESG ratings in the last two years, analyzed Sweden, Norway, Denmark, and Finland in the study. According to the results of the study, in which the data of the years 2008-2017 were used for 105 companies traded on the Nordic Stock Exchange, it was reported that there was no significant connection between the general ESG score and the number of stock price movements of the companies. When the results were analyzed in terms of pillars of ESG, there was no significant relationship between the E score and the number of stock price jumps, while a statistically significant relationship was found between the S and G scores and the number of stock price jumps.

Evaluating whether ESG factors can take precedence over other well-known investment factors in order to measure the abnormal returns of stocks, Breedt et al. (2019), created a portfolio consisting of 1000 most liquid stocks in the USA and Europe, 200 of Australia and Canada and 500 of Japan. As a result of the study, the authors report that the inclusion of ESG factors in a worldwide neutral portfolio does not provide additional returns, as they are covered by other well-known stock factors. The authors nevertheless stated that the inclusion of ESG factors in the portfolio will not adversely affect returns, and ESG should not be viewed as a unique factor.

Zehir and Aybars (2020) analyzed the performance of ESG score-based portfolios for firms operating in Europe and Turkey. In the study conducted using data from 2004-2018, 8 portfolios of 10% with the highest and lowest ESG scores were determined, and their performance was analyzed. The results show no relationship between socially responsible investment and stock performance in the study where the Capital Asset Pricing Model (CAPM) and Fama-French 3 Factor Model are used as performance measures. In particular, the results of the CAPM reveal that the two ESG score-based portfolios show lower returns than the market portfolio. Moreover, the average returns of

the bottom 10% ESG portfolio and the top 10% Governance portfolio outperform the market portfolio by 0.57% and 0.53%, respectively.

Boido et al. (2022) compared portfolios with high ESG scores and low ESG scores using MSCI ESG Rating, Sustainalytics, and S&P500 DJI/Robeco ESG data. The data obtained from the data sources used in the study, which examined the European stock market in two periods of one and five years, were examined by creating quarterly portfolios with the highest ESG scores and the lowest ESG scores. The study's findings show a divergence between the composition of the first quartile, while there is more homogeneity in the fourth quartile.

Fu (2024), who investigates the impact of ESG score performance of all A-share companies on stock returns and volatility for the period between 2019-2022, uses the ESG overall score and its sub-pillars Environment, Social and Governance scores. The results of the study, which uses various regression models to examine ESG scores and stock returns and volatility, show statistically significant and negative relationships between ESG overall score and stock returns. Similarly, Environmental, Social and Goverannce sub-pillars are reported to have a negative impact on returns. In addition, the results of the study also revealed that stock volatility is negatively related to the ESG overall score and its sub-pillars.

3. EMPIRICAL ANALYSIS

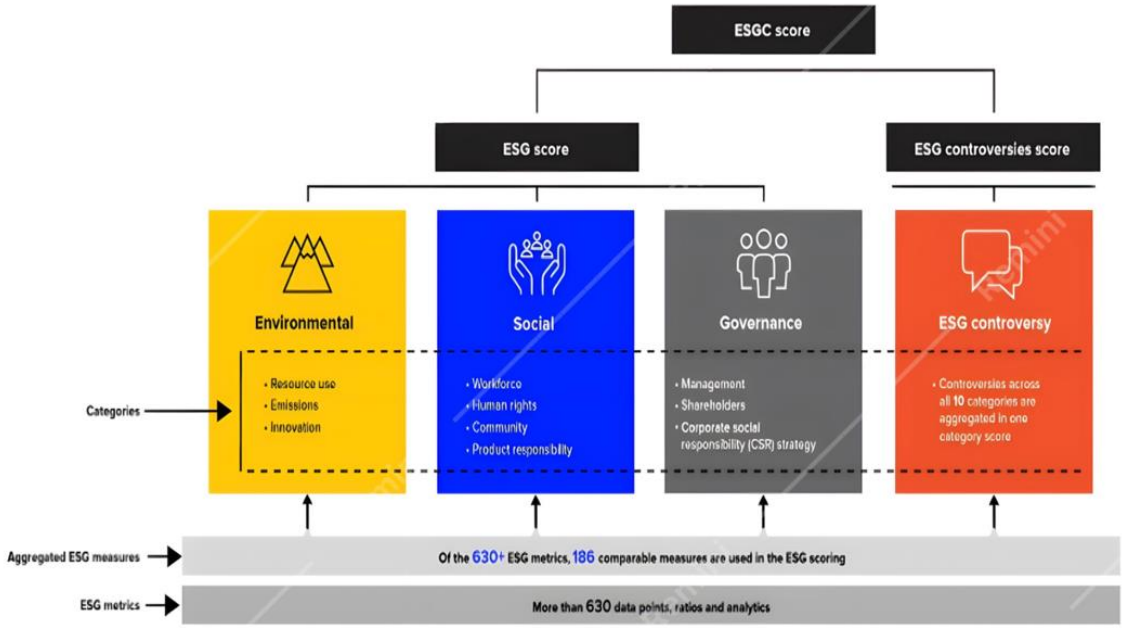
In this section of the study, the data obtained in accordance with the study's purpose will first be defined. Along with the definition, information on the ESG score averages of the 14 countries included in the study will be provided. After the data definition, detailed information on the methodology used in the study will be presented, and the analysis results will be reported accordingly.

3.1. Data Description

All financial and sustainability data in this doctoral thesis were obtained through Istanbul Commerce University using the Refinitiv Eikon. Since this study, which used data for the years 2010-2022, was based on the asset pricing model in the article “A Five-Factor Asset Pricing Model” published by Fama and French (2015), financial data were obtained as required by this model. Total assets, total equity, operating profit, market value, book value, annual return, beta values, were used as financial data for companies. Market return and risk-free interest rate data were used for countries. Annual ESG score data were obtained for the sustainability scores targeted to be integrated into the model.

3.1.1. ESG Data

ESG scores of firms are measured and published by independent data providers, rating agencies, and financial analysis firms. Examples of such organizations include MSCI (Morgan Stanley Capital International) ESG Research, Sustainalytics, FTSE Russell, Refinitiv Eikon, and Bloomberg. ESG scores are determined by assessing performance in three core areas: environmental, social, and governance. These scores are compiled using data collected from publicly available corporate information, voluntary disclosures made to companies such as Bloomberg and Reuters, non-governmental organizations, stock market activities, news sources, and corporate social responsibility reports. Each component of ESG (Environment, Social, Governance) is assigned a value ranging from 0 to 100.



Resource: Refinitiv Eikon Database, 2023

Figure 19. ESG Scores Methodology

In this thesis, the ESG methodology of Refinitiv Eikon, which we accessed through Istanbul Ticaret University, was utilized. As indicated in the table above, ESG scores consist of three main pillars: Environment, Social, and Governance. The table below outlines the methodology for the subcategories of Environmental, Social, and Governance scores as published by the Refinitiv Eikon Database.

Table 2. Environmental, Social, and Governance Scores Methodology

Pillars	Sub Pillars	Definitions
Env.	Resource Use Score	Reflects a company's performance and capacity to reduce the use of materials, energy or water, and to find more eco-efficient solutions by improving supply chain management
	Emissions Score	Measures a company's commitment and effectiveness towards reducing environmental emission in the production and operational processes.
	Environmental Innovation Score	This score reflects a company's capacity to reduce environmental costs and burdens for its customers, and thereby creating new market opportunities through new environmental technologies or processes or eco-designed products.
	Workforce Score	Measures a company's effectiveness towards job satisfaction, healthy and safe workplace, maintaining diversity and equal opportunities, and development opportunities for its workforce

Soc.	Human Rights Score	This score measures a company's effectiveness towards respecting the fundamental human rights conventions.
	Community Score	This score measures the company's commitment towards being a good citizen, protecting public health and respecting business ethics.
	Product Responsibility Score	This category score reflects a company's capacity to produce quality goods and services integrating the customer's health and safety, integrity and data privacy.
Gov.	Management Score	This score measures a company's commitment and effectiveness towards following best practice corporate governance principles
	Shareholders Score	This category includes a company's effectiveness towards equal treatment of shareholders and the use of anti-takeover devices
	CSR Strategy Score	This score reflects a company's practices to communicate that it integrates the economic, social and environmental dimensions into its day-to-day decision-making processes.

Resource: Refinitiv Eikon, 2024

The ESG Controversies Score measures a company's exposure to environmental, social, and governance controversies and negative events reported in the global media. A concise summary of the ESG scores and its pillars are presented in the table. First of all, when we consider the Environment Score, it consists of 3 sub-pillars: Resource Use, Emissions, and Innovation. Various and comprehensive data is used in the creation of the Environmental Score, which consists of three sub-pillars. Within the Resource Use sub-pillar that constitutes the Environment Score, firstly, whether the company has a policy on reducing environmental impacts within the scope of the supply chain or on using natural resources is included. In addition, whether the company has a policy on issues such as water efficiency and energy efficiency is examined, and whether it has targets related to this is also included in the assessment.

While making this assessment, the statements of the companies are also taken into account, and the companies' actions regarding the environmental management team and training are also evaluated. Finally, the company's activities, such as production, purchase, and sale of renewable energy along with electricity, are examined, and its works, such as green buildings, are included in the scoring.

Another sub-pillar of the Environment Score is the Emissions; whether the company has targets and goals regarding emission reduction and whether it has a policy

on the subject is evaluated. Moreover, it is considered whether the company has a report on its impact on living beings in the ecosystem where it operates and on reducing this impact. Under this sub-pillar, the amount of gases such as carbon dioxide produced by the companies in tons is also taken into consideration, and if any, the estimation methods for this are examined. In addition, the information on how much wastewater and residual matter (garbage) the company produces, as well as the improvement efforts, expenditures, and collaborations it has made regarding the environment, are included in the score calculation.

In the last pillar of the Environment Score, Innovation and developments are aimed at strengthening the interaction with the environment. First of all, the reporting on whether the company has a product or service that positively impacts the environment is considered. Moreover, it is examined whether the company has a reuse, recycling, or environmental impact reduction study for a specific product. In addition, the company's studies on noise prevention or reduction and research and development activities on environmental and water technologies are considered in creating the Innovation score. Finally, criteria such as whether the company has environmental assets under management, sustainable building products, and organic production efforts are evaluated, and the score is created.

Another sub-pillar in the creation of the ESG score is the Social Score. This score is related to how the company manages its relations with society. There are four sub-pillars in creating the Social Score: labor, human rights, society, and product responsibility, respectively. When we examine the criteria taken into account in the calculation of the first sub-pillar of the Social Score, the workforce, first of all, whether the company has policies to increase the health and safety of employees in the supply chain and within the company is taken into account. In addition, the existence of supportive and equal policies for the development of the skills of the company's employees is evaluated. In addition, rates such as the rate of female employees and managers in the company, the rate of disabled employees, the accident rate, and the injury rate are taken into account in the calculation of the workforce score. Employee satisfaction, salary differences, and reporting of policies by companies on diseases such as HIV/AIDS in the workplace are also used in calculating the workforce score.

The second sub-pillar of the Social score includes Human Rights. This sub-pillar generally includes companies' respect for the rights of their employees, compliance with ethical rules, and activities aimed at preventing child labor. In this context, the companies' policies, published reports, and news reflected in the media are examined, and the score is formed.

The Society in the third sub-pillar of the Social score is where the company's relations with the society, its fight against bribery and corruption, and its efforts to be a fair competitor are evaluated. In this context, the company's policies to have a good corporate identity, donations it has made in various areas, volunteering activities, and awards it has received in these areas, if any, are also used in the scoring. In addition, it is used to evaluate the company's tax evasion discussions, non-competitive behaviors, and data on intellectual property rights such as patents.

The last sub-pillar in the creation of the Social score is Product Responsibility. In this sub-pillar, the work of the companies on the health, security, and confidentiality of their relationships with their customers is evaluated. In addition, the company's responsibilities in marketing and whether it has various certificates (such as ISO 9000) are examined. Within the scope of product responsibility, variables such as whether the company produces in areas such as alcohol, gambling, tobacco, and weapons, and if so, the rate of profit from these are also used in the scoring.

Governance, the last pillar of ESG, covers how companies implement corporate governance principles, their relations with stakeholders, and how effectively they carry out corporate social responsibility activities. The sub-pillars comprising the Governance score consist of management, stakeholders, and corporate social responsibility (CSR) strategy. The first sub-pillar, comprising the Governance score, is management, which is the area where the company's board of directors' functions are evaluated. Here, the board of directors is evaluated in terms of its characteristics and policies. In this context, whether the board of directors has corporate governance, audit, and nomination committees is examined, and whether there are policies that increase their effectiveness on these are included in the scoring. In addition, data such as the size, diversity, independence, and experience of the board of directors are considered. The general CEO Chairman Duality and CEO Board Member statuses within the board of directors and

detailed information about the board meetings are used in the methodology. Another heading that makes up the Governance sub-pillar is shareholders. In this context, the company's policies on facilitating participation, especially for small shareholders, and using tools to prevent takeovers are examined. Moreover, the company's current shares and the rights and limits of its shareholders are used to evaluate the policies.

The last sub-pillar comprising the Governance score is the company's Corporate Social Responsibility (CSR) Strategy. In this context, whether the company has a corporate social responsibility committee or not and whether the company clearly includes financial and extra-financial issues in its annual reports are used to evaluate. In addition, whether the company has signed the UN Global Compact and whether it publishes an annual sustainability report is included in the scoring. Extra consideration is also given to whether the reports published by the company comply with the GRI guidelines. Finally, the company's sustainability activities, especially the committee activities, and whether these activities are audited are considered in the scoring.

3.1.1.1. ESG Performance of Developing Countries'

In this part, ESG performance of E-7 countries analyzed for the year between 2010-2022.

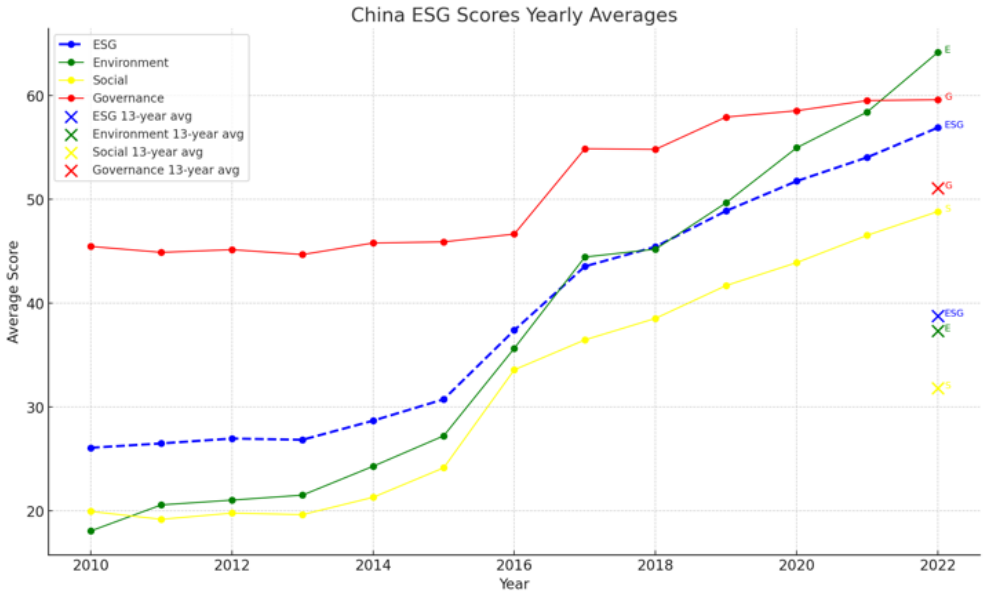


Figure 20. China Average ESG Scores

According to 2022 data, China, which has 31% of global carbon dioxide emissions, emitted approximately 11000 Megatons of carbon in 2022. China, which

increased its carbon emissions by 245% between 2000-2022, is far from today's sustainability perception due to its ongoing activities. When the world's largest CO2 emitter in 2023 (International Energy Agency [IEA], 2023) is analyzed, the development of ESG (Environmental, Social, and Governance) scores over the years is clearly seen. Since 2016, an upward trend has been observed in the ESG scores of companies, but the scores remain in the range of 30-40 on average, and only the Governance score stands out positively.

When we analyze the sub-pillars in detail, the Environmental score is higher than the Social and Governance scores. This indicates that the average Environmental score of the 107 firms operating in China and included in the analysis for 2010-2022 is approximately 65. This may suggest that firms are more sensitive in the Environmental score as a result of the reactions that China has received on environmental issues with its rise in the world market. Also, when we evaluate the 13-year average of 107 firms in terms of Social, another sub-pillar, it is seen that it was at very low levels until 2016 and started to increase after 2016. Here, such a low average Social score in the Chinese market provides important insights into the firms' perspective and attitude towards non-financial issues.

Finally, when we consider the 13-year averages of the Governance score, it is seen that the average of the companies operating in China until 2016 was approximately 45. After 2016, the averages of this score increased. Compared to other scores, it is seen that companies operating in China are more stable in Governance score compared to Environmental and Social scores. This shows that there is a more systematic structure in issues such as corporate governance principles and employee rights. In addition, it is seen in the scores that enterprises are forced to higher standards in topics such as personnel rights and corporate governance, depending on the Governance score in 2016, and these standards are met.

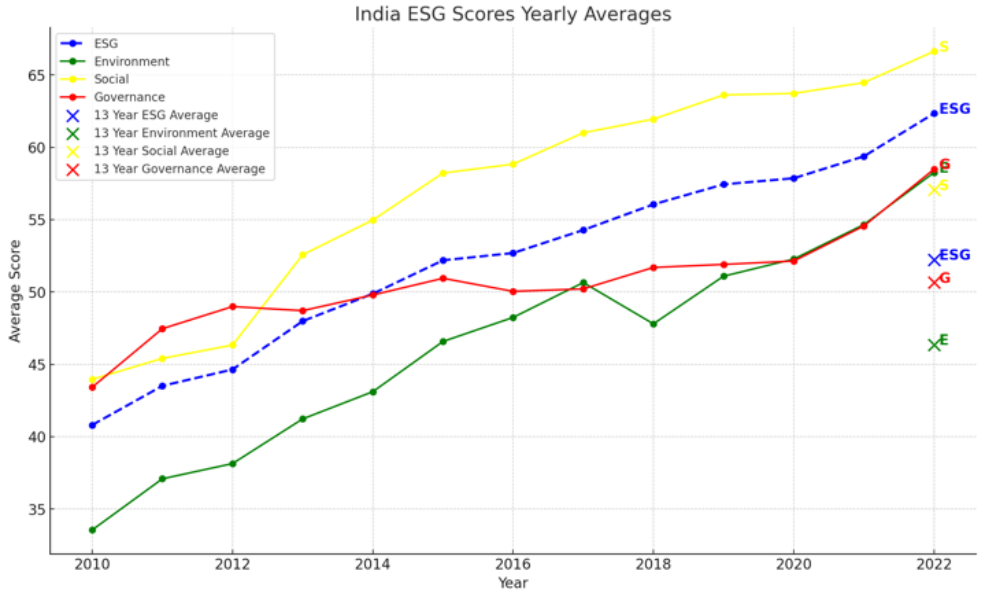


Figure 21. India Average ESG Scores

India accounted for approximately 7.5 percent of global carbon emissions in 2022, increasing its total carbon emissions by 182 percent between 2000 and 2022. With similar economic characteristics to China, sustainability issues do not seem to be as prioritized as economic and financial concerns in the near term in India. For India, which emitted around 2.5 billion tons of CO2 in 2023, the average ESG score is around 50. Among the ESG pillars, the Environmental score is significantly the lowest. Over a 13-year period, the social scores of firms in India have been significantly different and higher than those of the other pillars. The average ESG score of 57 firms operating in India from 2010-2022 is relatively higher than that of China. This shows that firms operating in India integrate sustainability into their workflows faster than Chinese firms. In addition, compliance with sustainability is an important issue in order to create a competitive advantage.

When we analyze the ESG scores of firms operating in India based on sub-pillars, we see that environmental has the worst average score. The general outlook that India has achieved in terms of air and water pollution compared to world averages is also reflected in the Environmental score of companies. Although the average for 2022 is approximately 60, it is seen that the 13-year average is 45.

When this situation is considered together with the total number of companies operating in India and the population, it is at an alarming level. Both national and

international legal and regulatory actions should be taken to regulate and reshape the environmental activities of firms. As the second sub-pillar, the Social scores of firms are the area where firms operating in India have reached the highest scores. In 2022, the average Social score of firms is approximately 70.

This shows that firms operating in India are more successful in issues such as labor and human rights than in issues such as resource use, emissions, and environmental innovation. This is encouraging in the sense that the graph has an upward trend, and at least one of the three sub-pillars appears to be optimistic.

Finally, the Governance score for firms operating in India has been around 50 on average for 13 years. However, in recent years, the average score for this has been increasing like the other scores. Governance scores are highly important for companies in terms of both financial and sustainability performance. Without good governance, enterprises cannot make progress in environmental and social issues. Therefore, firms operating in India need to develop and implement better strategies for corporate governance principles, board of directors, shareholder rights, and corporate social responsibility strategies.

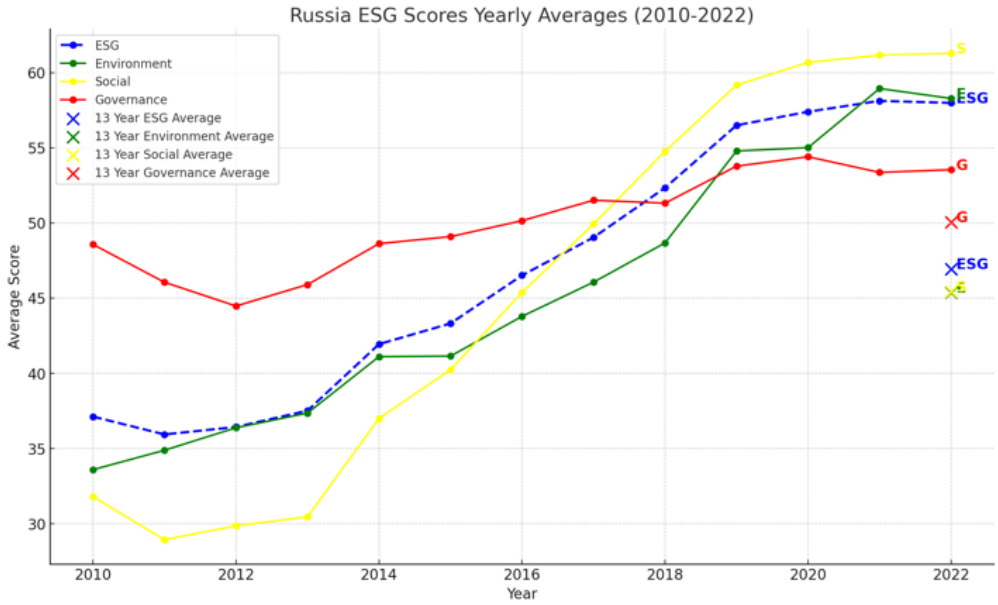


Figure 22. Russia Average ESG Scores

In 2023, Russia emits around 2 billion tons of carbon emissions annually, accounting for around 5% of global carbon emissions in 2022 (IEA, 2024). Its ESG score

is around 50, and an upward trend in ESG scores has been observed since 2018 (Global Carbon Project, 2023). The analysis includes 23 companies operating in Russia between 2010 and 2022 and whose ESG scores are available. The overall average ESG score of these companies is approximately 50 in the 13-year period. However, compared to the 13-year average, the average of the last 3 years is 10 points higher. In correlation with the increasing importance of sustainability, ESG scores are on an upward trend in Russia, as are all countries. This situation represents the development of awareness of sustainability.

When sustainability sub-pillars are analyzed separately, the lowest average score of the firms is in the Environmental category, as in China and India. This is related to Russia being the world's primary energy supplier. Energy is an important source of income in Russia, where natural resources such as natural gas are abundant and exported. The 13-year average of the Environmental scores of the companies is around 45, but in recent years, this average has reached approximately 60. This situation is particularly noticeable in the graph since 2016. Due to the increasing environmental pressure, knowing how much real intention firms have to complete cost-increasing environmentally friendly developments is essential. However, due to the change in competition conditions, the environmental performance of firms operating in environmentally sensitive sectors is becoming more and more important day by day.

Secondly, when the Social score performance of firms in Russia is analyzed, it is seen that the best improvement in 13 years has been achieved in this area. As of 2020, the 3-year Social score average is above 60. The 13-year average of this score is 45. It is important for companies to score higher in the social area. Especially when compared to the Environment and Governance score, the activities belonging to the Social score are seen as easier for companies to implement.

Finally, the 13-year average Governance score of 23 companies operating in Russia is 50. This score, which has a more stable structure compared to other scores, shows that the enterprises have significant basic corporate governance standards in the 13 years. However, the average upward trend in the Governance score in recent years is lower than the Environmental and Social pillars. The difference between the average Governance score for 2020-2022 and the 13-year average is less than the other scores.

This situation may cause Russian companies to be disadvantaged against their competitors in the future and may negatively affect potential international investors.

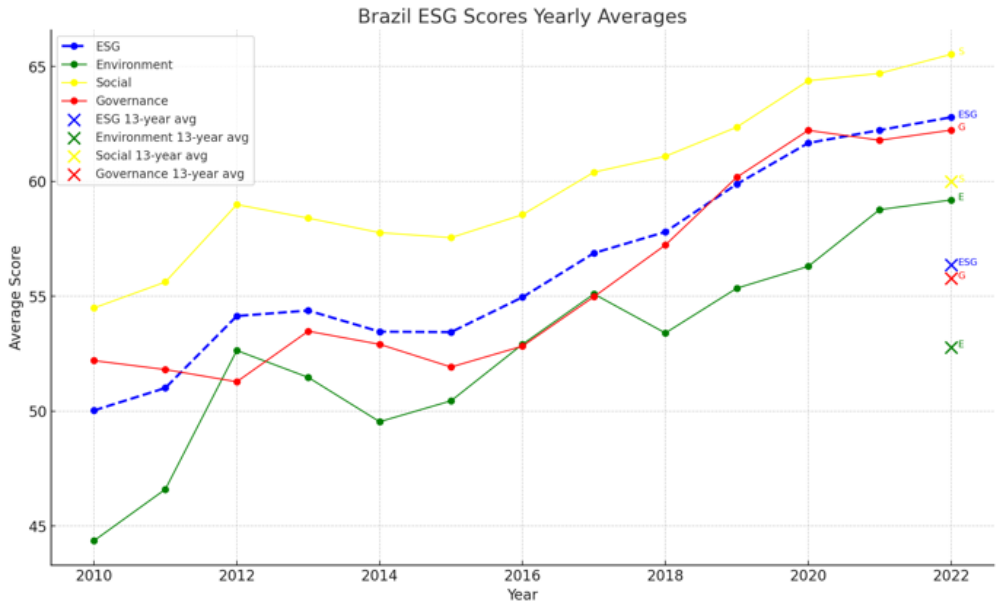


Figure 23. Brazil Average ESG Scores

In Brazil, which emitted approximately 500 million tons of carbon emissions annually in 2023, the 13-year average ESG score is approximately 55, and the lowest average score is observed in the Environmental category (Latin America Energy Outlook [IEA], 2023). Indeed, in this country high revenues are generated from agricultural products such as soya beans, coffee, and sugar, the automotive sector, mining, and forestry are also important sources of income. The scope of the analysis includes 54 firms operating in Brazil. While the average ESG score of these companies for the 13 years between 2010 and 2022 is approximately 55, it is observed that the score has increased to 65 in recent years. As in other developed countries included in the scope of the analysis, sustainability in Brazil is at the development stage and the common feature of these countries is that Environmental scores are lower than other scores. The interaction between growth and environment is similar for developing countries like Brazil.

When we analyze the 13-year sustainability performance of 54 firms operating in Brazil in terms of sub-pillars, Environmental Score has the lowest average, while Social Score has the highest average, as in Russia and India. It has been observed that firms in Brazil have had a higher average environmental score in recent years. The increase in the average Environmental score, especially after 2018, indicates that this issue may increase

further with the increasing environmental awareness and expectations of other stakeholders such as companies, government and public. The most successful area in terms of ESG scores of Brazilian firms is Social score performance, which has been 60 on average for 13 years. In recent years, the average for this score has been around 65. This situation is good and promising, as it is the easiest step for businesses to adapt and integrate sustainability activities.

The average Governance score has been approximately 55 over the 13 years and has approached 65 in recent years. As of 2016, the average Governance score has been on an upward trend, which can be interpreted as the effects of the 2015 Paris Agreement on companies. The importance of sustainability activities in Brazil is on the rise. The graph shows that firms' ESG scores indicate that sustainability activities have become more important in the country over the years.

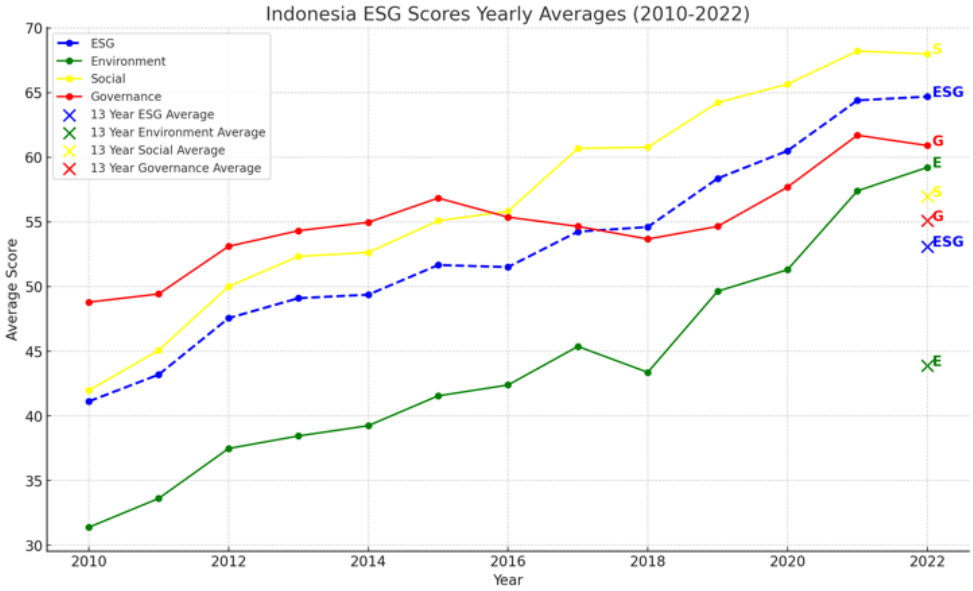


Figure 24. Indonesia Average ESG Scores

According to the International Energy Agency's (IEA) 2022 data, Indonesia is responsible for 2% of global emissions. The distribution of ESG scores is quite similar to that of Brazil, especially in the environmental dimension. For Indonesia, where 24 companies are included in the scope of the analysis, the averages of ESG scores between 2010 and 2022 are shown in the graph. It is seen that the average ESG overall score was approximately 55 in the 13-year period, while the average has been around 65 in recent years. The graph also shows that the ESG score has continuously increased over the years.

When Environmental, Social, and Governance scores are analyzed separately in terms of sub-pillars, it is seen that the Environmental is the pillar with the lowest average score as in other developing countries. However, unlike other countries, there are larger differences between the 13-year averages of the scores in Indonesia. Especially the Environmental score remains low in the 13-year average compared to other scores. This situation can be analyzed specifically for Indonesia, and the reasons for this scoring can be investigated. Although the 13-year average is low for the Environmental score, there has been an increase in the average value of this score in recent years.

When the Social score for Indonesia is analyzed, it is seen that it has the highest value among the other pillars both for recent years and for the 13-year period. This may be the first finding indicating that the integration of sustainability in developing countries is in the development stage. The average Social score for the 24 firms in recent years is about 70, which is one of the highest scores among developing countries.

When we consider the Governance score performance of firms operating in Indonesia, the 13-year average is 55 and has been on an upward trend in recent years. In 2022, the average Governance score of companies is around 60. Firms operating in Indonesia received the highest sustainability scores in Governance until 2016, while they started to receive the highest sustainability scores in Social after 2016.

In general terms, the importance given to ESG issues by companies in Indonesia has made significant progress in the last 10 years. In particular, it should be expected and targeted for companies to maintain their sensitivity to the environment and to continue the rise between 2018-2022 in the coming years.

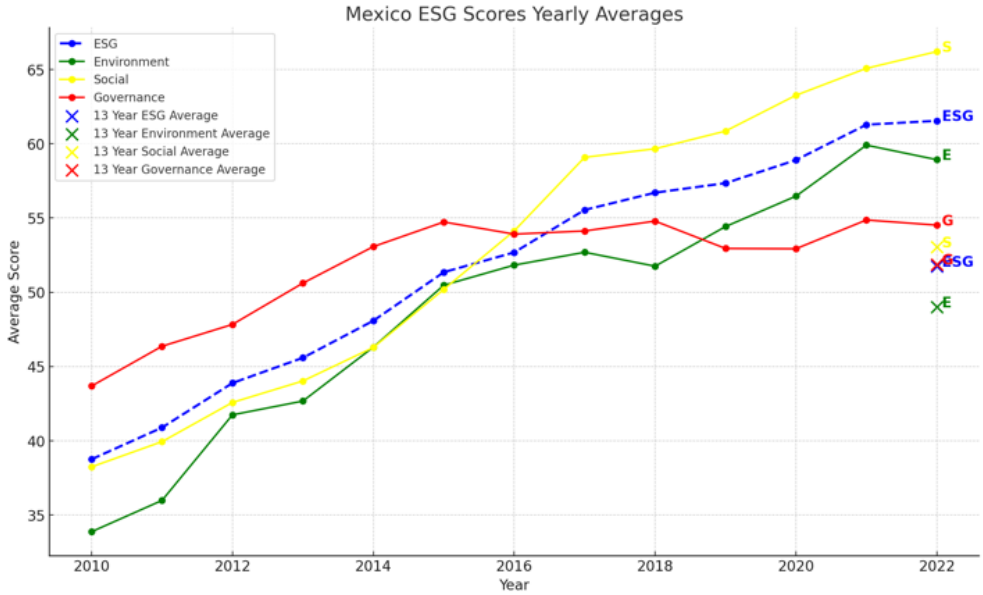


Figure 25. Mexico Average ESG Scores

In 2023, Mexico, the world's 11th largest oil producer, produced approximately 500 million tons of carbon emissions (IEA, Latin America Energy Outlook 2023). On the other hand, the ESG score averages between 2010 and 2022 are like those of other developing countries in Mexico. In Mexico, 21 companies were included in the scope of the analysis. The ESG scores of the companies in the country were between 50 and 55 points on average over a 13-year period. Between 2010 and 2022, it is observed that firms have continuously increased their sustainability scores, and the average in the last years is approximately 60.

When the graph's results are analyzed in terms of ESG pillars, it is seen that the lowest average score is Environmental, similar to other developing countries. This may be due to the Mexican economy's intensive activities in the oil, natural gas, and automotive industries. However, although the 13-year average is low, the average Environmental score has been increasing in recent years. As in other developing countries whose graphs are analyzed above, Mexico's sustainability area with the highest average is Social. Companies have achieved higher Social scores, especially after 2016. While the overall average social score is approximately 55, the average score is around 65 in 2021.

Finally, when we evaluate the Governance score, while Governance was the area where companies received the highest average score until 2016, the score has the lowest average after 2016. This may indicate that firms have problems increasing and

maintaining various corporate governance principles, employee rights, and corporate social responsibility activities. In general, ESG activities in Mexico have gained importance over the years, but firms need to perform better, especially in the Environmental and Governance pillars. In the environmental area, renewable energy and waste management issues need to be reconsidered and implemented more carefully.

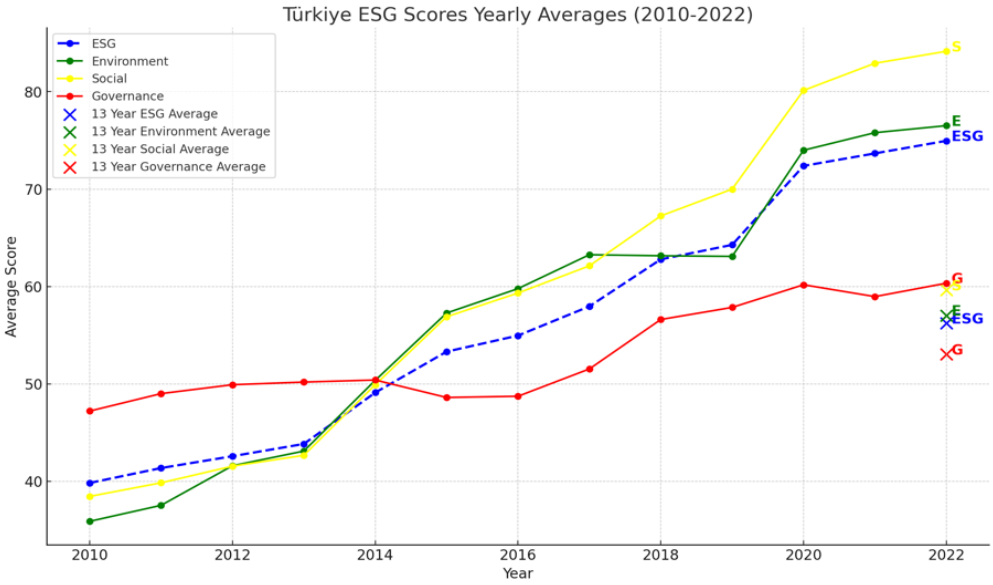


Figure 26. Türkiye Average ESG Scores

According to Turkish Statistical Institute (TurkStat) data, Turkey produced approximately 550 million tons of emissions in 2022. The country is making significant efforts to reduce carbon emissions and promote renewable energy. Analyzing Turkey's average ESG scores, the 13-year average is similar to other countries, but the increase in scores since 2020 has been remarkable. In particular, companies' environmental scores are higher (around 80) than those of the other six developing countries.

The analysis, which includes 25 companies operating in Turkey, finds that Turkey's average ESG performance between 2010 and 2022 was higher than that of the other countries whose graphs are analyzed above. This suggests that the integration of sustainability activities in Turkey is faster and more feasible. The 13-year average ESG score is approximately 55, but the average in recent years is 75. This development is visible in the graph, especially since 2016. The fact that companies have high ESG scores may provide a competitive advantage for companies compared to their competitors operating in the same sector. Moreover, due to compliance with the Paris Climate

Agreement and 2030 targets, the development of companies in this direction may cause them to be more preferred and attract investors in the future.

When the average ESG performance of 25 firms operating in Turkey is analyzed separately, the environmental score differs from that of other developed countries. Unlike other developed countries, the performance of the firms in Turkey under the Environmental score is high. Although this situation shows optimistic results, it may be related to the fact that there are fewer environmentally sensitive firms among the firms included in the scope of the analysis. In other words, the fact that there are more financial institutions among the firms included in the analysis in Turkey may have affected the results since they are less environmentally sensitive sectors. However, it is still a positive situation that the firms have averaged approximately 80 points in the Environmental score in recent years.

When the 13-year performance of companies in Turkey under Social scores is analyzed, the average is 60. The average for the last years has the highest score among developing countries, approximately 85. This indicates that firms operating in Turkey have made better progress in labor, human rights, community, and product responsibility. When the average ESG performance of firms operating in Turkey is analyzed based on Governance, the lowest performance is observed in this area. Although the average Governance score achieved by companies in recent years is 60, the 13-year average is approximately 55. These results are similar to those of Indonesia, India, and China.

Firms in Turkey need to improve themselves in various basic issues to achieve higher governance scores. In particular, it is important to carry out various activities to increase the effectiveness of the board of directors and establish committees. In addition, activities on shareholder rights should be strengthened, and activities should be carried out in a fair and transparent manner. In general, the ESG performance of firms operating in Turkey is higher compared to other developing countries. ESG performances will reach higher levels in the coming years, especially with the prioritization of the requirements of the Governance pillar. Firms' high ESG scores may allow them to stand out from their competitors due to increasing sustainability concerns worldwide.

3.1.1.2. ESG Performance of Developed Countries'

In this part, ESG performance of G-7 countries analyzed for the year between 2010-2022.

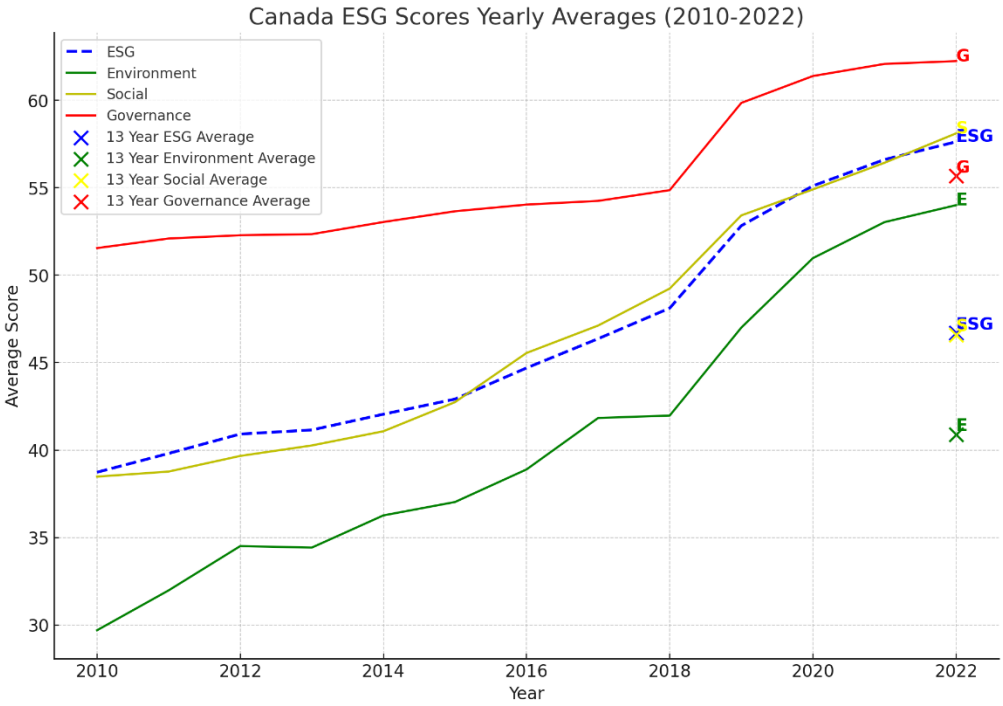


Figure 27. Canada Average ESG Scores

Canada, which aims to achieve net-zero emissions by 2050 and reduce greenhouse gas (GHG) emissions by approximately 45% compared to 2005 levels by 2030, accounts for about 2% of global GHG emissions (IEA, Canada 2022 Energy Policy Review). Within the scope of the study, the ESG performance of 149 firms in Canada was examined, revealing an average ESG score ranging between 45 and 50 for the period 2010–2022. However, in recent years, particularly as of 2020, the average overall ESG score has reached 55. When the sustainability scores of these firms are evaluated from an environmental perspective, the results indicate a significant gap between the targets. The 13-year average Environmental score is approximately 40 points, making it the area with the weakest performance compared to the Social and Governance scores. Although the Environmental score average of firms has risen to 55 in recent years, these results are insufficient for Canada, which is categorized as a developed country. However, these results should be assessed because energy production and use account for 80% of Canada's total GHG emissions.

These firms' 13-year average Social score performance is around 45–50. Like the overall ESG score performance, Social score performance has also increased in recent years. Lastly, when examining Governance scores, the situation differs significantly from that of developing countries. Among the 149 firms operating in Canada, governance performance stands out as the strongest in both the 13 years and recent years. This outcome may be associated with the country's level of development, adherence to corporate governance principles, and the established nature of firms. In summary, the ESG performance of firms in Canada has shown improvement over the years. Notably, the progression in firms' ESG performance since 2018 is clearly illustrated in the graph.

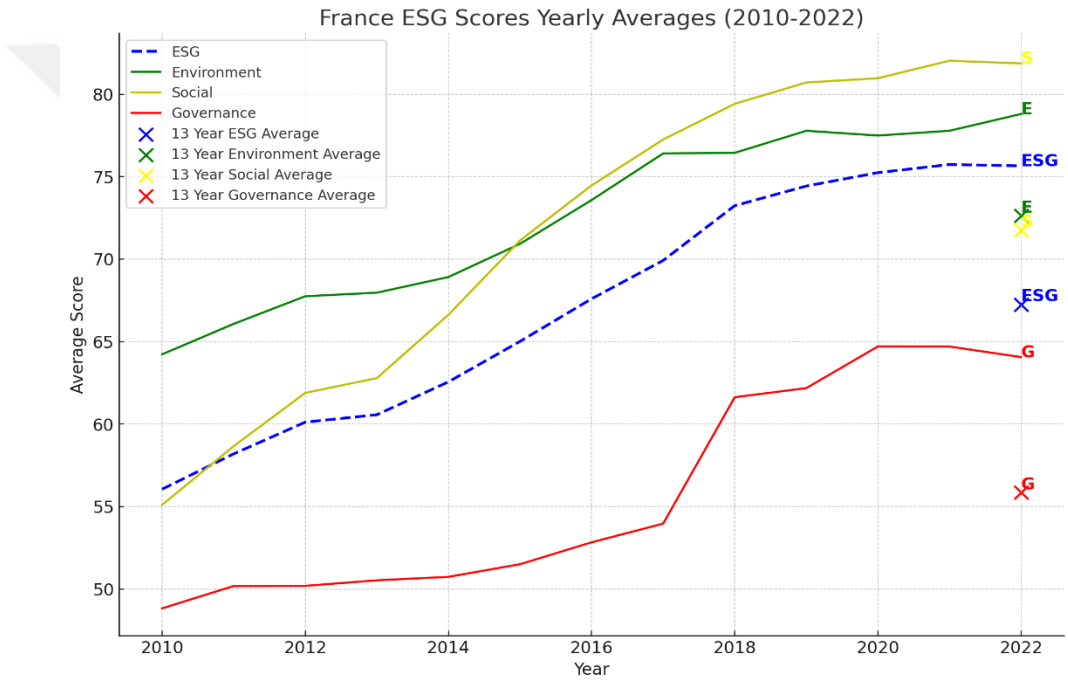


Figure 28. France Average ESG Scores

As of 2022, France accounts for only 0.8% of global greenhouse gas (GHG) emissions and possesses the second-largest nuclear fleet after the United States. A leader in setting ambitious targets for energy transition early on, France reduced its GHG emissions by approximately 22% between 2000 and 2022 (IEA, 2025). With approximately 283 megatons of carbon dioxide emissions as of 2022, France enacted a law in 2019 committing to achieving net-zero emissions by 2050. Additionally, the country has set a target to reduce GHG emissions by 55% by 2030 compared to 1990 (IEA, 2021).

The study, which includes the analysis of 73 companies, presents the ESG performance scores of firms in France from 2010–2022 in a graphical format. The results indicate that the average ESG score of companies operating in France during these 13 years ranges between 65 and 70. As of 2020, recent data reveal that the average score has reached 75. Compared to developing countries, France's results are significantly higher, allowing us to infer a strong correlation between the level of sustainability activities and a country's level of development.

When the 13-year Environmental, Social, and Governance performance of the 73 firms operating in France is analyzed separately, the Environmental score averages approximately 75. Moreover, in recent years, Environmental scores have reached as high as 80. The high Environmental scores indicate that, on average, firms have successfully utilized resources, emissions management, and environmental innovations. Additionally, firms' strong performance in energy efficiency and renewable energy activities positively influences their environmental scores. When comparing France's Environmental score averages with those of Canada, it is evident that French firms can serve as a valuable benchmark for Canadian firms.

The average Social score in France ranges between 70 and 75, with recent averages exceeding 80. Like Environmental scores, Social scores indicate strong performance by firms in this area. As a metric summarizing stakeholder relations, the Social score can have significant implications for the public perception of firms. Finally, when assessing the Governance scores of firms operating in France, it is evident that this is where firms exhibit the weakest performance compared to other dimensions. The 13-year average Governance score is approximately 55, while recent averages have risen to around 65. France's average Governance scores are comparable to those of Turkey, Brazil, and Canada.

In conclusion, the ESG performance of firms in France is high, except in the Governance dimension. The ESG performance of firms has continuously improved since 2014, with a notable increase in sustainability scores since 2018, as clearly illustrated in the graph.

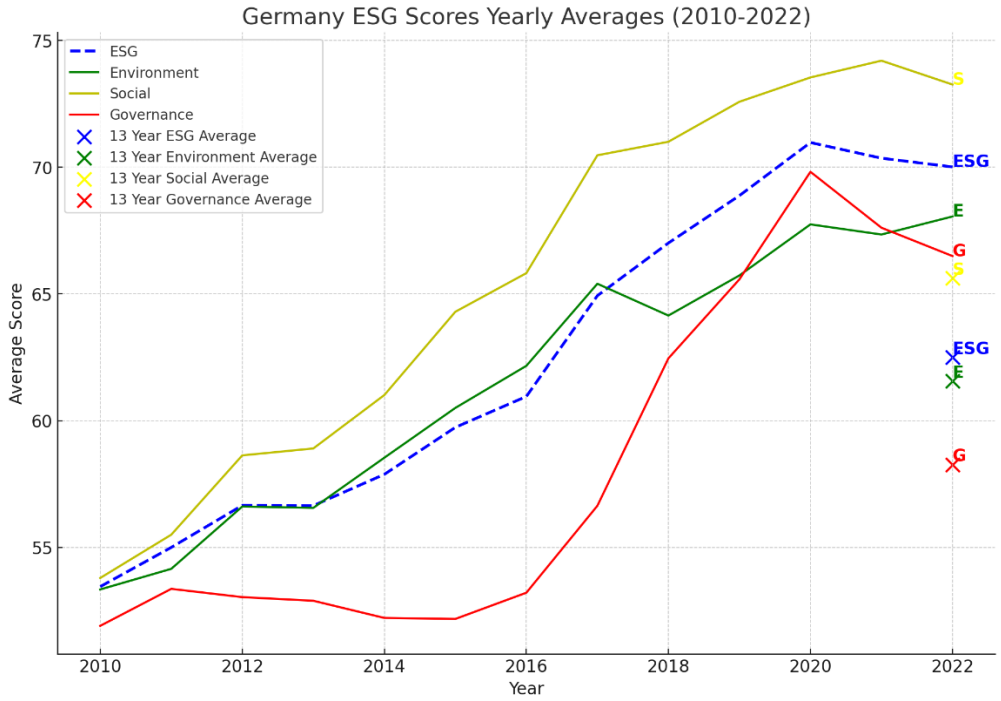


Figure 29. Germany Average ESG Scores

Germany had set a goal to reduce greenhouse gas (GHG) emissions by 40% by 2020 and 55% by 2030, compared to 1990. With a target to achieve carbon neutrality by 2050, Germany accounted for approximately 2% of global carbon dioxide emissions as of 2022. In 2022, Germany emitted 612 Mt CO_2 and succeeded in reducing its total GHG emission levels by 25% from 2000 to 2022. However, despite the overall progress in reducing emissions, short-term targets remain challenging due to inconsistent advancements in sectors such as transportation and heating. Although renewable electricity generation has increased significantly, this has not translated into a corresponding decrease in total emissions within the country (IEA, Germany 2020 Energy Policy Review).

The ESG performance of 63 firms operating in Germany is presented in the table above. In this context, the average ESG score of these firms for the period 2010–2022 is approximately 65, with the performance in recent years reaching a level of 70 as of 2022. When the ESG performance of firms is analyzed in terms of the Environmental dimension, the average value is similar to the overall ESG score, with the average score in recent years being around 70. While the average Environmental scores of firms in Germany do not align with those in Canada, they are comparable to those in France.

The results for Social scores are superior to those of Environmental and Governance scores. The 13-year average Social score of firms is approximately 62, while in recent years, the average Social score has approached 75. These results are favorable for firms operating in Germany. Finally, when evaluating firms' governance performance, this pillar scores lower than the other two pillars. Over the 13 years, firms achieved an average Governance score of approximately 60, with the highest value in this dimension being around 70, recorded in 2020. These results for Germany are similar to those of France but differ from those of Canada. Overall, when considering the 13-year ESG performance of the 63 firms in Germany as a whole, it is evident that the integration of sustainability into firms' workflows aligns with government policies, although progress remains slow.

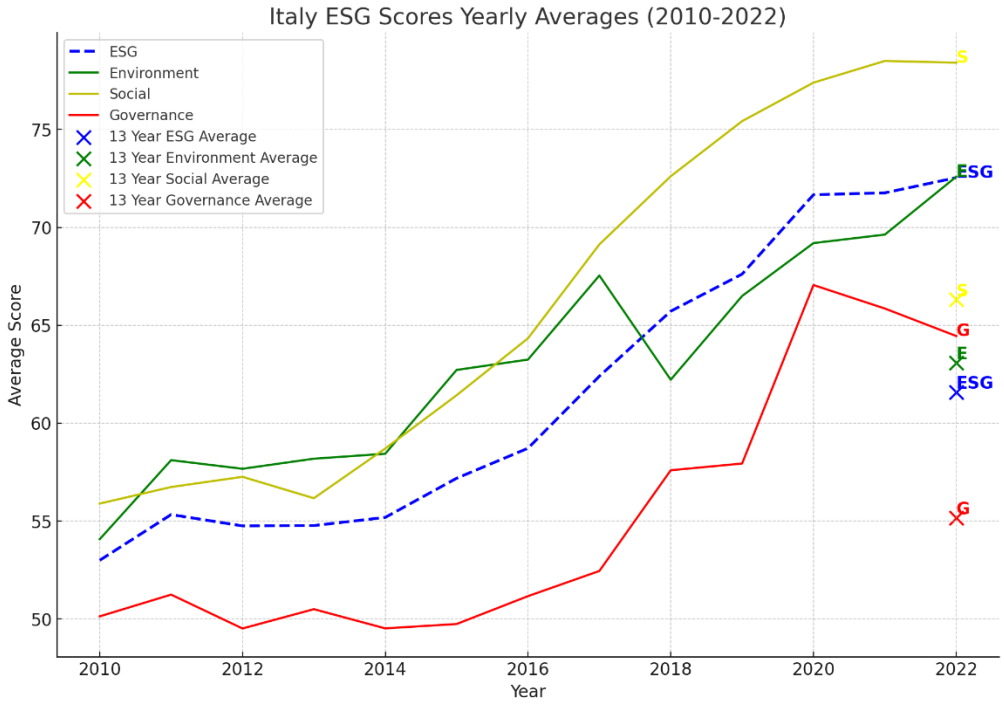


Figure 30. Italy Average ESG Scores

Italy aims to increase the share of renewable energy in total energy consumption to 30% and in electricity generation to 55%, while targeting carbon neutrality by 2050. Compared to 2010, Italy's energy system has undergone significant changes, with the country's energy supply now relying more on natural gas and renewable energy, and less on coal and oil. As a result of these efforts, Italy reduced its total greenhouse gas (GHG) emissions by approximately 30% between 2005 and 2019 (IEA, Italy 2023 Energy Policy Review).

Analyzing the ESG performance of 28 firms operating in Italy between 2010 and 2022 shows that the average ESG score is approximately 62. However, particularly after 2020, the average has increased to 73. The upward trend in firms' average ESG scores since 2014 is clearly illustrated in the graph. The ESG scores of firms operating in the country provide valuable insights into their alignment with government policies and targets for Italy.

When ESG performance is analyzed in terms of its sub-pillars for the period 2010–2022, the average Environmental score is found to be similar to the overall ESG score. In recent years, the average Environmental score has exceeded 70. If Italian firms maintain this performance in the coming years, the outlook will become even more optimistic. The 13-year average Social score performance of the 28 firms is 62; however, the recent performance has reached approximately 80. The Social score performance of Italian firms is better than that of German and Canadian firms and comparable to that of French firms. Since 2016, Italian firms have shown significant improvements in this dimension, and this progress is reflected in their Social scores, as depicted in the graph.

Finally, when examining the average Governance score of the firms, the results differ significantly from those of the Environmental and Social pillars. Italian firms have not been able to achieve the same level of success in the Governance pillar as in the other two pillars. Over the 13-year period, the average Governance score was 55; however, in recent years, this average has increased to 65. Italy's Governance scores are similar to those of Canada and France. Nevertheless, Italian firms need to produce better results in Governance-related areas in the coming years. In summary, while firms in Italy perform at average levels in the Environmental and Social pillars, they need to allocate more time and resources to various corporate governance and corporate social responsibility issues within the Governance pillar.

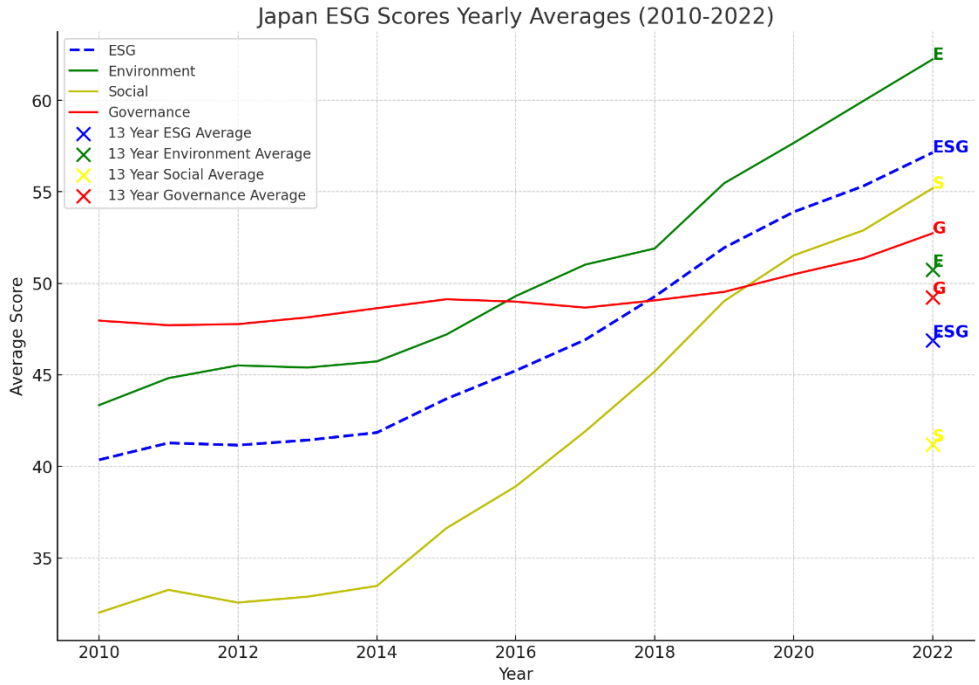


Figure 31. Japan Average ESG Scores

In 2020, Japan's new Prime Minister announced the nation's target to achieve net-zero greenhouse gas (GHG) emissions by 2050 and create a carbon-neutral society. Accounting for approximately 3% of global emissions in 2022, Japan managed to reduce its emissions by 15% between 2000 and 2022. However, despite these efforts, Japan's reliance on imported fossil fuels necessitates rapid progress in achieving the substantial emission reductions required to meet its future targets (IEA, Japan 2021 Energy Policy Review).

The ESG performance of 361 firms in Japan during the period 2010–2022 is illustrated in the graph above. Accordingly, the 13-year average ESG score of firms operating in Japan is approximately 47. However, the average ESG score has risen to around 58 in recent years. While the ESG score average in Japan is similar to that of Canada, it remains lower than the averages of France, Germany, and Italy. Although improvement in scores has been observed in recent years, it is evident that firms need to emphasize ESG-related issues more. When the ESG performance of firms is analyzed by pillars, Environmental scores emerge as the area in which Japanese firms perform best, in contrast to France, Italy, Germany, and Canada. This indicates that legal regulations, government policies, and national missions have influenced the activities of firms. Although the 13-year average Environmental score is around 50, the average

Environmental score of firms in recent years has exceeded 60. However, despite this progress in the Environmental pillar, Japan's overall averages remain low compared to other developed countries.

Secondly, the 13-year average Social score of firms operating in Japan is very low, at approximately 42 points. Although the recent average has risen to 55 points, firms need to improve significantly in this area. Regarding Governance scores, the 13-year average is approximately 50, while the average in recent years has reached around 54. Similar to the other ESG sub-pillars, the Governance score averages of firms operating in Japan are lower than the overall averages for developing countries. This situation may stem from legal, geographical, operational, or other factors affecting firms. While these conditions may vary from country to country or society to society, firms must act with a shared understanding of sustainability. Overall, Japan's ESG performance is relatively low compared to other developed countries. This highlights that the perception and prioritization of sustainability are not uniformly emphasized across regions globally. Although government declarations on sustainability may exhibit similarities, the sustainability performance of firms within the country reveals discrepancies between rhetoric and implementation.

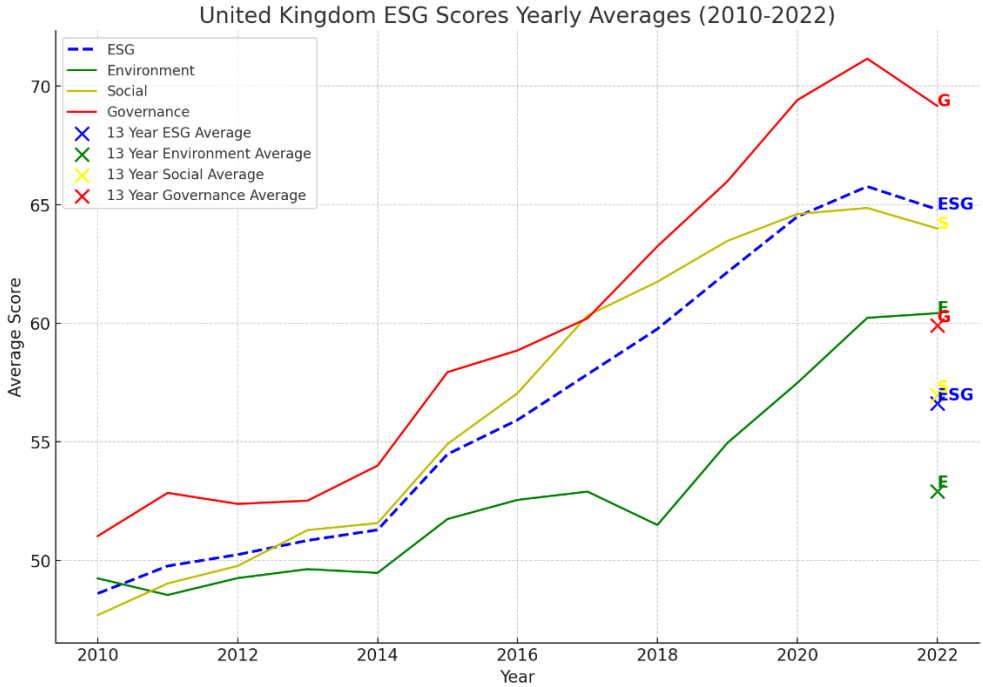


Figure 32. United Kingdom Average ESG Scores

The United Kingdom, accounting for approximately 1% of global emissions in 2022, has been an early player in energy transition. As one of the first countries to initiate net-zero targets and carbon budgets, the UK achieved a reduction of approximately 41% in total greenhouse gas (GHG) emissions between 2000 and 2022. Committed to reducing emissions by 68% compared to 1990 levels by 2030, the UK emitted around 310 megatons of carbon in 2022 (IEA, the United Kingdom 2024 Energy Policy Review).

The graph above presents the ESG performance of 181 firms in the UK during the period 2010–2022. These firms' average ESG score over the past 13 years is approximately 57, while in recent years, it has risen to around 65. The average ESG score of firms in the UK is higher than that of Canada and Japan but lower than the averages for Germany, France, and Italy. When ESG performance is analyzed by sub-pillars, the Environmental score is observed to be the lowest among the three pillars over the 13 years. The 13-year average Environmental score is approximately 55, while the recent average is slightly above 60. The low Environmental scores of firms operating in the UK are not aligned with the sustainability declarations, activities, and targets set by government authorities.

Private and publicly traded firms are also expected to align with these sustainability processes alongside governmental initiatives. The 13-year Social score performance of the 181 firms in the UK is similar to the overall ESG score, with the recent average Social score also being around 65. This consistency indicates that firms in the UK have maintained moderate performance in this dimension over time.

Finally, the 13-year average Governance score of UK firms is approximately 60, with the recent average rising to around 70. This performance is higher than the averages observed in developed countries such as Japan, Italy, Germany, France, and Canada. This suggests that UK firms demonstrate better management of corporate governance, employee relations, board structure, and corporate social responsibility issues under the Governance pillar.

In conclusion, while the ESG performance of firms operating in the UK requires further improvement in certain areas, it shows promise in others. As depicted in the graph, the progress in firms' ESG performance since 2014 indicates that sustained improvement in this area will contribute significantly to achieving the country's various sustainability goals.

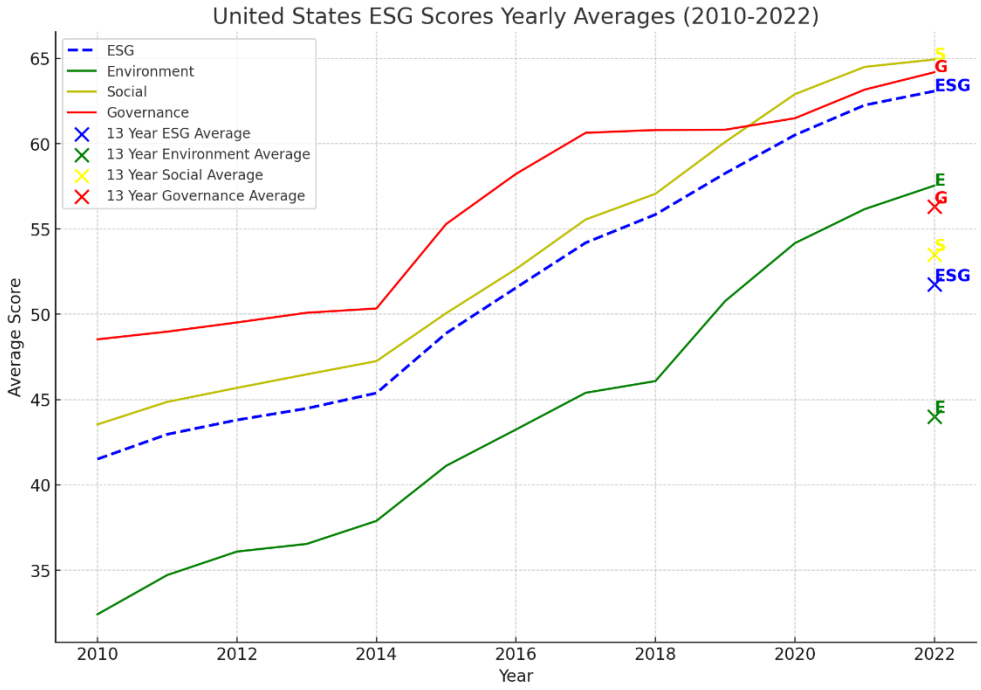


Figure 33. United States Average ESG Scores

As the world's largest oil producer and liquefied natural gas exporter, the United States is critical in supporting international energy security. In 2022, the U.S. was responsible for approximately 4,610 megatons of carbon emissions, accounting for 13.5% of total global emissions. Between 2000 and 2022, the U.S. achieved a 20% reduction in total emissions and has since implemented significant energy and climate policy reforms to transition the country towards a secure, affordable, and net-zero emissions economy (IEA, United States 2024 Energy Policy Review).

The analysis included 610 firms operating in the U.S. between 2010 and 2022 for which ESG scores were available. The findings indicate that these firms' 13-year average ESG score is approximately 52, while recent ESG performance has risen to around 65. These results are similar to those of the United Kingdom, higher than Canada and Japan, but lower than France, Italy, and Germany. When analyzing the average performance of the 610 firms across ESG sub-pillars, the 13-year average Environmental score is approximately 45. Although the recent average Environmental score has exceeded 55, the results are comparable to those of Canada and the United Kingdom and suggest that firms do not adequately prioritize environmental issues within the broader context of sustainability. As one of the top three global emitters, the U.S. should take further steps to encourage firms to focus more on environmental issues.

Examining the Social score, the 13-year average is approximately 54, as depicted in the graph, while in recent years, this score has reached 65. For the final ESG sub-dimension, Governance, the 13-year average for firms operating in the U.S. is approximately 57, with the recent average nearing 65, similar to the Social score. Governance scores for U.S. firms are higher than those of Japan, lower than the United Kingdom, and comparable to Italy, France, Canada, and Germany.

Overall, ESG performance for firms in the U.S. has exhibited a clear upward trend since 2014. The understanding, adoption, and implementation of sustainability and corporate social responsibility practices by firms are noteworthy. Accelerating efforts and regulations within the Environmental dimension could result in a more optimistic outlook for the future.

3.2. Methodology

This thesis aims to integrate variables created with sustainability scores of companies into classical asset pricing models. For this reason, financial and sustainability data of a total of 14 developed and developing countries were collected through the Refinitiv Eikon database.

The companies operating in E-7 and G-7 countries that the research will include were determined by some basic criteria. At this stage, firstly, the data scope included companies with regular ESG scores between 2010-2022. This situation narrowed the total number of companies to be used to a great extent (approximately 85%). Although the number of companies with ESG scores has increased significantly in recent years, the number of companies with data between 2010-2022 is quite low.

China, India, Brazil, Indonesia, Mexico, Russia and Turkey were included in the study within the scope of the 7 developing countries. A total of 311 companies were included in the analysis, 107, 57, 54, 24, 21, 23 and 25 from these countries, respectively.

Canada, France, Germany, Italy, Japan, the United Kingdom and the United States were included in the study within the scope of the 7 developed countries. A total of 1465 companies were included in the analysis, 149, 73, 63, 28, 361, 181 and 610 from these countries, respectively.

After determining the companies with regular ESG scores, various financial data of the companies were obtained and organized. In order to integrate ESG scores, the model in the study titled "A five-factor asset pricing model" published by Fama & French in 2015, which is the most widely accepted and easily testable asset pricing model frequently used in the literature, was used.

Since the historical development of the model developed by Fama and French was explained above under the title of the importance and development of investment theory, it will not be explained again here. However, the creation of the factors in the asset pricing model and the installation of the model will be explained.

Using the same dataset as in their earlier three-factor models, Fama and French found statistically more significant results with their five-factor model, expressed below.

$$\mathbf{R_{it}\text{-}Rf_{it}}=\alpha_i+\beta_i(Rm\text{-}Rf)_{it}+s_iSMB_{it}+h_iHML_{it}+r_iRMW_{it}+c_iCMA_{it}+\varepsilon_i$$

$\mathbf{R_{it}\text{-}RF_{it}}$= The expected excess return of security/portfolio i over the risk-free rate,

$\mathbf{Rm_{it}\text{-}Rf_{it}}$ = The expected excess return of the market portfolio over the risk-free rate,

$\mathbf{SMB_{it}}$ = The return difference between portfolios of small-cap stocks and large-cap stocks *(Small Minus Big),*

$\mathbf{HML_{it}}$ = The return difference between portfolios of stocks with high and low book-to-market ratios *(High Minus Low),*

$\mathbf{RMW_{it}}$ = The return difference between portfolios of stocks with high and low profitability *(Robust Minus Weak),*

$\mathbf{CMA_{it}}$ = The return difference between portfolios of stocks with high and low investment levels *(Conservative Minus Aggressive),*

$\boldsymbol{\beta_i}$= sensitivity of the excess returns of portfolio i to the excess returns of the market,

$\mathbf{s_i}$= sensitivity of the excess returns of portfolio i to the SMB factor,

$\mathbf{h_i}$= sensitivity of the excess returns of portfolio i to the HML factor,

$\mathbf{r_i}$= sensitivity of the excess returns of portfolio i to the RMW factor,

$\mathbf{c_i}$= sensitivity of the excess returns of portfolio i to the CMA factor,

$\boldsymbol{\alpha_i}$= the difference between the actual return and the return predicted by the model,

$\boldsymbol{\varepsilon_i}$= the residuals

In their 2015 study, Fama and French tested the FF5F model, which includes the market factor, firm size (SMB), book-to-market ratio (HML), profitability (RMW), and investment (CMA) factors of firms traded on the NYSE, AMEX, and NASDAQ stock markets. During the portfolio formation phase, they followed the same methodology as in their 1993 study, where they introduced the FF3F model.

The firm size factor, SMB, essentially considers the market capitalization of firms. Market capitalization for a firm is calculated as the product of the number of outstanding shares and the stock price, commonly denoted as MCAP, Market Capitalization, or MV (Market Value). In Fama and French's studies (1993 and 1995), firms were ranked annually based on their market capitalization at the end of year "t" and divided into small and big groups. The classifications were determined using market capitalization figures as of the end of June of the corresponding year, and these figures were utilized to construct portfolios for the period from July of the year "t" to June of the year "t+1."

The value factor, HML, is calculated based on firms' book-to-market ratios. Firms classified by market capitalization were further ranked by their book-to-market ratios and divided into three groups: 30% Low (L), 40% Medium (M), and 30% High (H). The book-to-market ratio for each firm in a given year was calculated by simultaneously dividing the equity value at the end of year "t-1" by the market value.

One of the two new factors included in Fama and French's five-factor model, the Profitability Factor (RMW), essentially represents the operating profitability ratio. Firms previously grouped by market capitalization were further categorized into three groups based on the ratio of operating profit to equity value: 30% Weak (W), 40% Medium (M), and 30% Robust (R). The annual profitability ratio for each firm was calculated by dividing the operating profit of year "t-1" by the equity value of year "t-1."

The second new factor included in Fama and French's 2015 model is the Investment Factor, referred to as CMA. Also known as the investment ratio, this factor is calculated based on the asset growth rate of firms. It is determined by dividing the difference in total assets between years "t-1" and "t-2" by the total value of assets in year "t-2." As previously explained, this factor is divided into three groups. Firms with a low investment ratio are classified as 30% Conservative (C), medium-sized firms as 40% Medium (M), and firms with a high investment ratio as 30% Aggressive (A). For each firm, the investment ratio for year "t" is calculated by dividing the total asset difference between years "t-1" and "t-2" by the total asset value in year "t-2."

It is aimed at integrating the companies' sustainability scores into the asset pricing model by including them in the 5-factor model of Fama and French. In this context, factors created with ESG scores are needed. When the companies' annual ESG scores are turned into factors to show the development or differences between the years, it is expected to give meaningful results within the asset pricing model.

However, since the ESG scores are published annually in this study, all data belonging to the companies, including financial and sustainability, are used annually. It was planned to include ESG scores as the 6th factor after all the factors in the Fama and French 5-factor model are arranged annually. In addition, while collecting the companies' data, companies with negative equity values were not included in the study as Fama and French did in their study. In addition, companies with problems in their financial data and various basic data missing or deficiencies were not included in the analysis while creating the data sets.

In order to measure the integration of the factors created with ESG scores into the asset pricing model and their impact on asset prices, 2 ESG factors were created. The first of these factors was created using the direct ESG scores of the companies specific to the years. By creating portfolios similar to the factors in the Fama and French 5-factor article, the difference between portfolios with low, medium, and high ESG scores and their effect and relationship on the asset price is tried to be measured.

The second ESG factor was created not by using the companies' scores directly but by using their growth rates. What we are trying to distinguish here is that the growth in the companies' ESG scores may be equal, but its growth at the current rate is

proportionally different. Again, similar to the Fama and French 2015 study, the second ESG factor created by creating the portfolios will be included in the asset pricing model.

With these two new variables, which we call ESGt1 and ESGt2 factors, we aim to examine whether sustainability activities affect stock performance. Today, many studies examine the relationship between companies' sustainability activities and their financial performance.

In order to integrate the factors created with ESG scores into asset pricing models and to analyze the effect of ESG scores on asset prices, we analyzed each country separately. For this purpose, we accepted the annual return of each country's most accepted stock market index as the average market return. We also determined the risk-free interest rate for each country as the government's 2-year bond yield in the selected country. In addition, the beta value for each company was created by Refinitiv Eikon according to years.

The following models were created because the sustainability scores of companies over the years would be a good proxy for explaining stock performance.

3.2.1. Model Created Using ESG Scores – ESGt1 Model

The model established for integrating the factor we created using ESG scores into the Fama and French 5-factor model is given below.

$$R_{it}\text{-}Rf_{it}=\alpha_i+\beta_i(Rm\text{-}Rf)_{it}+s_iSMB_{it}+h_iHML_{it}+r_iRMW_{it}+c_iCMA_{it}+e_i\mathbf{ESGt1_{it}}+\varepsilon_i$$

The Sustainability Factor (ESG) was calculated using the sustainability scores of each firm from the t−1 year. As part of this process, firms were first divided into large and small groups based on their market capitalization. Then, they were classified into three categories according to their ESG scores: 30% of firms with low ESG scores were categorized as Small (S), 40% with medium ESG scores as Medium (M), and 30% with high ESG scores as Big (B).

S/S: A portfolio of stocks from firms with small market value and low ESG scores.

S/M: A portfolio of stocks from firms with small market value and medium ESG scores.

S/B: A portfolio of stocks from firms with small market value and high ESG scores.

B/S: A portfolio of stocks from firms with large market value and low ESG scores.

B/M: A portfolio of stocks from firms with large market value and medium ESG scores.

B/B: A portfolio of stocks from firms with large market value and high ESG scores.,

During the portfolio formation phase, the risk factors were calculated as in Fama and French's (2015) study. The calculation methods are detailed in the table below. Additionally, the ESG factor to be integrated was also calculated in a manner similar to the methodology of Fama and French (2015).

Table 3. Factor Components and Cutoff Points

Cutoff Points	**Factor Components**
Size: Median Book to Market Ratio (B/M): 30th and 70th percentiles Profitability: 30th and 70th percentiles Investment: 30th and 70th percentiles ESG: 30th and 70th percentiles	*SMBB/M = (SH + SN + SL)/3 – (BH + BN + BL)/3* *SMBOP = (SR + SN + SW)/3 – (BR + BN + BW)/3* *SMBInv = (SC + SN + SA)/3 – (BC + BN + BA)/3* *SMBESG = (SS + SN + SB)/3 – (BS + BN + BN)/3* *SMB = (SMBB/M + SMBOp + SMBInv + SMBESG)/4* *HML = (SH + BH)/2 – (SL + BL)/2* *RMW = (SR + BR)/2 – (SW + BW)/2* *CMA = (SC + BC)/2 – (SA + BA)/2* *ESG = (SB + BB)/2 – (SS + BS)/2*

3.2.2. Model Created Using Growth Rate in ESG Scores – ESGt2 Model

The ESGt2 model specifies the variable for creating portfolios, using the growth in these scores instead of the companies' ESG scores themselves. The model established for integrating the factor we created using ESG scores into the Fama and French 5-factor model is given below.

$$R_{it}\text{-}Rf_{it}=\alpha_i+\beta_i(Rm\text{-}Rf)_{it}+s_iSMB_{it}+h_iHML_{it}+r_iRMW_{it}+c_iCMA_{it}+e_i\mathbf{ESGt2_{it}}+\varepsilon_i$$

The ESG factor added according to the established model was obtained by calculating the growth rate of each company's ESG score between t-2 and t-1. Here, the calculation for each year t was calculated by dividing the difference between t-2 and t-1 by t-1.

In this context, first of all, companies were divided into two groups, large and Small, according to market value: 30% Small (S) for the small group, 40% Medium (M) for the medium group, and 30% Big (Big -B) for companies with high ESG scores according to their growth rate in their ESG scores.

S/S: Portfolio consisting of stocks with small market value and low ESG growth rate.

S/M: Portfolio consisting of stocks with small market value and medium ESG growth rate.

S/B: Portfolio consisting of stocks with small market value and high ESG growth rate.

B/S: Portfolio consisting of stocks with high market value and low ESG growth rate.

B/N: Portfolio consisting of stocks with high market value and medium ESG growth rate.

B/B: Portfolio consisting of stocks with high market value and high ESG growth rate.

Risk factors were calculated as in the Fama and French (2015) study along with the portfolio creation stage. These calculation methods are detailed in the table below. In addition, the ESG factor to be integrated was calculated similarly to the Fama and French (2015) methodology.

Table 4. Factor Components and Cutoff Points

Cutoff Points	**Factor Components**
Size: Median Book to Market Ratio (B/M): 30th and 70th percentiles Profitability: 30th and 70th percentiles Investment: 30th and 70th percentiles ESG: 30th and 70th percentiles	$SMB_{B/M} = (SH + SN + SL)/3 - (BH + BN + BL)/3$ $SMB_{OP} = (SR + SN + SW)/3 - (BR + BN + BW)/3$ $SMB_{Inv} = (SC + SN + SA)/3 - (BC + BN + BA)/3$ $SMB_{ESG} = (SS + SN + SB)/3 - (BS + BN + BB)/3$ $SMB = (SMB_{B/M} + SMB_{Op} + SMB_{Inv} + SMB_{ESG})/4$ $HML = (SH + BH)/2 - (SL + BL)/2$

	RMW = (SR + BR)/2 – (SW + BW)/2 *CMA = (SC + BC)/2 – (SA + BA)/2* *ESG = (SB + BB)/2 – (SS + BS)/2*

3.3. Data Analysis and Findings

In order to integrate the new factor created with ESG scores into the Fama and French 5-factor model, all necessary financial data of all companies included in the analysis in E-7 and G-7 countries were collected. In order to conduct separate analyses for each country, the relevant countries' market returns, and risk-free interest rates were created separately. Since the data for each country will be evaluated separately, the data was downloaded in each country's currency. After the factors were created, the data was analyzed using the panel data analysis method.

In the analysis phase, pre-tests were conducted for each country to determine the appropriate estimator for the data set. Then, various tests for deviation from assumptions, such as cross-sectional dependency, autocorrelation, and heteroscedasticity, were conducted. According to the findings from the deviation from assumption tests, analyses were conducted with the most appropriate estimators, such as robust and bootstrap standard errors. Analyses were conducted using the STATA econometrics program. Correlation coefficients containing the relationship between independent variables and the Variance Inflation Factor (VIF) made accordingly were specified for each country within the scope of the analysis.

3.3.1. Analysis and Findings from ESGt1 Model

In this section, the results of the analyses obtained from E-7 and G-7 countries within the scope of the ESGt1 model will be presented.

3.3.1.1. Analysis and Findings from ESGt1 Model – Developing Countries

In this section, the impact of the new factor created using ESG scores on portfolio performance will be examined in the context of portfolios created for China, India, Brazil, Indonesia, Mexico, Russia, and Turkey.

3.3.1.1.1. Findings From China

The table contains summary statistics (mean, median, standard deviation, minimum, maximum, and number of observations) for 107 companies operating in China between 2010 and 2022, depending on the established model.

Table 5. Summary Statistics of China

Variable	Mean	Median	Std. Dv.	Min	Max	N
Ri-Rf	0.0477	-0.05	0.4320	-0.70	3.27	1391
Bx(Rm-Rf)	0.0786	0.06	0.2385	-0.80	1.2	1391
CMA	-0.0138	-0.03	0.1104	-0.21	0.16	1391
HML	0.0069	0.08	0.2601	-0.54	0.52	1391
RMW	0.0253	0.01	0.1667	-0.34	0.25	1391
ESG	0.0223	0.02	0.0852	-0.13	0.23	1391
SMB	0.0246	0.04	0.1117	-0.02	0.25	1391

When the average values of 107 companies operating in China between 2010-2022 are considered, it is seen that the average returns of the companies on the risk-free interest rate are approximately 5% and have a high standard deviation. When we examine the 13-year average of the market risk premium, it is approximately 8%. When we examine the variables of the Fama & French 5-factor model, it is seen that the averages are 2-3%, except for the CMA and HML factors. The negative value of the CMA factor indicates that the average returns of capital-intensive companies have lower returns than others.

The fact that the average value for the HML variable is close to zero indicates that the difference between companies with high book value/market value ratios and others is close to zero. The fact that the average value of the ESG factor, which we included in the model for integration purposes, is around 2% represents the difference in returns between companies with high ESG scores and those with low ones on a 13-year average.

Table 6. China Correlation Coefficients and Variance Inflation Factors

China	Bx(Rm-Rf)	CMA	HML	RMW	ESG	SMB
Bx(Rm-Rf)	1					
CMA	-0.0731	1				
HML	-0.2375	0.1115	1			
RMW	-0.3049	-0.6597	-0.1284	1		
ESG	-0.2826	-0.3750	0.3022	0.2298	1	
SMB	-0.0680	-0.0603	-0.2835	-0.4679	-0.5326	1

Variable	VIF	1/VIF
RMW	4.05	0.2470
SMB	3.04	0.3293
ESG	2.70	0.3706
CMA	2.68	0.3735
Bx(Rm-Rf)	1.58	0.6317
HML	1.23	0.8163
Mean VIF	**2.54**	

The correlation coefficients and Variance Inflation Factors (VIF) values for all countries are presented above. Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional dependence. Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity

Table 7. Analysis Results of China

China				
Dependent Variable Ri-Rf				
Independent Variables	**Coefficients**	**Standard Errors**	**t-statistics**	**P-values**
$B_x(R_m-R_f)$	0.4299	0.0389	11.03	0.000
CMA	0.2064	0.1540	1.34	0.183
HML	0.2917	0.0631	4.62	0.000
RMW	0.2315	0.1269	1.82	0.071
ESG	0.2505	0.1767	1.42	0.159
SMB	-0.1740	0.1570	-1.11	0.270
Constant	0.0075	0.0067	1.13	0.261
Number of Firms				107
Observations per Firm				13
Number of Observations				1391
R-squared				0.0765

The model, which aims to integrate a new factor created with ESG scores into the classic Fama & French 5-factor model, is examined in companies operating in China, it is seen that the explanation rate of the model is 7%. This situation shows that the model has limited explanatory power. When we consider the independent variables, it is seen that the Market Risk Coefficient has a positive and significant effect on returns. This

situation indicates that investors in the Chinese market are sensitive to the market risk premium, and this result is compatible with the CAPM.

According to the results obtained from the CMA factor, there is no statistically significant relationship between capital investments and returns. The effect of capital investments in China may be insignificant compared to other markets. When we consider the results regarding the HML variable, it has a significant and positive effect on returns. Companies with a high book/market ratio have higher returns in the Chinese market. This result is compatible with traditional factor models. When we consider the results in terms of the profitability factor, it is understood that it has a limited effect and that the returns of more profitable companies are higher than those of less profitable companies.

When we consider the results in terms of the ESG factor that is attempted to be integrated into the model, it is found that it does not significantly affect returns. This situation can be interpreted as ESG investments not yet being a decisive criterion for investors in the Chinese market, and the sustainability issue has not yet gained full importance in investment decisions. When we evaluate the small companies factor (SMB) results, the returns of small companies in the Chinese market do not show a significant difference compared to large companies. Finally, it is seen that the constant term is insignificant, and it is understood that the dependent variable does not have a significant value when the independent variables are zero.

3.3.1.1.2. Findings From India

The table below includes summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) for 57 companies operating in India between 2010 and 2022, depending on the established model.

Table 8. Summary Statistics of India

Variable	Mean	Median	Std. Dv.	Min	Max	N
Ri-Rf	0.0822	0.04	0.4315	-0.96	2.84	741
Bx(Rm-Rf)	0.0511	0.04	0.1822	-0.58	0.58	741
CMA	0.0000	0.02	0.1885	-0.3	0.33	741
HML	-0.0930	-0.25	0.2517	-0.38	0.42	741
RMW	0.0630	0.07	0.1476	-0.28	0.27	741
ESG	0.0484	0.04	0.1475	-0.17	0.27	741
SMB	0.0430	0	0.1750	-0.22	0.35	741

A total of 57 companies were used for the study in India. It is seen that the average return of these companies on risk-free interest is approximately 8%. However, the high standard deviation of the average returns indicates the market's volatility. It is seen that the market risk premium, RMW, ESG and SMB factor averages vary between 4% and 6%. The fact that the 13-year average of the Capital Investment Factor is zero indicates that companies making capital investments in India cannot be differentiated. It is seen that the HML factor has a negative average. This situation shows that value stocks are not differentiated by investors.

Table 9. India Correlation Coefficients and Variance Inflation Factors

India	Bx(Rm-Rf)	CMA	HML	RMW	ESG	SMB
Bx(Rm-Rf)	1					
CMA	0.2899	1				
HML	0.4035	0.6790	1			
RMW	-0.4624	-0.6649	-0.7846	1		
ESG	-0.2930	-0.1282	-0.4114	0.3325	1	
SMB	0.5032	**0.8568**	0.6205	-0.5370	-0.2389	1

Variable	VIF	1/VIF
CMA	7.28	0.1372
SMB	6.33	0.1580
RMW	3.64	0.2746
HML	3.33	0.3004
Bx(Rm-Rf)	1.97	0.5077
ESG	1.37	0.7315
Mean VIF	**3.99**	

The correlation coefficients and Variance Inflation Factors (VIF) values for India presented above. Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional dependence. Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity.

Table 10. Analysis Results of India

India

Dependent Variable				
Ri-Rf				
Independent Variables	**Coefficients**	**Standard Errors**	**t-statistics**	**P-values**
$B_x(R_m-R_f)$	0.9289	0.1231	7.54	0.000
CMA	0.0603	0.1733	0.35	0.734
HML	0.1335	0.0539	2.48	0.029
RMW	0.0770	0.1453	0.53	0.606
ESG	-0.0578	0.0784	-0.74	0.475
SMB	0.4400	0.1560	2.82	0.015
Constant	0.0262	0.0127	2.06	0.062
Number of Firms				57
Observations per Firm				13
Number of Observations				741
R-squared				0.3199

When the analysis results made with 13 years of data from 57 companies operating in India are considered, it is seen that the R-squared value of the model is approximately 32%. This situation indicates that the model has a reasonable explanatory power on the returns in the Indian market. Regarding the independent variables, it is seen that the Market Risk Coefficient has a strong and significant effect on the returns. On the other hand, the capital investment factor does not significantly affect the returns. There is no statistically significant relationship between capital investments and returns. Investing in India's capital-intensive companies does not significantly affect the returns.

The HML factor, i.e., value stocks (companies with high book value/market value ratio), is attractive to investors and provides higher returns. The RMW factor, on the other hand, has a positive effect on the returns but is not significant at any level of significance econometrically. Investors in the Indian market may not consider profitability as a primary factor. Similar to the RMW factor, the ESG factor is also insignificant on the returns. This can be evaluated as sustainability-based investments are not yet widespread in India. Finally, when we consider the SMB (firm size factor) variable, it is seen that it has a positive and significant effect on returns. This situation includes firms with small market capitalization providing higher returns. The constant term is significant at the 10% significance level. This shows that even when the independent variables are zero, the dependent variable can have a positive average value.

3.3.1.1.3. Findings From Brazil

The table contains summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) for 54 companies operating in Brazil between 2010 and 2022, depending on the established model.

Table 11. Summary Statistics of Brazil

Variable	Mean	Median	Std. Dv.	Min.	Max.	N
Ri-Rf	0.0347	-0.02	0.4434	-1	2.68	702
Bx(Rm-Rf)	-0.0368	-0.04	0.1874	-0.58	0.68	702
CMA	0.0400	0.06	0.2072	-0.31	0.37	702
HML	0.0669	0.01	0.2593	-0.24	0.68	702
RMW	0.0007	0.02	0.1158	-0.23	0.15	702
ESG	-0.0246	-0.05	0.1165	-0.17	0.21	702
SMB	0.0684	0.07	0.1425	-0.19	0.28	702

Summary statistics are given above for the analysis of 54 companies operating in Brazil. First of all, it is seen that the average returns are positive, but it is noteworthy that the median value is negative. This situation shows that while some companies exhibit positive performance above average, the general market has imbalances and volatility. The market risk coefficient has a negative average, indicating that the market risk premium generally has a negative effect on company returns. This situation may indicate that many companies in the Brazilian market are moving in the opposite direction to the market or that there are macroeconomic uncertainties such as recession and high inflation. The mean and median of the ESG factor are negative; these results can be evaluated as ESG factors have a negative effect on returns in Brazil or that sustainability-oriented investments are not attractive.

Table 12. Brazil Correlation Coefficients and Variance Inflation Factors

Brazil	Bx(Rm-Rf)	CMA	HML	RMW	ESG	SMB
Bx(Rm-Rf)	1					
CMA	0.2970	1				
HML	0.3653	0.7564	1			
RMW	-0.4607	-0.3226	-0.5458	1		
ESG	0.0415	0.0195	0.0808	0.1064	1	
SMB	0.6083	-0.0047	0.0348	-0.2343	-0.1751	1

Variable	VIF	1/VIF
HML	3.19	0.3132
CMA	2.48	0.4029
Bx(Rm-Rf)	2.21	0.4530
SMB	1.83	0.5478

RMW	1.74	0.5744
ESG	1.13	0.8886
Mean VIF	**2.10**	

The correlation coefficients and Variance Inflation Factors (VIF) values for Brazil presented above. Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional dependence. Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity.

Table 13. Analysis Results of Brazil

Brazil				
Dependent Variable Ri-Rf				
Independent Variables	**Coefficients**	**Standard Errors**	**z-statistics**	**P-values**
$B_x(R_m-R_f)$	1.1126	0.1297	8.58	0.000
CMA	0.0087	0.1211	0.07	0.943
HML	-0.0322	0.1143	-0.28	0.778
RMW	0.2033	0.1732	1.17	0.241
ESG	-0.1580	0.1248	-1.27	0.206
SMB	0.3288	0.1550	2.12	0.034
Constant	0.0509	0.0159	3.20	0.001
Number of Firms				54
Observations per Firm				13
Number of Observations				702
R-squared				0.2673

When the analysis results of 54 companies operating in Brazil are examined, only the Market Risk Premium and Firm Size (SMB) factors are statistically significant. The SMB factor shows that small companies offer higher risk premiums in the Brazilian market.

However, unlike the Market Risk Premium Factor and the SMB factor, the CMA, HML, RMW, and ESG factors are not statistically significant. The ineffectiveness of factors such as ESG, CMA, HML, and RMW shows that they do not sufficiently affect investment decisions in the Brazilian market or that investors do not consider them. The CMA factor results can be interpreted as investors not clearly distinguishing between capital-intensive companies and other companies. The HML factor has a negative

coefficient, indicating that value stocks are associated with lower returns, but this relationship is not statistically significant.

The profitability factor RMW has a positive effect on returns, meaning that more profitable companies generally provide higher returns. However, it is understood that this effect does not affect investor behavior in the Brazilian market. The ESG factor has a negative impact on returns, but this relationship is not statistically significant. This can be interpreted as investors in Brazil do not follow a sustainability-based strategy.

3.3.1.1.4. Findings From Indonesia

The table includes summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) for 24 companies operating in Indonesia between 2010 and 2022, depending on the established model.

Table 14. Summary Statistics of Indonesia

Variable	Mean	Median	Std. Dv.	Min.	Max.	N
Ri-Rf	0.0835	0.015	0.4478	-0.73	3.26	312
Bx(Rm-Rf)	0.0251	-0.02	0.1787	-0.39	0.75	312
CMA	-0.0469	-0.06	0.1949	-0.43	0.37	312
HML	0.0215	0.02	0.2001	-0.46	0.34	312
RMW	0.0284	0.01	0.1713	-0.27	0.35	312
ESG	-0.0146	-0.02	0.2846	-0.55	0.68	312
SMB	0.1015	0.07	0.2762	-0.24	0.69	312

The average return of the companies on the risk-free interest rate between 2010-2022 is approximately 8%, indicating that the companies generally perform better than the risk-free return. However, the high standard deviation (0.4478) and wide value range (-0.73 to 3.26) indicate high volatility in the market. The low market risk coefficient shows that many companies are insensitive or negatively respond to the market risk premium. When the summary statistics are considered in terms of the CMA factor, it is seen that companies with low capital investments have lower returns. Similar to the CMA factor, the returns of ESG companies are generally lower. However, the high standard deviation for the ESG factor shows that some companies are positively affected by ESG-focused investments. Finally, the SMB factor shows that companies with small market values provide higher returns.

Table 15. Indonesia Correlation Coefficients and Variance Inflation Factors

Indonesia	Bx(Rm-Rf)	CMA	HML	RMW	ESG	SMB

Bx(Rm-Rf)	1					
CMA	0.3287	1				
HML	0.2150	0.5913	1			
RMW	0.3686	0.1321	-0.2022	1		
ESG	-0.3184	-0.6207	-0.6665	-0.0641	1	
SMB	0.3096	0.2463	0.0463	0.0516	0.0473	1

Variable	**VIF**	**1/VIF**
ESG	2.36	0.4230
HML	2.35	0.4248
CMA	2.13	0.4692
Bx(Rm-Rf)	1.48	0.6754
RMW	1.40	0.7167
SMB	1.28	0.7883
Mean VIF	**1.83**	

The correlation coefficients and Variance Inflation Factors (VIF) values for Indonesia presented above. Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional dependence. Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity.

Table 16. Analysis Results of Indonesia

Indonesia				
Dependent Variable Ri-Rf				
Independent Variables	**Coefficients**	**Std. Errors**	**t-statistics**	**P-values**
$B_x(R_m-R_f)$	0.8574	0.1542	5.56	0.000
CMA	-0.1587	0.0663	-2.39	0.034
HML	0.1267	0.0951	1.33	0.208
RMW	0.1182	0.1251	0.95	0.363
ESG	0.0789	0.0535	1.48	0.166
SMB	0.3264	0.0472	6.90	0.000
Constant	0.0165	0.0217	0.76	0.463
Number of Firms				24
Observations per Firm				13
Number of Observations				312
R-squared				0.1961

When the model results for Indonesia are considered, it is seen that the average explanatory power is approximately 20%, while the HML, RMW, and ESG variables are statistically insignificant. The Market Risk Premium, CMA, and SMB variables are significant. The CMA factor, which has a negative coefficient, shows a negative relationship between capital intensity and firm returns, indicating that investors see these firms as having low profit or high-risk levels. The panel data analysis results for the SMB factor also have a positive and significant effect in explaining returns.

3.3.1.1.5. Findings From Mexico

This table contains summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) for 21 companies operating in Mexico between 2010 and 2022, depending on the established model.

Table 17. Summary Statistics of Mexico

Variable	Mean	Median	Std. Dv.	Min.	Max.	N
Ri-Rf	0.0492	0	0.3373	-0.65	1.62	273
Bx(Rm-Rf)	-0.0201	-0.03	0.1191	-0.38	0.33	273
CMA	0.0076	0.06	0.1903	-0.34	0.38	273
HML	0.0615	0.16	0.3334	-0.64	0.51	273
RMW	-0.0415	-0.07	0.1669	-0.29	0.30	273
ESG	0.0215	-0.06	0.2395	-0.42	0.42	273
SMB	0.0676	0.05	0.1392	-0.13	0.30	273

Summary statistics for Mexico show that the average returns on the risk-free interest rate are around 5%, but the median value is zero. The zero median value indicates that the returns are not distributed symmetrically, and most have a neutral negative value. The high standard deviation of the average returns and the wide range of values indicate high volatility. The low mean of the CMA factor indicates that capital-intensive firms have a small positive effect on returns. The HML factor, on the other hand, shows that value stocks generally provide higher returns with a positive mean and median. In contrast to the HML factor, the RMW factor shows that profitable firms provide lower returns with a negative mean and median. The ESG factor has a slightly positive mean, which may mean that sustainability issues are not sufficiently considered in the Mexican market. Finally, the SMB factor, with a positive mean (approximately 7%), shows that small-cap firms provide higher returns.

Table 18. Mexico Correlation Coefficients and Variance Inflation Factors

Mexico	Bx(Rm-Rf)	CMA	HML	RMW	ESG	SMB

Bx(Rm-Rf)	1					
CMA	0.0992	1				
HML	-0.2335	0.0537	1			
RMW	0.1759	**-0.8501**	-0.0934	1		
ESG	0.6149	0.1200	-0.7135	0.0967	1	
SMB	0.3111	0.2079	-0.2008	-0.0174	0.5268	1

Variable	**VIF**	**1/VIF**
CMA	5.22	0.1916
RMW	5.08	0.1969
ESG	5.07	0.1970
HML	2.76	0.3619
Bx(Rm-Rf)	2.09	0.4778
SMB	1.59	0.6292
Mean VIF	**3.64**	

The correlation coefficients and Variance Inflation Factors (VIF) values for Mexico presented above. Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional dependence. Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity.

Table 19. Analysis Results of Mexico

Mexico				
Dependent Variable Ri-Rf				
Independent Variables	**Coefficients**	**Std.Errors**	**t-statistics**	**P-values**
$B_x(R_m-R_f)$	1.0943	0.0990	11.05	0.000
CMA	-0.3127	0.0592	-5.28	0.000
HML	0.0377	0.0363	1.04	0.320
RMW	-0.3814	0.0683	-5.58	0.000
ESG	-0.0015	0.0804	-0.02	0.985
SMB	0.4181	0.0448	9.33	0.000
Constant	0.0272	0.0056	4.86	0.000
Number of Firms				21
Observations per Firm				13
Number of Observations				273
R-squared				0.1777

When the model results for 21 countries operating in Mexico are examined, it is found that only the HML and ESG factors are not statistically significant, with an R-squared value of approximately 18%. When the statistically significant variables are examined, it is first seen that investors in the Mexican market are quite sensitive to the market risk premium. The CMA factor, which is another significant variable in the model, has a strong and negative effect on returns. This means that investors see capital-intensive firms as inefficient or riskier. When the results are evaluated in terms of the Profitability Factor (RMW), it is seen that it has a strong and negative effect, as in the CMA factor. This can be interpreted as profitable firms being less risky and, therefore, offering lower risk premiums. Investors evaluate profitable firms as safer but with lower returns. When the SMB factor, another significant variable in the model, is examined, it is understood that it has both a strong and positive effect on returns. This result shows that small firms offering higher risk premiums in the Mexican market provide higher returns.

3.3.1.1.6. Findings From Russia

The table contains summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) for 23 companies operating in Russia for the period 2010-2022, depending on the established model.

Table 20. Summary Statistics of Russia

Variable	Mean	Median	Std. Dv.	Min.	Max.	N
Ri-Rf	0.0702	0.03	0.4384	-0.89	2.63	299
Bx(Rm-Rf)	-0.0255	0.03	0.2009	-0.79	0.35	299
CMA	-0.0969	-0.02	0.2513	-0.53	0.33	299
HML	-0.0615	-0.03	0.2301	-0.53	0.30	299
RMW	0.0676	0.06	0.2691	-0.37	0.48	299
ESG	0.0300	0.01	0.2123	-0.22	0.56	299
SMB	0.0238	0.04	0.2328	-0.30	0.55	299

When the summary statistics of 23 companies operating in Russia are examined, it is seen that the average returns above the risk-free interest rate are approximately 7%. However, the high standard deviation indicates that the market is precarious. The average value for the market risk coefficient is negative, which indicates that many companies react negatively to the market risk premium. This situation can be explained by the weight of defensive sectors or the impact of economic uncertainties. The findings of the CMA and HML factors show that capital-intensive and value stocks are not attractive to investors in the Russian market. In Russia, the ESG factor can be considered as a factor

that has a positive, albeit limited, effect on returns, and the importance of this factor may increase in the long term. The summary statistics of the SMB factor indicate that small companies in Russia offer an attractive option for investors. However, the standard deviation is high, and there are significant differences between returns.

Table 21. Russia Correlation Coefficients and Variance Inflation Factors

Russia	Bx(Rm-Rf)	CMA	HML	RMW	ESG	SMB
Bx(Rm-Rf)	1					
CMA	-0.5041	1				
HML	-0.1484	-0.1605	1			
RMW	-0.0399	-0.0268	**-0.8045**	1		
ESG	0.1177	-0.0472	-0.3103	0.0796	1	
SMB	0.2830	-0.5986	-0.0195	-0.0675	0.6077	1

Variable	VIF	1/VIF
HML	6.33	0.1579
RMW	5.54	0.1805
CMA	4.34	0.2306
SMB	3.87	0.2582
ESG	2.37	0.4212
Bx(Rm-Rf)	2.23	0.4478
Mean VIF	**4.11**	

The correlation coefficients and Variance Inflation Factors (VIF) values for Russia presented above. Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional dependence. Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity.

Table 22. Analysis Results of Russia

Russia				
Dependent Variable Ri-Rf				
Independent Variables	**Coefficients**	**Std. Errors**	**t-statistics**	**P-values**

$B_x(R_m-R_f)$	1.0707	0.1006	10.64	0.000
CMA	-0.0155	0.1204	-0.13	0.899
HML	-0.1237	0.1476	-0.84	0.418
RMW	-0.1523	0.1190	-1.28	0.225
ESG	-0.0713	0.0830	-0.86	0.407
SMB	0.3015	0.0719	4.19	0.001
Constant	0.0936	0.0175	5.33	0.000
Number of Firms				23
Observations per Firm				13
Number of Observations				299
R-squared				0.3252

The analysis results obtained using 13 years of data on 23 companies operating in Russia show that the ability of the independent variables in the model to explain the dependent variable is approximately 33%. In addition, it is seen that only two variables are statistically significant in the model established for ESG integration. Here, as in the previously analyzed country analysis results, it is seen that the Market Risk Premium factor has a positive and significant effect in explaining returns. Moreover, it is seen that companies with small market values provide higher returns by offering a high-risk premium. When the analysis results are examined in terms of statistically insignificant factors, the CMA factor has a negative effect on returns, but this relationship is not statistically significant. The HML factor, i.e., value stocks, does not significantly affect returns in the Russian market. The RMW factor has a negative effect on returns, but this relationship is not statistically significant. More profitable companies may be associated with lower returns in the Russian market. The ESG factor has a negative effect on returns, but this relationship is not statistically significant.

3.3.1.1.7. Findings From Türkiye

The table contains summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) for 25 companies operating in Turkey between 2010 and 2022, depending on the established model.

Table 23. Summary Statistics of Türkiye

Variable	Mean	Median	Std. Dv.	Min.	Max.	N
Ri-Rf	0.2378	0.1	0.7143	-0.65	5.94	325
Bx(Rm-Rf)	-0.0614	-0.06	0.2018	-0.75	0.28	325
CMA	0.0800	0.06	0.2500	-0.48	0.70	325
HML	-0.4153	-0.08	0.2135	-0.57	0.29	325
RMW	0.0215	0.04	0.2326	-0.62	0.29	325

ESG	0.0238	0.05	0.1008	-0.13	0.27	325
SMB	0.1423	0.12	0.1962	-0.05	0.76	325

When we examine the 13-year summary statistics of 25 companies operating in Turkey, it is seen that the average returns on the risk-free interest rate are higher than in other countries, but the high standard deviation reveals the high level of risk and the heterogeneous structure of the market. The statistics regarding the Market Risk Premium show that the average is negative, and many companies react negatively to the market risk premium. As in Brazil and India, capital investment-intensive companies in Turkey have a positive effect on returns.

The average for the HML factor is seen to be highly negative, which may be the perception that value stocks (high book value/market value) companies in Turkey have low growth potential. The RMW factor has a positive mean and median, which indicates that profitable companies generally provide higher returns. The ESG factor has a positive mean and low standard deviation, which indicates that ESG factors have a positive but limited effect on investors in Turkey.

Table 24. Türkiye Correlation Coefficients and Variance Inflation Factors

Türkiye	**Bx(Rm-Rf)**	**CMA**	**HML**	**RMW**	**ESG**	**SMB**
Bx(Rm-Rf)	1					
CMA	-0.4769	1				
HML	0.2019	-0.0868	1			
RMW	0.5022	-0.5295	-0.3973	1		
ESG	0.0264	-0.0031	-0.5784	0.1490	1	
SMB	-0.7335	0.6607	0.1562	**-0.8143**	-0.0542	1

Variable	**VIF**	**1/VIF**
SMB	6.45	0.1549
RMW	3.97	0.2521
Bx(Rm-Rf)	3.35	0.2986
HML	3.14	0.3187
CMA	2.08	0.4812
ESG	1.84	0.5446
Mean VIF	**3.47**	

The correlation coefficients and Variance Inflation Factors (VIF) values for Türkiye presented above. Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity,

and cross-sectional dependence. Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity.

Table 25. Analysis Results of Türkiye

Türkiye				
Dependent Variable Ri-Rf				
Independent Variables	**Coefficients**	**Std.Errors**	**Z-statistics**	**P-values**
Bx(Rm-Rf)	-0.5633	0.1590	-3.54	0.000
CMA	-0.2895	0.1092	-2.65	0.008
HML	0.5178	0.1328	3.90	0.000
RMW	-0.5945	0.2069	-2.87	0.004
ESG	1.7102	0.1987	8.60	0.000
SMB	1.6924	0.2521	6.71	0.000
Constant	-0.0208	0.0321	-0.65	0.515
Number of Firms				25
Observations per Firm				13
Number of Observations				325
R-squared				0.5271

According to the results of the analysis of 25 companies between 2010 and 2022, the model is generally significant. The coefficients related to the Market Risk Premium, CMA, and RMW factors are negative. First of all, market risk has a negative effect on returns in the Turkish market and does not comply with market dynamics. This situation can be thought to be affected by macro factors such as economic uncertainties.

The coefficient related to the CMA factor shows that the returns of capital-intensive companies are lower, which may be related to the insufficient use of investments. The RMW factor has a significant and negative effect on returns. The negative effect indicates that profitable companies are perceived as less risky and offer lower returns.

When considering the factors with positive coefficients, the HML factor shows that the positive effect of value stocks in Turkey is attractive to investors. When we consider the results of the ESG factor, it is seen that it has a significant and robust positive effect on returns. This situation shows that investors reward companies that attach importance to ESG in the Turkish market and provide high returns. This indicates that ESG-focused investments and sustainability strategies are becoming more important.

Similar to the ESG factor, the results regarding the SMB factor also have a significant and strong positive effect on returns. This situation can be explained by companies with small market values offering a higher risk premium.

In addition, this effect can be observed due to the new companies that have joined the market due to the public offerings in recent years and the strong companies with low capital. Finally, the Constant Term has a negative coefficient and is not statistically significant. This result shows that the independent variables have strong effects on the model, and the effect of the constant term remains in the background.

3.3.1.2. Analysis and Findings from ESGt1 Model – Developed Countries

In this section, the impact of the new factor created using ESG scores on portfolio performance will be examined in the context of portfolios created for Canada, France, Germany, Italy, Japan, United Kingdom, United States.

3.3.1.2.1. Findings from Canada

The table contains summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) for 149 companies operating in Canada between 2010 and 2022, depending on the established model.

Table 26. Summary Statistics of Canada

Variable	Mean	Median	Std. Dv.	Min	Max	N
Ri-Rf	0,1186	0,07	0,5609	-0,90	7,7	1937
Bx(Rm-Rf)	0,0395	0,04	0,1583	-0,45	0,89	1937
CMA	0,0115	-0,05	0,1970	-0,19	0,55	1937
HML	0,0500	-0,03	0,3573	-0,35	1,05	1937
RMW	-0,0003	0,12	0,3360	-0,90	0,30	1937
ESGt1	-0,0223	0,03	0,1421	-0,44	0,13	1937
SMB	0,0723	0,04	0,1512	-0,12	0,40	1937

The average return of 149 companies operating in Canada on the risk-free interest rate between 2010 and 2022 is approximately 12%. However, the high standard deviation and high minimum and maximum values (-0.90 and 7.70) of the average return indicate the volatility of returns in Canada. The average market risk value of approximately 4% and the high maximum value indicate that market risk is variable for companies in Canada.

The CMA factor shows that conservative investment trends in Canada are relatively different. The average of the HML factor, which indicates the difference between companies with a high book value/market value ratio and companies with a low book value/market value ratio, is 5%. This result shows that value stocks were more prominent on average between 2010 and 2022. However, the high standard deviation of the value factor HML indicates the volatility of value stock returns.

The average value of the RMW factor, which is based on the difference between companies with high profitability and companies with low profitability, is close to zero. These results are inconsistent with the expectation that profitable firms will provide high returns. The average returns for the ESGt1 variable we included in the model are around 2%. This shows that the returns of firms with high ESG scores fail to significantly differ from the 13-year average. The average return for the size factor (HML) is 7%. The results show that small firms provided higher returns from 2010 to 2022.

Table 27. Canada Correlation Coefficients and Variance Inflation Factors

Canada	Bx(Rm-Rf)	CMA	HML	RMW	ESG	SMB
Bx(Rm-Rf)	1					
CMA	0,4231	1				
HML	0,5549	0,7955	1			
RMW	-0,6184	-0,7885	**-0,8819**	1		
ESGt1	-0,1376	-0,5114	-0,7075	0,5698	1	
SMB	0,5440	0,6235	0,7850	**-0,8911**	-0,4999	1

Variable	VIF	1/VIF
RMW	11,27	0,0887
HML	7,89	0,1267
SMB	5,40	0,1850
CMA	3,49	0,2862
ESGt1	2,54	0,3931
Bx(Rm-Rf)	2,05	0,4889
Mean VIF	**5,44**	

The correlation coefficients and Variance Inflation Factors (VIF) values for Canada presented above. When the correlation coefficients between the independent variables related to the Canadian model are examined, the relationship between the SMB and RMW factors exceeds the determined critical value. Apart from this, the correlation between the HML and CMA factors is close to 80%, which is determined as the critical

value. Similarly, the correlation between the RMW and CMA factors is high and close to 80%. Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional dependence. Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity for Canada dataset.

Table 28. Analysis Results of Canada

Canada				
Dependent Variable Ri-Rf				
Independent Variables	**Coefficients**	**Std. Errors**	**t-statistics**	**P-values**
Bx(Rm-Rf)	1,0113	0,2829	3,57	0,004
CMA	-0,1123	0,1213	-0,93	0,373
HML	0,0720	0,0967	0,74	0,471
RMW	0,0233	0,1233	0,19	0,853
ESGt1	-0,1194	0,1159	-1,03	0,323
SMB	0,5692	0,0809	7,03	0,000
Constant	0,0325	0,0171	1,89	0,083
Number of Firms				149
Observations per Firm				13
Number of Observations				1937
R-squared				0,1615

When we examine the analysis findings of companies operating in Canada, the explanatory percentage of the model (R^2 value) is 16%. While the analysis results of 149 companies are statistically significant, the Market Risk Premium and Size Factor are not statistically significant, and the CMA, HML, RMW, and ESGt1 factors are not statistically significant. The market risk premium has a positive and statistically significant effect on the dependent variable at the 1% significance level. These findings are consistent with the CAPM. The other statistically significant variable, the SMB factor, is seen to have a positive effect on the dependent variable for small-scale companies compared to large companies. Although the results of the CMA factor show that the difference between conservative and aggressive investment strategies has a negative effect on returns, the results are statistically insignificant.

The analysis results also show that the factor (HML) regarding whether high-value companies perform better than low-value companies is insignificant. Similar to the HML factor, the RMW factor, which indicates the superior performance of high-profitability companies against low-profitability companies, is statistically insignificant. Finally, the sustainability factor (ESGt1) integrated into the Fama and French 5-factor article has a negative effect on returns (-0.1194) but is not statistically significant. This result can be interpreted as investors in Canada did not prioritize sustainability enough to create a significant relationship on stock prices between 2010 and 2022.

3.3.1.2.2. Findings From France

The table contains summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) for 73 companies operating in France between 2010 and 2022, depending on the established model.

Table 29. Summary Statistics of France

Variable	Mean	Median	Std. Dv.	Min	Max	N
Ri-Rf	0,0991	0,09	0,2933	-0,86	1,36	949
Bx(Rm-Rf)	0,0439	0,04	0,1463	-0,37	0,54	949
CMA	-0,0661	-0,04	0,0803	-0,21	0,03	949
HML	-0,0430	-0,03	0,1119	-0,24	0,15	949
RMW	0,0376	0,04	0,0774	-0,16	0,15	949
ESGt1	-0,0592	-0,05	0,1160	-0,30	0,11	949
SMB	-0,0061	-0,01	0,0653	-0,13	0,10	949

When we evaluate the summary statistics of 73 companies operating in France between 2010 and 2022, we see that the average return on the risk-free interest rate was 10% over the 13-year period, and the market risk premium was approximately 4%. When the results are examined in terms of the Fama and French 5-factor model variables, CMA, HML, and SMB have negative averages. In addition, the ESG factor included in the model also has a negative value in the 13-year average. Unlike these results, the RMW factor has a positive value (approximately 4%) in the period between 2010 and 2022.

The CMA factor shows that, on average, companies with low investment levels achieved lower returns than companies with high investment levels in the period covered by the analysis. Similarly, companies with a high book value/market value ratio have lower returns than companies with low book value/market value in the 13-year average. Finally, the ESG factor, which represents the difference between portfolios consisting of

companies with high ESG scores and companies with low ESG scores, has a negative coefficient. This result may suggest that investors in France do not evaluate or price companies according to their ESG scores.

Table 30. France Correlation Coefficients and Variance Inflation Factors

France	Bx(Rm-Rf)	CMA	HML	RMW	ESG	SMB
Bx(Rm-Rf)	1					
CMA	-0,0566	1				
HML	0,4761	0,6429	1			
RMW	-0,3015	-0,4799	-0,5701	1		
ESGt1	0,4286	0,1838	0,3278	-0,6006	1	
SMB	0,0528	0,2683	0,2088	-0,0287	0,1458	1

Variable	VIF	1/VIF
HML	3,32	0,3008
CMA	2,67	0,3748
RMW	2,33	0,4209
Bx(Rm-Rf)	2,11	0,4748
ESGt1	1,88	0,5324
SMB	1,16	0,8648
Mean VIF	**2,24**	

The correlation coefficients and Variance Inflation Factors (VIF) values for France presented above. When the relationship between the independent variables of the established model is examined, it is seen that the two variables with the highest level of correlation are CMA and HML (0.6429). The correlation test results obtained are suitable for the analysis of the model. Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional dependence.

Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity for France.

Table 31. Analysis Results of France

France
Dependent Variable
Ri-Rf

Independent Variables	Coefficients	Std. Errors	t-statistics	P-values
Bx(Rm-Rf)	1,0454	0,0913	11,45	0,000
CMA	0,0645	0,1423	0,45	0,658
HML	0,0021	0,1595	0,01	0,990
RMW	-0,0748	0,0921	-0,81	0,432
ESGt1	-0,1898	0,0947	-2,00	0,068
SMB	1,1321	0,0809	13,98	0,000
Constant	0,0561	0,0123	4,55	0,001
Number of Firms				73
Observations per Firm				13
Number of Observations				949
R-squared				0,3221

When the analysis results of 73 companies operating in France are examined, the Market Risk Premium, Firm Size Factor (SMB), and Sustainability Factor (ESGt1) are statistically significant. On the other hand, the CMA, HML, and RMW factors are not statistically significant in explaining the returns. The market risk premium has a positive and significant effect at the 1% significance level in explaining the returns. This shows that the stock market's excess return has a strong and positive effect on the dependent variable.

Similarly, the sustainability factor (ESGt1) is statistically significant at the 10% significance level but has a negative effect on the returns. This shows that ESG scores are not yet a priority for investors in France. The SMB factor, which indicates that small companies perform better than large companies, has a strong positive and statistically significant effect on returns.

This shows that companies with small market values in France provide higher returns than large ones. Similar to the ESGt1 score, the RMW factor also has a negative effect on the returns, but this effect is not statistically significant. Like the RMW factor, the CMA and HML factors do not have a statistically significant effect in explaining returns.

3.3.1.2.3. Findings From Germany

The table contains summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) for 63 companies operating in Germany between 2010 and 2022, depending on the established model.

Table 32. Summary Statistics of Germany

Variable	Mean	Median	Std. Dv.	Min	Max	N
Ri-Rf	0,0957	0,07	0,3376	-0,74	2,74	819
Bx(Rm-Rf)	0,0707	0,07	0,1564	-0,35	0,54	819
CMA	0,0046	0,01	0,1068	-0,14	0,19	819
HML	-0,0046	-0,04	0,1194	-0,27	0,20	819
RMW	0,0015	0,01	0,1019	-0,21	0,13	819
ESGt1	0,0176	0,04	0,1008	-0,18	0,17	819
SMB	0,0323	0,04	0,0952	-0,11	0,20	819

In Germany, where 63 companies were included in the analysis, the summary statistics of the companies for the years 2010-2022 are given above. In light of this information, the average return of the companies on the risk-free interest rate in the 13-year period is approximately 10%. The Market Risk Premium results are 7% on average.

When we evaluate the summary statistics regarding other Fama and French 5-factor model variables, the CMA, HML, and RMW factor averages are close to zero. Unlike the CMA and RMW factors, the HML factor average has a negative value. The SMB, or firm size factor, is 3% on average. This situation shows the average return between small and large companies in the 13-year period. Finally, in terms of the sustainability factor targeted for integration into the model, the 13-year average is approximately 2%. This value shows the average difference between companies operating in Germany with high ESG scores and companies with low scores. Sustainability issues are prioritized by investors in Germany, although not to a very high degree.

Table 33. Germany Correlation Coefficients and Variance Inflation Factors

Germany	Bx(Rm-Rf)	CMA	HML	RMW	ESG	SMB
Bx(Rm-Rf)	1					
CMA	0,0001	1				
HML	-0,0977	0,6297	1			
RMW	0,0630	-0,3698	-0,7459	1		
ESGt1	-0,0982	0,1705	0,1705	-0,0895	1	
SMB	0,1497	0,5886	0,6482	-0,3604	-0,0443	1

Variable	VIF	1/VIF
HML	4,57	0,2190
RMW	2,48	0,4037
SMB	2,28	0,4376
CMA	1,90	0,5271

ESGt1	1,11	0,8984
Bx(Rm-Rf)	1,11	0,9045
Mean VIF	**2,24**	

The correlation coefficients and Variance Inflation Factors (VIF) values for Germany presented above. The correlation test results conducted to determine the relationships between the independent variables of the established model are given above. The results obtained show that no independent variable has a correlation above the determined threshold value (80%). When the current correlation values are considered, they are clearly between 0.7459 and 0.6482.

Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional dependence. Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity.

Table 34. Analysis Results of Germany

Germany				
Dependent Variable				
Ri-Rf				
Independent Variables	**Coefficients**	**Std.Errors**	**t-statistics**	**P-values**
Bx(Rm-Rf)	0,9896	0,0565	17,50	0,000
CMA	0,1354	0,1121	1,21	0,232
HML	-0,1111	0,1630	-0,68	0,498
RMW	0,0753	0,1214	0,62	0,537
ESGt1	-0,0454	0,1102	-0,41	0,681
SMB	0,6430	0,1453	4,42	0,000
Constant	0,0045	0,0067	0,68	0,500
Number of Firms				63
Observations per Firm				13
Number of Observations				819
R-squared				0,2576

In the model where 63 companies operating in Germany between 2010-2022 are included, the explanation rate of the dependent variable of the independent variables is 25%. According to the analysis's results, the market risk premium and the firm size factor (SMB) are statistically significant. The SMB factor, which represents the return difference between companies with low market value and companies with high market

value, is strongly positive and statistically significant on returns. This result can be interpreted as small companies in Germany having high return expectations. Investors demand higher risk premiums due to the riskier and more volatile structures of small companies. This situation is consistent with the positive SMB coefficient.

On the other hand, the other variables in the model are not statistically significant. While the HML and ESGt1 factors have a negative effect on returns, the other factors have a positive effect. The difference between companies with low investment levels and companies with high investment levels has a strong positive effect on returns, but this effect is not statistically significant at any level. Similar to the CMA factor, the RMW factor, which represents the difference between the returns of high-profitability firms and low-profitability firms, has a positive effect on returns, but this effect is not statistically significant.

The sustainability factor, added to the model, represents the difference in returns between firms with high ESG scores and low ESG scores. This factor has a negative coefficient on returns, but this effect is also not statistically significant.

3.3.1.2.4. Findings from Italy

The table contains summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) for 28 companies operating in Italy between 2010 and 2022, depending on the established model.

Table 35. Summary Statistics of Italy

Variable	Mean	Median	Std. Dv.	Min	Max	N
Ri-Rf	0,0287	0,01	0,3531	-0,93	2	364
Bx(Rm-Rf)	0,0142	0,00	0,1830	-0,49	0,46	364
CMA	-0,1169	-0,19	0,1503	-0,30	0,13	364
HML	-0,1300	-0,26	0,1961	-0,35	0,19	364
RMW	0,1953	0,24	0,1221	-0,09	0,36	364
ESGt1	-0,0284	-0,03	0,1439	-0,28	0,24	364
SMB	0,0376	0,00	0,1407	-0,09	0,46	364

In Italy, where 28 companies were included in the analysis between 2010 and 2022, the summary statistics of the companies show that the average return on the risk-free interest rate is approximately 3%. The standard median value of this value is close to zero, and the standard deviation is high. This shows that the returns are not normally

distributed and that volatility in the market is high. The low median means that most of the returns are concentrated in low values, but some extremely high returns increase the average.

The 13-year average of the market risk premium is positive but quite small, indicating that it remains at low levels. When the summary statistics are considered in terms of other variables, the CMA, HML, and ESG factors have negative means, while the RMW and SMB factors have positive means. The CMA factor shows that firms with high investment levels in Italy achieved higher returns in the 13 years compared to firms with low investment levels. The negative mean and median for the HML factor indicate that companies with a low book value/market value ratio (growth) perform better than companies with a high ratio (value). The mean of approximately -0.13 indicates that investors in Italy tend to prefer growth companies. The sustainability factor (ESGt1), with a negative mean, generally indicates that ESG activities may have a slightly negative impact on stock returns. The mean value indicates that companies with high ESG scores achieve lower returns than those with low ones.

Finally, when the summary statistics for the RMW and SMB factors are examined, the positive median and mean for the RMW factor indicate that companies with strong (robust) profitability provide better returns compared to companies with low (weak) profitability. This can be interpreted as investors generally prefer more profitable firms. The results for the SMB factor are small, although the mean is positive. This indicates that small companies have a slight return advantage compared to large ones.

Table 36. Italy Correlation Coefficients and Variance Inflation Factors

Italy	**Bx(Rm-Rf)**	**CMA**	**HML**	**RMW**	**ESG**	**SMB**
Bx(Rm-Rf)	1					
CMA	-0,3105	1				
HML	0,1087	-0,2373	1			
RMW	-0,1549	-0,1392	-0,6846	1		
ESGt1	-0,2687	0,3781	-0,3142	0,1992	1	
SMB	0,3949	-0,4737	0,0978	0,2323	-0,3840	1

Variable	**VIF**	**1/VIF**
RMW	3,03	0,3302
HML	2,68	0,3732
SMB	1,80	0,5557

CMA	1,68	0,5963
Bx(Rm-Rf)	1,42	0,7019
ESGt1	1,41	0,7107
Mean VIF	**2,00**	

The correlation coefficients and Variance Inflation Factors (VIF) values for Italy presented above. When the correlation coefficients between the independent variables of the established model are examined within the scope of companies in Italy, it is seen that the values are between -0.6846 and 0.3781. These results show that the independent variables for the established model will not contain a multicollinearity problem.

Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional dependence. Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity.

Table 37. Analysis Results of Italy

Italy				
Dependent Variable Ri-Rf				
Independent Variables	**Coefficients**	**Std. Errors**	**t-statistics**	**P-values**
Bx(Rm-Rf)	0,9056	0,0663	13,66	0,000
CMA	-0,0113	0,1227	-0,09	0,927
HML	-0,0894	0,1308	-0,68	0,500
RMW	-0,3790	0,1764	-2,15	0,041
ESGt1	-0,0933	0,0979	-0,95	0,349
SMB	0,4618	0,1624	2,84	0,008
Constant	0,0569	0,0228	2,49	0,019
Number of Firms				28
Observations per Firm				13
Number of Observations				364
R-squared				0,3450

In Italy, where 28 companies were included in the analysis, the results of the companies in the 13 years, depending on the established model, are given in the table. Accordingly, in the model established based on the Fama and French 5-factor model, only

the Market Risk Premium and SMB factors are statistically significant and have a positive effect on returns.

The difference between small and large companies operating in Italy has a positive coefficient on returns, and this effect is statistically significant at the 1% significance level. Similarly, the Market Risk Premium also has a strong positive effect on returns, and this effect is statistically significant at the 1% significance level. When the other factors in the model are considered, the CMA, HML, RMW, and ESGt1 factors are not statistically significant at any significance level and have a negative coefficient on returns.

3.3.1.2.5. Findings From Japan

The table contains summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) for 361 companies operating in Japan between 2010 and 2022, depending on the established model.

Table 38. Summary Statistics of Japan

Variable	Mean	Median	Std. Dv.	Min	Max	N
Ri-Rf	0,1123	0,06	0,3341	-0,91	4,41	4693
Bx(Rm-Rf)	0,0733	0,07	0,1586	-0,39	1,03	4693
CMA	0,0315	0,02	0,0554	-0,06	0,15	4693
HML	0,0053	0,00	0,1128	-0,25	0,25	4693
RMW	-0,0192	-0,01	0,0874	-0,19	0,10	4693
ESGt1	0,0446	0,06	0,0966	-0,10	0,21	4693
SMB	0,0307	0,05	0,0532	-0,09	0,10	4693

When the summary statistics of 361 firms operating in Japan are examined, the average returns on the risk-free interest rate are 11%. However, the high standard deviation, low median value, and extreme values (-0.91 and 4.41) show that the averages are generally low, with some being very high and increasing the average. The 13-year average of the Market Risk Premium in Japan is approximately 7%. The fact that the median (0.07) is close to the average shows that market returns have a more symmetric distribution.

The 13-year average of the CMA factor is 3%. This result shows that firms with a protective investment strategy in Japan have higher average returns than firms with an aggressive investment strategy. The average value of the HML factor is very close to zero, which shows no significant difference between the returns of firms with high market

value/book value and firms with low book value/market value ratios. The 13-year average of the RMW factor is approximately -2%. This value reveals that portfolios consisting of companies with high profitability perform worse than portfolios consisting of companies with low profitability.

The 13-year average of the SMB factor, representing the difference in returns between small and large companies, is 3%. This average value indicates that small-scale companies in Japan have achieved higher returns than large-scale companies in the period between 2010 and 2022. Finally, when we evaluate the summary statistics in terms of the sustainability factor (ESGt1) integrated into the model, the average is around 4%. This situation shows that companies with high ESG scores in Japan had higher average returns than companies with low ESG scores in the 13-year period.

Table 39. Japan Correlation Coefficients and Variance Inflation Factors

Japan	**Bx(Rm-Rf)**	**CMA**	**HML**	**RMW**	**ESG**	**SMB**
Bx(Rm-Rf)	1					
CMA	-0,1104	1				
HML	-0,1390	0,5999	1			
RMW	-0,1923	-0,6892	-0,7890	1		
ESGt1	0,6814	-0,2223	0,0168	-0,2171	1	
SMB	0,0465	0,6064	0,6699	-0,4214	0,1502	1

Variable	**VIF**	**1/VIF**
RMW	15,73	0,0635
HML	12,41	0,0805
CMA	8,35	0,1198
SMB	7,05	0,1417
ESGt1	3,64	0,2745
B(Rm-Rf)	2,72	0,3672
Mean VIF	**8,32**	

The correlation coefficients and Variance Inflation Factors (VIF) values for Japan presented above. When the relationships between the independent variables are examined depending on the established model, it is seen that the negative and positive maximum values are between -0.7890 and +0.6814. These results show that the independent variables will not present a multicollinearity problem due to their high relationships with each other.

Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional dependence. Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity for Japan.

Table 40. Analysis Results of Japan

Japan				
Dependent Variable Ri-Rf				
Independent Variables	**Coefficients**	**Std. Errors**	**t-statistics**	**P-values**
Bx(Rm-Rf)	1,0168	0,0323	31,48	0,000
CMA	-0,0825	0,2207	-0,37	0,715
HML	0,1160	0,0846	1,37	0,195
RMW	-0,0814	0,1496	-0,54	0,596
ESGt1	-0,0920	0,0425	-2,16	0,051
SMB	0,5647	0,1691	3,34	0,006
Constant	0,2496	0,0060	4,13	0,001
Number of Firms				361
Observations per Firm				13
Number of Observations				4693
R-squared				0,3284

The analysis results, which include 361 companies operating in Japan, show that the market risk premium, sustainability (ESGt1), and firm size (SMB) factors are statistically significant in explaining returns. The results of the SMB factor indicate that small firms in Japan are more positively received by investors due to higher return expectations. The difference between portfolios consisting of small firms and portfolios consisting of large firms is significant at the 1% significance level in explaining returns, and this effect has a strong positive effect on returns.

The sustainability factor included in the model has a negative effect on returns. This situation shows that ESG activities have a slightly negative effect on stock returns. When the results are examined in terms of the variables included in the model and are not statistically significant, the results of the CMA factor have a negative effect on returns. Similar to the CMA factor, the coefficients of the RMW factor are also negative. The coefficients of the HML factor are positive, but this result is not statistically significant.

3.3.1.2.6. Findings from United Kingdom

The table contains summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) for 181 companies operating in the UK between 2010 and 2022, depending on the model established.

Table 41. Summary Statistics of United Kingdom

Variable	Mean	Median	Std. Dv.	Min	Max	N
Ri-Rf	0,1079	0,08	0,3612	-0,91	3,4	2353
Bx(Rm-Rf)	0,0185	0,02	0,1050	-0,56	0,51	2353
CMA	0,0215	0,02	0,1370	-0,13	0,43	2353
HML	-0,0084	-0,04	0,1350	-0,19	0,33	2353
RMW	0,0246	0,05	0,1280	-0,35	0,17	2353
ESGt1	-0,0376	-0,01	0,0999	-0,30	0,11	2353
SMB	0,0184	0,03	0,0771	-0,16	0,14	2353

Summary statistics for 181 firms operating in the UK show that the average return on the risk-free interest rate over the 13 years is approximately 11%. This average value shows that the returns are volatile due to the high standard deviation and extreme values (-0.91 and 3.4) and that the return distribution of firms in the market is not normal. With its low but positive mean and median value, the market risk premium has relatively exceeded the risk-free return on average.

The results for the CMA factor show that the average return over the 13-year average is 2%. Similar to the CMA factor, the average value for the RMW factor is 2%. The RMW factor, which shows the difference between a portfolio of firms with high profitability and a portfolio of firms with low profitability, shows that firms with low profitability have higher returns over the 13-year period. When the results for the HML factor are evaluated, the average return is close to zero. This situation indicates that firms with high book value/market value in Japan do not produce different returns compared to firms with low book value/market value. The results in terms of the firm size factor show that the average returns are approximately 2%. This result shows the 13-year average of the difference between small-scale firms and large-scale firms in Japan. Finally, the results regarding the sustainability factor integrated into the model show that the average returns are approximately -4%. This result represents the difference in returns between firms with high ESG scores and firms with low ESG scores using data from 361 firms operating in Japan.

Table 42. United Kingdom Correlation Coefficients and Variance Inflation Factors

U.K	Bx(Rm-Rf)	CMA	HML	RMW	ESG	SMB
Bx(Rm-Rf)	1					
CMA	0,2516	1				
HML	0,3490	0,5031	1			
RMW	-0,4517	-0,6841	**-0,9438**	1		
ESGt1	-0,1396	-0,2530	-0,1467	0,1604	1	
SMB	0,5152	0,2723	-0,1083	-0,0601	0,2289	1

Variable	VIF	1/VIF
RMW	26,73	0,0374
HML	17,70	0,0564
CMA	4,02	0,2486
Bx(Rm-Rf)	2,50	0,3992
SMB	2,41	0,4152
ESGt1	1,43	0,4152
Mean VIF	**9,13**	

The correlation coefficients and Variance Inflation Factors (VIF) values for United Kingdom presented above. According to the results of the correlation test performed to measure the relationship between the independent variables in the analyzed model, the values are between -0.9438 and +0.5152. Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional dependence. Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity.

Table 43. Analysis Results of United Kingdom

United Kingdom				
Dependent Variable Ri-Rf				
Independent Variables	**Coefficients**	**Std.Errors**	**t-statistics**	**P-values**

Bx(Rm-Rf)	1,1331	0,2696	4,20	0,001
CMA	-0,4631	0,1389	-3,33	0,006
HML	-1,5007	0,1489	-10,08	0,000
RMW	-1,5554	0,2861	-5,44	0,000
ESGt1	-0,4552	0,1330	-3,42	0,005
SMB	0,5827	0,3017	1,93	0,077
Constant	0,0946	0,0161	5,88	0,000
Number of Firms				181
Observations per Firm				13
Number of Observations				2353
R-squared				0,2267

The analysis model, which includes 181 firms operating in the United Kingdom, explains approximately 23% of the independent variable variance. In addition, the market risk premium positively and significantly affects returns. When the results are examined in terms of other variables belonging to the model, the CMA factor's results have a strong negative effect on returns and are statistically significant. The results show that firms with low investment levels produce lower returns.

The results of the HML factor are statistically significant and have a strong negative effect on returns. They show that the difference between high-value firms and low-value firms has a non-positive relationship with returns. The results of the RMW factor have a negative coefficient and are statistically significant. This indicates that less profitable firms in the United Kingdom provide higher returns.

When the results regarding the sustainability factor (ESGt1) included in the model are examined, it is understood that it has a negative coefficient on returns and is statistically significant. This result shows that portfolios formed by companies with high ESG scores have a negative effect on returns. It also reveals that sustainability activities are not positively differentiated by investors. Finally, the SMB factor in the model is statistically significant at the 10% significance level and has a positive coefficient in explaining returns. This shows that small companies provide higher returns in the UK.

3.3.1.2.7. Findings From United States

The table contains summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) for 610 companies operating in the United States between 2010 and 2022, depending on the established model.

Table 44. Summary Statistics of United States

Variable	Mean	Median	Std. Dv.	Min	Max	N
Ri-Rf	0,1292	0,11	0,3473	-0,83	7,2	7930
Bx(Rm-Rf)	0,1164	0,12	0,1738	-0,56	0,87	7930
CMA	0,0007	-0,01	0,0742	-0,12	0,15	7930
HML	-0,0092	-0,02	0,1238	-0,29	0,18	7930
RMW	0,0100	0,00	0,0672	-0,12	0,13	7930
ESGt1	0,0015	-0,01	0,0247	-0,04	0,05	7930
SMB	0,0161	0,01	0,0541	-0,05	0,11	7930

When the summary statistics of the companies operating in the United States are examined, it is stated that the average return of the companies on the risk-free interest rate in the 13-year period is approximately 13%. However, as in some countries, this situation is understood to be high volatility in the returns of the companies in the market with high standard deviation and extremely high minimum and maximum values (-0.83 and 7.2).

In addition, the return of half of the observations in the analysis is below 11%. The effect of the market risk premium on the company returns is positive, and the standard deviation (0.1738) shows that there are differences between the companies. The minimum and maximum values provide information that some companies move inversely with the market. When the summary statistics are considered in terms of other factors, the average of the CMA factor is very close to zero. This situation shows that there is almost no difference between the returns of companies with conservative and aggressive investment strategies. Similarly, the average of the HML factor is close to zero; this result reveals that companies with low book value/market value show almost the same performance in returns compared to high ones.

In addition, the RMW factor also shows that high profitability does not create a positive difference in returns in the United States. The summary statistics of the sustainability factor integrated into the model also reveal that the high ESG scores that companies have obtained due to their sustainability activities do not create a significant difference in the 13-year average. Finally, when the results are evaluated in terms of the firm size factor (SMB), the average value is close to zero. This finding shows no significant difference in the 13-year average returns between large and small firms in the United States.

Table 45. United States Correlation Coefficients and Variance Inflation Factors

U.S	Bx(Rm-Rf)	CMA	HML	RMW	ESG	SMB
Bx(Rm-Rf)	1					
CMA	-0,1294	1				
HML	-0,1296	0,9130	1			
RMW	-0,0095	-0,8409	-0,6906	1		
ESGt1	0,3174	0,0843	0,2386	-0,1571	1	
SMB	0,1536	0,7297	0,6771	-0,7605	0,0817	1

Variable	VIF	1/VIF
CMA	15,91	0,0628
HML	10,19	0,0981
RMW	5,67	0,1762
SMB	3,20	0,3125
ESGt1	1,66	0,6015
Bx(Rm-Rf)	1,41	0,7106
Mean VIF	**6,34**	

The correlation coefficients and Variance Inflation Factors (VIF) values for United States presented above.The correlation test results, which were conducted to determine the relationships between the independent variables in the established model, show that they are in the range of -0.9130 to +0.7605. Bootstrap and robust standard error estimators were used to prevent measurement errors that may occur due to the high correlation between the independent variables. Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional dependence. Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity.

Table 46. Analysis Results of United States

United States				
Dependent Variable Ri-Rf				
Independent Variables	**Coefficients**	**Std. Errors**	**t-statistics**	**P-values**

Bx(Rm-Rf)	0,6501	0,0332	19,54	0,000
CMA	-0,3868	0,1656	-2,33	0,020
HML	0,1872	0,0916	2,04	0,041
RMW	0,1528	0,1133	1,35	0,178
ESGt1	1,2218	0,2002	6,10	0,000
SMB	1,3838	0,1146	11,98	0,000
Constant	0,0341	0,0037	9,08	0,000
Number of Firms				610
Observations per Firm				13
Number of Observations				7930
R-squared				0,1791

According to the analysis results of 610 companies operating in the United States, it is understood that only the RMW factor is not statistically significant in the model. This provides information that although companies with high profitability in the United States have a positive coefficient on returns, it does not have a statistically significant result. When other variables found to be statistically significant are examined, the coefficient of the CMA factor, which indicates the difference between companies with a conservative investment strategy and companies with an aggressive investment strategy, is negative. This shows that there is a negative relationship between capital investments and returns in the United States.

The results of the HML factor show that value stocks have a positive coefficient in explaining returns in the United States. Our sustainability factor (ESGt1), which is integrated into the model, is statistically significant in terms of returns and has a strong positive coefficient. This result shows that portfolios consisting of companies with high sustainability scores have a strong effect in explaining returns. A 1% increase in the sustainability factor causes a 1.22% increase in returns. This situation can be interpreted as a result of the high number of firms included in the analysis, the perception of investors and the positive activities of the firms. Finally, the size factor (SMB) results are statistically significant on returns, similar to the sustainability factor, and have a strong positive coefficient. This result shows that small firms in the US provide higher returns. This can be interpreted as a result of investors' interest in and perception of investing in new and promising firms with high potential in the US.

3.3.2. Analysis and Findings from ESGt2 Model

In this part of the analysis phase, a sustainability factor was tried to be integrated into the Fama and French 5-factor model again. Unlike the ESGt1 factor, the ESGt2 factor

was used in this context. While the ESGt1 factor refers to the direct use of the ESG score of the companies, the ESGt2 factor addresses the growth in the ESG scores of the companies. We are trying to determine here that even when the annual ESG score growth between the companies is numerically the same or similar, the proportional growth is different. This factor differs from the ESGt1 factor because it takes into account the growth rate of the ESG score performance of the analyzed company for the last 2 years. The results of the ESGt2 factor and model, which indicate the return difference between the portfolio consisting of companies with a higher ESG score growth rate compared to the T-1 year and those with a lower ESG score growth rate, are given below.

3.3.2.1. Analysis and Findings from ESGt2 Model – Developing Countries

In this section, the impact of the second new factor created using ESG scores on portfolio performance will be examined in the context of portfolios created for China, India, Brazil, Indonesia, Mexico, Russia, and Turkey.

3.3.2.1.1. Findings From China

The table contains summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) for 107 companies operating in China between 2010 and 2022, depending on the established model.

Table 47. Summary Statistics of China

Variable	Mean	Median	Std. Dv.	Min	Max	N
Ri-Rf	0.0477	-0.05	0.4320	-0.70	3.27	1391
Bx(Rm-Rf)	0.0786	0.06	0,2885	-0,80	1,2	1391
CMA	-0,1384	-0,03	0,1104	-0,21	0,16	1391
HML	0,0069	0,08	0,2601	-0,54	0,52	1391
RMW	0,0253	0,01	0,1667	-0,34	0,25	1391
ESGt2	-0,0192	-0,01	0,1033	-0,30	0,13	1391
SMB	0,0215	0,04	0,1175	-0,22	0,26	1391

When the average values of 107 companies operating in China between 2010-2022 are considered, it is seen that the average returns of the companies on the risk-free interest rate are approximately 5% and have a high standard deviation. When we examine the 13-year average of the market risk premium, it is approximately 8%. When we examine the Fama and French 5-factor model variables, it is seen that the averages are 2-3%, except for the CMA and HML factors. The negative value of the CMA factor

indicates that the average returns of capital-intensive companies have lower returns than others.

The fact that the average value for the HML variable is close to zero indicates that the difference between companies with high book value/market value ratios and others is close to zero. The fact that the average value of the ESGt2 factor, which we included in the model for integration purposes, is around -2% represents the difference in returns between companies with high ESG score growth and those with low ones on a 13-year average.

Table 48. China Correlation Coefficients and Variance Inflation Factors

China	Bx(Rm-Rf)	CMA	HML	RMW	ESG	SMB
Bx(Rm-Rf)	1					
CMA	-0,0732	1				
HML	-0,2375	0,1115	1			
RMW	-0,3049	-0,6597	-0,1284	1		
ESGt2	-0,1960	-0,5022	-0,4062	0,5458	1	
SMB	-0,0719	-0,0820	-0,2964	0,4766	0,0823	1

Variable	VIF	1/VIF
RMW	3,93	0,2546
CMA	2,62	0,3814
ESGt2	2,19	0,4576
SMB	1,86	0,5379
HML	1,66	0,6009
Bx(Rm-Rf)	1,57	0,6350
Mean VIF	**2,31**	

The correlation coefficients and Variance Inflation Factors (VIF) values for China presented above. In line with the established model, the correlation test results between dependent variables range from -0.6597 to +0.5458. These results reveal that multicollinearity between independent variables does not constitute a significant problem. Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional dependence. Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity.

Table 49. Analysis Results of China

China				
Dependent Variable Ri-Rf				
Independent Variables	**Coefficients**	**Standard Errors**	**z-statistics**	**P-values**
Bx(Rm-Rf)	0,3726	0,0379	9.81	0,000
CMA	0,0815	0,1527	0,53	0,593
HML	0,2334	0,0583	4,00	0,000
RMW	0,3517	0,1178	2,99	0,003
ESGt2	-0,3215	0,1540	-2,11	0,035
SMB	-0,3925	0,1262	-3,11	0,002
Constant	0,1122	0,1000	1,12	0,263
Number of Firms				107
Observations per Firm				13
Number of Observations				1391
R-squared				0,0793

The analysis results, which are based on the growth in sustainability scores and integrated into the Fama and French 5-factor model, are presented in the table above for companies operating in China. In the analysis conducted using data between 2010 and 2022, the ratio of independent variables explaining the dependent variable, that is, the R2 value, is approximately 8%. The analysis shows that the (CMA) factor results, representing only the returns of conservative and aggressive investment strategies, are not statistically significant. The results of the market risk premium are statistically significant at the 1% significance level and have a positive coefficient on the returns.

The HML factor results, which indicate the difference in returns between companies with a high book value / market value ratio and companies with a low book value / market value ratio, are statistically significant at the 1% significance level and have a strong positive coefficient in explaining the returns. The HML and RMW factor results have the same effect and coefficient. According to the results of the RMW factor, it is concluded that companies with high profitability are associated with higher returns in the Chinese market. This result explains that investors expect higher returns from firms with high profitability in the Chinese market.

The sustainability factor integrated into the model is statistically significant at the 5% significance level. However, unlike the HML and RMW factors, these results have a

strong negative coefficient on returns. The results of the ESGt2 factor show that sustainability activities in the Chinese market are not of interest to investors and are not priced positively. Finally, the results of the size factor (SMB) are statistically significant between 2010 and 2012 and have a strong negative coefficient on returns. This situation can be evaluated as small firms with high return potential in China are not of interest to investors.

3.3.2.1.2. Findings from India

The table contains summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) for 57 companies operating in India between 2010 and 2022, depending on the established model.

Table 50. Summary Statistics of India

Variable	Mean	Median	Std. Dv.	Min	Max	N
Ri-Rf	0,0822	0,04	0,4315	-0,96	2,84	741
Bx(Rm-Rf)	0,0511	0,04	0,1822	-0,58	0,58	741
CMA	0,0000	0,02	0,1885	-0,03	0,33	741
HML	-0,0930	-0,25	0,2517	-0,38	0,42	741
RMW	0,0630	0,07	0,1476	-0,28	0,27	741
ESGt2	0,0261	0,06	0,1267	-0,19	0,21	741
SMB	0,0423	0,01	0,1779	-0,22	0,35	741

Summary statistics of firms operating in India show that the average returns above the risk-free interest rate for 2010-2022 are around 8%. However, due to the high standard deviation and high extreme values (-0.96 and 2.84), the average returns above the risk-free interest rate indicate that the firms have unstable returns annually. The average of the market risk premium is around 5%. The 13-year average of the CMA factor is zero. The results of 57 firms operating in India show that there is no difference between the returns of firms with conservative and aggressive investment strategies.

The average of the HML factor is around -1%. This indicates that there is a small difference between firms with a high book value/market value ratio and those with low ones. In addition, the HML factor with a standard deviation value of 25% indicates that the difference between the two portfolios is highly volatile. The RMW factor, which represents the difference in returns between firms with high profitability and firms with low profitability, has a value of 6% in the 13-year average. The RMW factor provides information that firms with high profitability generate higher returns. The sustainability factor (ESGt2) integrated into the model has an average of approximately 3%. This result

shows that firms with high ESG score growth have generated relatively higher returns over the 13-year average compared to those with low ESG score growth. The last factor in the model is SMB, which has an average of 4%. This shows that the portfolio of small-cap firms in India has higher returns over the 13-year average compared to large-cap firms.

Table 51. India Correlation Coefficients and Variance Inflation Factors

India	Bx(Rm-Rf)	CMA	HML	RMW	ESGt2	SMB
Bx(Rm-Rf)	1					
CMA	0,2899	1				
HML	0,4035	0,6790	1			
RMW	-0,4624	-0,6649	-0,7846	1		
ESGt2	-0,0762	-0,4250	-0,3553	0,3849	1	
SMB	0,5071	0,8517	0,6328	-0,5376	-0,3929	1

Variable	VIF	1/VIF
CMA	6,33	0,1580
SMB	6,15	0,1625
RMW	3,80	0,2634
HML	3,13	0,3198
Bx(Rm-Rf)	2,06	0,4863
ESGt2	1,31	0,7609
Mean VIF	**3,80**	

The correlation coefficients and Variance Inflation Factors (VIF) values for India presented above.In line with the established model, the correlation test results between dependent variables range from -0.7846 to +0.8517. These results reveal that multicollinearity between independent variables does not constitute a significant problem.Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional dependence. Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity for India.

Table 52. Analysis Results of India

India
Dependent Variable

Ri-Rf

Independent Variables	Coefficients	Std. Errors	t-statistics	P-values
Bx(Rm-Rf)	0,8316	0,1498	5,55	0,000
CMA	-0,0241	0,1495	-0,16	0,874
HML	0,1298	0,0417	3,11	0,009
RMW	-0,0418	0,1418	-0,29	0,773
ESGt2	0,1695	0,0523	3,24	0,007
SMB	0,5693	0,1695	3,36	0,006
Constant	0,0259	0,0118	2,20	0,048
Number of Firms				57
Observations per Firm				13
Number of Observations				741
R-squared				0,3023

The analysis results of 57 companies operating in India between 2010 and 2022 show that the ratio of independent variables explaining the dependent variable in the model is 30%. Moreover, although the CMA and RMW factors in the model have a moderate negative effect on returns, this effect is not found to be statistically significant. When we evaluate the statistically significant variables, the Market Risk Premium has a strong positive effect on returns. This shows that investors in the Indian market are sensitive to market risk premiums, which is consistent with the CAPM.

The results of the HML factor show that investors find value stocks operating in India more attractive. The HML factor has a moderate positive coefficient on returns at the 1% significance level. The ESGt2 factor, which represents the returns of companies integrated into the model and that increase their sustainability scores proportionally, is statistically significant at the 1% significance level and has a positive coefficient explaining returns. The positive coefficient provides information that investors in India value companies' developing sustainability activities and, therefore, associate them with higher returns. However, the results of the SMB factor are also statistically significant at the 1% significance level for companies operating in India, like the ESGt2 factor. It shows that investors in the Indian market prefer companies with high return potential with small market values.

3.3.2.1.3. Findings from Brazil

The table contains summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) for 54 companies operating in Brazil between 2010 and 2022, depending on the established model.

Table 53. Summary Statistics of Brazil

Variable	Mean	Median	Std. Dv.	Min	Max	N
Ri-Rf	0,0347	-0,02	0,4434	-1	2,68	702
Bx(Rm-Rf)	-0,0368	-0,04	0,1878	-0,58	0,68	702
CMA	0,0400	0,06	0,2072	-0,31	0,37	702
HML	0,0669	0,01	0,2593	-0,24	0,68	702
RMW	0,0007	0,02	0,1159	-0,23	0,15	702
ESGt2	0,0323	0,01	0,1158	-0,15	0,25	702
SMB	0,0684	0,06	0,1449	-0,19	0,30	702

In Brazil, 54 companies were included in the analysis to analyze the period between 2010 and 2022. Summary statistics show that the average returns on the risk-free interest rate were approximately 3.5% in this period. However, the low median, high standard deviation, and high minimum-maximum values indicate that the returns are not normally distributed. The 13-year average of the Market Risk Premium is approximately -4 %. This generally indicates companies' negative sensitivity to market returns. The width between the minimum and maximum values represents the diversity in risk sensitivity among companies.

The CMA factor with an average of 4% indicates that companies with a conservative investment strategy yielded an average of 4% more returns than companies with an aggressive investment strategy in the 13-year average. The HML factor, with an average value of approximately 7%, provides information that companies with a high book value/market value ratio yielded better returns than companies with a low book value/market value ratio for the companies included in the analysis in Brazil. The table clearly shows that the 13-year average of the profitability factor (RMW) in Brazil is close to zero. This result shows that there is no linear relationship between companies' high profitability and their high returns.

The average of the ESGt2 factor, which represents the return difference between companies with high sustainability score growth rates and companies with low sustainability score growth rates, is approximately 3%. This shows that the ESG score

growth that occurs as a result of companies' increasing sustainability activities in Brazil results in higher returns. The average of the SMB factor is approximately 7%. This result shows that companies with small market values in Brazil provide higher returns.

Table 54. Brazil Correlation Coefficients and Variance Inflation Factors

Brazil	**Bx(Rm-Rf)**	**CMA**	**HML**	**RMW**	**ESGt2**	**SMB**
Bx(Rm-Rf)	1					
CMA	0,2970	1				
HML	0,3653	0,7564	1			
RMW	-0,4607	-0,3226	-0,5458	1		
ESGt2	0,2274	-0,0449	-0,0016	-0,1683	1	
SMB	0,6027	0,0128	0,0628	-0,2710	0,1516	1

Variable	**VIF**	**1/VIF**
HML	3,12	0,3206
CMA	2,45	0,4086
Bx(Rm-Rf)	2,07	0,4833
RMW	1,70	0,5885
SBM	1,67	0,5981
ESGt2	1,09	0,9207
Mean VIF	**2,02**	

The correlation coefficients and Variance Inflation Factors (VIF) values for Brazil presented above. The correlation test results, which were conducted to diagnose the multicollinearity problem that may arise due to the strong relationships between the independent variables in the established model, take values between -0.5458 and +0.7564. These results show that there will be no multicollinearity problem due to the correlation between the independent variables of the established model. Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional dependence. Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity for Brazil.

Table 55. Analysis Results of Brazil

Brazil

Dependent Variable				
Ri-Rf				
Independent Variables	**Coefficients**	**Std.Errors**	**z-statistics**	**P-values**
Bx(Rm-Rf)	1,1293	0,1160	9,73	0,000
CMA	0,0143	0,1218	0,12	0,906
HML	-0,0649	0,1104	-0,59	0,556
RMW	0,1487	0,1680	0,89	0,376
ESGt2	-0,2048	0,0953	-2,15	0,032
SMB	0,3421	0,1423	2,40	0,016
Constant	0,0632	0,0151	4,18	0,000
Number of Firms				54
Observations per Firm				13
Number of Observations				702
R-squared				0,2678

The analysis results for 54 companies operating in Brazil are given in the table above. In the model where a new sustainability factor is included in the Fama and French 5 factor model, the explanatory power of the independent variables for the dependent variable is approximately 27%. In the established model, the coefficients related to the CMA, HML, and RMW factors are not statistically significant in explaining the returns. The coefficient of the market risk premium has a strong positive effect on explaining the returns and is statistically significant at the 1% significance level. This result shows that the Brazilian market is quite sensitive to risk premiums.

Although the sustainability factor included in the model is statistically significant, it has a negative coefficient on the returns. This situation shows that investors in the Brazilian market do not prioritize companies' sustainability activities and developments. Finally, the firm size factor is statistically significant and has a strong positive effect on returns. The firm size factor SMB provides information showing that companies with small market values provide higher returns than others.

3.3.2.1.4. Findings From Indonesia

The table contains summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) for 24 companies operating in Indonesia between 2010 and 2022, depending on the established model.

Table 56. Summary Statistics of Indonesia

Variable	Mean	Median	Std. Dv.	Min	Max	N
Ri-Rf	0,0835	0,015	0,4478	-0,73	3,26	312
Bx(Rm-Rf)	0,0251	-0,02	0,1787	-0,39	0,75	312
CMA	-0,0469	-0,06	0,1949	-0,43	0,37	312
HML	0,0215	0,02	0,2001	-0,46	0,34	312
RMW	0,0284	0,01	0,1713	-0,27	0,35	312
ESGt2	0,0646	0,11	0,1489	-0,15	0,28	312
SMB	0,1061	0,07	0,2740	-0,23	0,69	312

According to the summary statistics of 24 companies operating in Indonesia between 2010-2022, the average return of the companies on the risk-free interest rate is approximately 8.5%. The high standard deviation and high minimum-maximum range of the return on the risk-free interest rate indicate that the returns are not normally distributed. In addition, the average value of the market risk premium is 2.5%. The average value of the CMA factor is approximately -5%. This result provides information that conservative investment strategies result in lower returns compared to aggressive investment strategies. The average of the HML factor is approximately 2%. It shows that companies with a high book value/market value ratio achieve higher returns than companies with a low book value/market value ratio in Indonesia. The results of the RMW factor show that companies with high profitability provide relatively higher returns than companies with low profitability.

The results of the sustainability factor included in the model are approximately 6.5% on average over 13 years. This average value shows that firms with high sustainability score growth rates in the Indonesian market have higher returns. The firm size factor average shows that small-scale firms in Indonesia have much higher returns than large-scale firms.

Table 57. Indonesia Correlation Coefficients and Variance Inflation Factors

Indonesia	Bx(Rm-Rf)	CMA	HML	RMW	ESG	SMB
Bx(Rm-Rf)	1					
CMA	0,3287	1				
HML	0,2150	0,5913	1			
RMW	0,3686	0,1321	-0,2022	1		
ESGt2	-0,1010	-0,2834	-0,0321	-0,6634	1	
SMB	0,2903	0,2234	0,0401	0,0349	0,1120	1

Variable	VIF	1/VIF
RMW	2,63	0,3807
ESGt2	2,24	0,4473
CMA	1,95	0,5129
HML	1,88	0,5306
Bx(Rm-Rf)	1,54	0,6476
SMB	1,19	0,8389
Mean VIF	**1,91**	

The correlation coefficients and Variance Inflation Factors (VIF) values for Indonesia presented above. In the established model, the correlation coefficients between the independent variables take values between -0.6634 and +0.5913. The correlation test results provide information that the model does not contain a multicollinearity problem. Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional dependence. Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity for Indonesia.

Table 58. Analysis Results of Indonesia

Indonesia				
Dependent Variable Ri-Rf				
Independent Variables	**Coefficients**	**Std. Errors**	**t-statistics**	**P-values**
Bx(Rm-Rf)	0,8921	0,1508	5,91	0,000
CMA	-0,2242	0,0883	-2,54	0,026
HML	0,0526	0,0538	0,98	0,347
RMW	-0,0338	0,1694	-0,20	0,845
ESGt2	-0,2256	0,1589	-1,42	0,181
SMB	0,3593	0,0466	7,59	0,000
Constant	0,0274	0,0154	1,78	0,100
Number of Firms				24
Observations per Firm				13
Number of Observations				312
R-squared				0,1967

In Indonesia, where 24 companies were included in the analysis, the ratio of independent variables explaining the dependent variable is approximately 20%. The results obtained from the model show that the HML, RMW, and ESGt2 factors are not

statistically significant in explaining returns. When statistically significant variables are examined, the market risk premium has a strong positive effect on explaining returns. It is statistically significant at the 1% significance level, which shows that the Indonesian market is sensitive to risk premiums.

The results of the CMA factor are statistically significant at the 5% significance level and have a negative effect on returns. This can be interpreted as conservative investment trends were not positively received by investors in the Indonesian market. The firm size factor SMB is significant at the 1% significance level and has a strong positive effect on returns. This result can be interpreted as investors valuing small firms with high return potential.

3.3.2.1.5. Findings From Mexico

The table contains summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) for 21 companies operating in Mexico between 2010 and 2022, depending on the established model.

Table 59. Summary Statistics of Mexico

Variable	Mean	Median	Std. Dv.	Min	Max	N
Ri-Rf	0,0492	0	0,3373	-0,65	1,62	273
Bx(Rm-Rf)	-0,0201	-0,03	0,1191	-0,38	0,33	273
CMA	0,0076	0,06	0,1903	-0,34	0,38	273
HML	0,0615	0,16	0,3334	-0,64	0,51	273
RMW	-0,0415	-0,07	0,1669	-0,29	0,30	273
ESGt2	-0,0415	0,02	0,2202	-0,41	0,28	273
SMB	0,0730	0,05	0,1392	-0,13	0,30	273

The summary statistics of firms operating in Mexico show that the average return above the risk-free rate is around 5%. The zero median value and the high standard deviation indicate that returns are generally low, with some high returns increasing the average. The average for the market risk premium is -2%. The average for the CMA factor is close to zero, indicating that there is no significant difference between conservative and aggressive investment strategies. The results for the HML factor are around 6% on average. It is seen that firms with a high book value/market value ratio provide higher returns on average.

The RMW factor, which indicates the difference between firms with high and low profitability, has an average value of -4%. This average value shows that firms with high

profitability do not achieve higher returns. The average value for the sustainability factor is -4%. This result indicates that firms with high sustainability activities in Mexico achieve lower returns than others. The average for the SMB factor is around 7%. This value indicates that the portfolio consisting of small-scale companies provides higher returns on average over 13 years compared to the portfolio consisting of large-scale companies.

Table 60. Mexico Correlation Coefficients and Variance Inflation Factors

Mexico	Bx(Rm-Rf)	CMA	HML	RMW	ESG	SMB
Bx(Rm-Rf)	1					
CMA	0,0992	1				
HML	-0,2335	0,0537	1			
RMW	0,1759	-0,8501	-0,0934	1		
ESGt2	-0,1043	0,0537	0,4684	-0,0494	1	
SMB	0,2568	0,2583	-0,1695	-0,0466	-0,1317	1

Variable	VIF	1/VIF
CMA	5,40	0,1851
RMW	5,19	0,1927
Bx(Rm-Rf)	1,42	0,7058
HML	1,36	0,7364
ESGt2	1,30	0,7720
SMB	1,26	0,7931
Mean VIF	**2,65**	

The correlation coefficients and Variance Inflation Factors (VIF) values for Mexico presented above. The correlation test results, which were conducted to measure the relationships between the independent variables in the established model, range from -0.8501 to +0.4684. In light of these data, various strong robust estimators were used for the possible multicollinearity problem among firms operating in Mexico.

Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional dependence. Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity for Mexico.

Table 61. Analysis Results of Mexico

Mexico				
Dependent Variable Ri-Rf				
Independent Variables	**Coefficients**	**Std. Errors**	**t-statistics**	**P-values**
Bx(Rm-Rf)	1,1422	0,0419	27,26	0,000
CMA	-0,3547	0,0917	-3,87	0,002
HML	0,0412	0,0154	2,67	0,020
RMW	-0,4193	0,1051	-3,99	0,002
ESGt2	-0,0219	0,0393	-0,56	0,587
SMB	0,4184	0,0669	6,25	0,000
Constant	0,0235	0,0080	2,94	0,012
Number of Firms				21
Observations per Firm				13
Number of Observations				273
R-squared				0,1748

In the model tested using data from 21 companies between 2010 and 2022, the dependent variable explanation rate of the independent variables, the R^2 value, is around 17%. In the model, which is generally significant, the sustainability factor (ESGt2) was not found to be statistically significant. The Market Risk Premium variable is statistically significant and has a strong positive effect. This shows that companies are highly sensitive to market movements.

The CMA factor shows that conservative investment trends negatively affect returns at the 1% significance level. Similar to the CMA factor, the RMW factor also has a strong negative coefficient on returns. This reveals that companies with high profitability in Mexico do not provide high returns.

The HML factor has a strong positive effect on returns, and this effect is statistically significant at the 5% significance level. In the Mexican market, companies with small market values provide higher returns than companies with high market values.

3.3.2.1.6. Findings from Russia

The table contains summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) for 23 companies operating in Russia for the period 2010-2022, depending on the established model.

Table 62. Summary Statistics of Russia

Variable	Mean	Median	Std. Dv.	Min	Max	N
Ri-Rf	0,0702	0,03	0,4384	-0,89	2,63	299
Bx(Rm-Rf)	-0,0255	0,03	0,2009	-0,79	0,35	299
CMA	-0,0969	-0,02	0,2517	-0,53	0,33	299
HML	-0,0615	-0,03	0,2301	-0,53	0,30	299
RMW	0,0676	0,06	0,2691	-0,37	0,48	299
ESGt2	-0,0600	-0,05	0,2266	-0,60	0,25	299
SMB	0,02230	0,03	0,2142	-0,29	0,50	299

Summary statistics for 23 companies operating in Russia show that the 13-year average return on the risk-free rate is 7%. The high standard deviation value and high minimum and maximum values (-0.89 and 2.63) indicate that returns fluctuate from year to year. The average for the Market Risk Premium is -2.5%. This result shows that while firms are generally negatively sensitive to market returns, some may be positively affected.

Similar to the Market Risk Premium, the CMA, HML, and ESGt2 factors have negative means. In addition, the median values for all three variables are negative. The CMA factor shows that firms with a conservative investment strategy yield lower returns on average than aggressive ones. The HML and ESGt2 factors have similar means. The HML factor shows that firms with low values are ahead in returns. The sustainability factor ESGt2 shows that firms that prioritize environmental, social, and governance factors experience negative returns.

The RMW and SMB factors have positive means. The RMW factor provides information that firms with high profitability provide better returns on a 13-year average, while the SMB factor provides information that smaller firms provide relatively higher returns.

Table 63. Russia Correlation Coefficients and Variance Inflation Factors

Russia	Bx(Rm-Rf)	CMA	HML	RMW	ESG	SMB
Bx(Rm-Rf)	1					
CMA	-0,5041	1				
HML	-0,1484	-0,1605	1			
RMW	-0,0399	-0,0268	-0,8045	1		
ESGt2	0,0264	0,2172	-0,6252	0,5539	1	
SMB	0,3134	-0,6213	-0,0178	-0,0643	-0,0831	1

Variable	VIF	1/VIF
HML	6,25	0,1599
RMW	5,67	0,1763
CMA	4,03	0,2478
SMB	2,22	0,4505
Bx(Rm-Rf)	2,20	0,4545
ESGt2	1,74	0,5731
Mean VIF	**3,69**	

The correlation coefficients and Variance Inflation Factors (VIF) values for Russia presented above. The correlation test results for the detection of possible multicollinearity in the model range from -0.8045 to +0.5539. Since these results are within the determined critical value range, the problem of multicollinearity is not of serious importance. Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional dependence. Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity for Russia.

Table 64. Analysis Results of Russia

Russia				
Dependent Variable Ri-Rf				
Independent Variables	**Coefficients**	**Std. Errors**	**t-statistics**	**P-values**
Bx(Rm-Rf)	1,0724	0,0889	12,05	0,000
CMA	-0,0092	0,1113	-0,08	0,935
HML	-0,1452	0,1182	-1,23	0,243
RMW	-0,1191	0,1009	-1,18	0,261
ESGt2	-0,1188	0,0290	-4,09	0,002
SMB	0,2812	0,0629	4,47	0,001
Constant	0,0824	0,0123	6,70	0,000
Number of Firms				23
Observations per Firm				13
Number of Observations				299
R-squared				0,3269

The results of the analysis, which included 23 companies operating in Russia, show that the ratio of independent variables to the dependent variable is approximately

33%. The results regarding the variables show that the factors of investment strategy (CMA), profitability (RMW), and company value (HML) have a negative effect on the returns, but they are not statistically significant. The results regarding the Market Risk Premium have a strong positive effect on the returns, which is statistically significant at the 1% significance level. These results show that the companies are highly sensitive to market fluctuations and have strong relationships with market movements.

The sustainability factor is statistically significant at the 1% level of significance and has a slightly negative effect on the returns. This situation provides information that the sustainability activities of the companies in Russia do not have a mediating role in providing positive returns. The negative effect of sustainability and the high market sensitivity provide important clues for correctly perceiving the risk and reward dynamics of the Russian market. The results regarding the company size factor are statistically significant and have a positive effect on the returns. This shows that investors in Russia prioritize small companies with high return potential.

3.3.2.1.7. Findings From Türkiye

The table contains summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) for 25 companies operating in Turkey between 2010 and 2022, depending on the established model.

Table 65. Summary Statistics of Türkiye

Variable	Mean	Median	Std. Dv.	Min	Max	N
Ri-Rf	0,2378	0,10	0,7143	-0,65	5,94	325
Bx(Rm-Rf)	-0,0614	-0,06	0,2018	-0,75	0,28	325
CMA	0,0800	0,06	0,2500	-0,48	0,70	325
HML	-0,0415	-0,08	0,2135	-0,57	0,29	325
RMW	0,0215	0,04	0,2326	-0,62	0,29	325
ESGt2	-0,0284	-0,07	0,1213	-0,15	-0,26	325
SMB	0,1415	0,12	0,1931	-0,06	0,74	325

Summary statistics of companies operating in Turkey for 2010-2022 show that the average return on the risk-free interest rate is 24%. Although the median value of 10% indicates that positive returns dominate the distribution of returns, the high standard deviation (71%) shows that there are significant changes in returns. In addition, the wide range of values (-0.65 and 5.94) indicates that some companies experience serious losses while others provide very high returns.

The results of the Market Risk Premium provide information that the mean and median are -6%. These results show that companies are negative towards market movements and that the negative tendency towards market returns is dominant.

The average value of the CMA factor is 8%. This average shows that conservative investment trends in Turkey provide higher returns. The average of the HML factor includes information that companies with low book value/market value ratio are ahead in returns. The profitability factor provides information that high profitability has a moderate positive effect on returns. The summary results for the sustainability factor indicate that positive ESG activities have a negative impact on firms' returns. Finally, the firm size factor is 14% on average for SMBs, indicating that smaller firms have higher returns over the 13-year average.

Table 66. Türkiye Correlation Coefficients and Variance Inflation Factors

Türkiye	**Bx(Rm-Rf)**	**CMA**	**HML**	**RMW**	**ESG**	**SMB**
Bx(Rm-Rf)	1					
CMA	-0,4769	1				
HML	0,2019	-0,0868	1			
RMW	0,5022	-0,5295	-0,3973	1		
ESGt2	0,0486	0,0264	-0,2356	0,2163	1	
SMB	-0,7392	0,6624	0,1682	-0,7987	-0,2624	1

Variable	**VIF**	**1/VIF**
SMB	6,71	0,1491
RMW	3,52	0,2842
Bx(Rm-Rf)	3,14	0,3186
CMA	2,18	0,4585
HML	1,83	0,5450
ESGt2	1,24	0,8076
Mean VIF	**3,10**	

The correlation coefficients and Variance Inflation Factors (VIF) values for Türkiye presented above. The correlation test results, which were conducted to test the relationship between independent variables, ranged from -0.7987 to +0.6624. These results show that multicollinearity will not be a significant problem in the model. Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional

dependence. Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity for Türkiye.

Table 67. Analysis Results of Türkiye

Türkiye				
Dependent Variable Ri-Rf				
Independent Variables	**Coefficents**	**Std. Errors**	**t-statistics**	**P-values**
Bx(Rm-Rf)	-0,6358	0,4655	-1,37	0,197
CMA	-0,0345	0,1756	-0,20	0,847
HML	-0,2813	0,1696	-1,66	0,123
RMW	-1,1034	0,3372	-3,27	0,007
ESGt2	-2,2530	0,2732	-8,24	0,000
SMB	0,6085	0,5953	1,02	0,327
Constant	0,0633	0,0801	0,79	0,444
Number of Firms				25
Observations per Firm				13
Number of Observations				325
R-squared				0,1976

The analysis results, using data from 25 companies between 2010 and 2022, show that the ratio of independent variables to the dependent variable is approximately 20%. However, the Market Risk Premium, investment, value, and firm size factors in the model are not statistically significant. The RMW factor has a negative coefficient on returns and is statistically significant at the 1% significance level. This result shows that profitable companies in the Turkish market can provide lower returns. The results of the sustainability factor also have a negative coefficient on returns like the RMW factor and are statistically significant. This result shows that companies that attach importance to environmental, social, and governance issues in the Turkish market exhibit negative performance in returns.

3.3.2.2. Analysis and Findings from ESGt2 Model – Developed Countries

In this section, the impact of the second new factor created using ESG scores on portfolio performance will be examined in the context of portfolios created for Canada, France, Germany, Italy, Japan, United Kingdom and United States

3.3.2.2.1. Findings From Canada

The table contains summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) for 149 companies operating in Canada between 2010 and 2022, depending on the established model.

Table 68. Summary Statistics of Canada

Variable	Mean	Median	Std. Dv.	Min	Max	N
Ri-Rf	0,1186	0,07	0,5609	-0,93	7,7	1937
Bx(Rm-Rf)	0,0395	0,04	0,1583	-0,45	0,89	1937
CMA	0,0115	-0,05	0,1970	-0,19	0,55	1937
HML	0,0500	-0,03	0,3573	-0,35	1,05	1937
RMW	-0,0030	0,12	0,3360	-0,90	0,30	1937
ESGt2	-0,0561	-0,05	0,0640	-0,22	0,02	1937
SMB	0,0723	0,03	0,1606	-0,13	0,44	1937

Summary statistics for 149 firms between 2010 and 2022 show that the average return on the risk-free interest rate is approximately 12%. However, the high standard deviation and high minimum-maximum values indicate that returns fluctuate significantly, and the risk level is high. The average value of the market risk premium is approximately 4%, indicating positive sensitivity. The CMA factor shows that conservative investment trends have a positive effect on returns, but this effect is quite low. The negative median value of the CMA factor implies that the negative effect is dominant for some firms.

The average of the HML factor is 5%, and the median value is -3%. These values conclude that firms with high book value/market value provide higher returns than those with low ones. In contrast, the median value of -3% indicates that the negative contribution is dominant. The profitability factor has a negative mean. On the 13-year average, the difference in returns between firms with high profitability and firms with low profitability is negative, but this difference is very close to zero. The average difference between companies with high ESG activities and others is 5.5%. This result can be interpreted as high ESG activities not being rewarded with high returns in the Canadian market. The average for the firm size factor is 7%, which provides information that small-sized companies have higher average returns in Canada.

Table 69. Canada Correlation Coefficients and Variance Inflation Factors

Canada	Bx(Rm-Rf)	CMA	HML	RMW	ESG	SMB
Bx(Rm-Rf)	1					

CMA	0,4231	1				
HML	0,5549	0,7955	1			
RMW	-0,6184	-0,7885	-0,8819	1		
ESGt2	-0,3970	-0,7986	0,6739	0,8351	1	
SMB	0,5302	0,6404	0,8087	-0,8972	-0,8138	1

Variable	VIF	1/VIF
RMW	12,32	0,0811
SMB	8,39	0,1192
HML	8,15	0,1227
ESGt2	7,74	0,1292
CMA	6,34	0,1576
Bx(Rm-Rf)	1,76	0,5691
Mean VIF	**7,45**	

The correlation coefficients and Variance Inflation Factors (VIF) values for Canada presented above. The correlation test results between the independent variables used in the model range from -0.8972 to +0.8351. Various robust estimators were used for the possible multicollinearity problem. Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional dependence. Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity.

Table 70. Analysis Results of Canada

Canada				
Dependent Variable Ri-Rf				
Independent Variables	**Coefficients**	**Standard Errors**	**t-statistics**	**P-values**
Bx(Rm-Rf)	0,9707	0,2617	3,71	0,003
CMA	-0,0370	0,1098	-0,34	0,742
HML	0,0513	0,0656	0,78	0,449
RMW	-0,0163	0,1423	-0,11	0,911
ESGt2	0,4378	0,2229	1,96	0,073
SMB	0,6611	0,0840	7,87	0,000
Constant	0,0548	0,0230	2,38	0,035
Number of Firms				149
Observations per Firm				13

Number of Observations	1937
R-squared	0,1617

In the model where 149 companies are analyzed, the dependent variable explanation rate (R^2) of the independent variables is 16%. Although the investment (CMA), value (HML), and profitability (RMW) factors in the model have positive and negative effects on returns, these effects are not statistically significant. The coefficient of the Market Risk Premium is positive and statistically significant at the 1% significance level. This shows that companies operating in Canada give strong positive responses to market movements.

The sustainability factor (ESGt2) results are statistically significant at the 10% level of significance and have a strong positive coefficient on returns. It is seen that returns are strongly positively affected for companies that attach importance to ESG activities and increase their scores in the Canadian market. The analysis results of the SMB factor are significant at the 5% level of significance and have a moderate positive effect on returns. This finding shows that companies with small market values in Canada provide more returns than companies with large market values.

3.3.2.2.2. Findings From France

The table contains summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) for 73 companies operating in France between 2010 and 2022, depending on the established model.

Table 71. Summary Statistics of France

Variable	Mean	Median	Std. Dv.	Min	Max	N
Ri-Rf	0,0991	0,09	0,2933	-0,86	1,36	949
Bx(Rm-Rf)	0,0439	0,04	0,1463	-0,37	0,54	949
CMA	-0,0661	-0,04	0,0803	-0,21	0,03	949
HML	-0,0430	-0,03	0,1119	-0,24	0,15	949
RMW	0,3769	0,04	0,0774	-0,16	0,15	949
ESGt2	0,0100	0,00	0,0805	-0,14	0,15	949
SMB	-0,0030	-0,02	0,0647	-0,13	0,11	949

Summary statistics for companies operating in France show that the average return over the risk-free interest rate over the 13-year period was approximately 10%, while the average for the Market Risk Premium was 4%. The average value of the investment and value factors is negative. The investment factor (CMA) shows that conservative

investment strategies are rewarded with lower returns. The value factor indicates that firms with high book value/market value are rewarded with lower returns. The average of the profitability factor RMW provides information that firms with high profitability provide higher returns. The sustainability factor average integrated into the model shows that firms with high ESG growth scores provide higher returns than those with low ones. The average value of the firm size factor SMB shows that the difference in average returns between firms with small market value and firms with large market value is almost zero.

Table 72. France Correlation Coefficients and Variance Inflation Factors

France	**Bx(Rm-Rf)**	**CMA**	**HML**	**RMW**	**ESG**	**SMB**
Bx(Rm-Rf)	1					
CMA	-0,0566	1				
HML	0,4761	0,6429	1			
RMW	-0,3015	-0,4799	-0,5701	1		
ESGt2	0,0374	-0,0131	-0,2374	-0,2989	1	
SMB	-0,0409	0,2360	0,1271	0,0385	-0,1668	1

Variable	**VIF**	**1/VIF**
HML	4,68	0,2135
CMA	2,88	0,3469
RMW	2,14	0,4663
Bx(Rm-Rf)	2,06	0,4859
ESGt2	1,69	0,5906
SMB	1,11	0,8980
Mean VIF	**2,43**	

The correlation coefficients and Variance Inflation Factors (VIF) values for all France presented above. The correlation test results, which were conducted to examine the relationship between the independent variables in the established model, take values between -0.5701 and +0.6429. These results show that the model does not contain a multicollinearity problem. Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional dependence. Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity for France.

Table 73. Analysis Results of France

France				
Dependent Variable Ri-Rf				
Independent Variables	**Coefficients**	**Std Errors**	**t-statistics**	**P-values**
Bx(Rm-Rf)	1,0805	0,0836	12,92	0,000
CMA	0,1636	0,1101	1,49	0,163
HML	-0,1269	0,1754	-0,72	0,483
RMW	-0,0922	0,0685	-1,35	0,203
ESGt2	-0,2864	0,0554	-5,16	0,000
SMB	1,0780	0,0542	19,89	0,000
Constant	0,0666	0,0034	19,55	0,000
Number of Firms				73
Observations per Firm				13
Number of Observations				949
R-squared				0,3257

In the analysis of companies operating in France, the ratio of independent variables explaining the dependent variable was found to be 32.5%. In addition, the CMA, HML, and RMW factors in the model are not statistically significant. When the statistically significant factors in the model are considered, it is understood that there is a strong positive relationship between the Market Risk Premium and company returns. This relationship can be interpreted as the serious impact of market movements on the financial performance of companies in France.

The sustainability factor analysis results provide information that companies' developing ESG activities negatively affect their returns. This situation can be interpreted as the cost-increasing elements of increasing ESG activities putting companies at a disadvantage and negatively affecting their returns. The results of the company size factor indicate the strong positive effect of a portfolio consisting of companies with small market values on returns. This shows that companies with small market values exhibited high performance in the French market between 2010 and 2022.

3.3.2.2.3. Findings From Germany

The table includes summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) of 63 firms operating in Germany for the period 2010-2022 based on the model.

Table 74. Summary Statistics of Germany

Variable	Mean	Median	Std. Dv.	Min	Max	N
Ri-Rf	0,0957	0,07	0,3376	-0,74	2,74	819
Bx(Rm-Rf)	0,0707	0,07	0,1564	-0,35	0,54	819
CMA	0,0046	0,01	0,1068	-0,14	0,19	819
HML	-0,0046	-0,04	0,1194	-0,27	0,20	819
RMW	0,0015	0,01	0,1019	-0,21	0,13	819
ESGt2	0,0253	0,02	0,1173	-0,17	0,24	819
SMB	0,0307	0,02	0,0960	-0,12	0,22	819

The 13-year summary statistics for firms operating in Germany show that the average return on the risk-free rate, i.e., the risk-adjusted return, is about 10%. The high standard deviation indicates that returns are highly volatile, while the median shows that half of the firm returns are more than 7%. The mean for the Market Risk Premium is 7%, representing the average market movement sensitivity. The mean of the CMA factor, which distinguishes between conservative investment tendencies and aggressive investment strategies, is close to zero.

This result indicates that the investment strategies of firms in Germany do not have a differentiating importance for investors. Similar to the CMA factor, the mean of the HML factor is also close to zero. This result shows that value stocks do not have a significant difference in the 13-year average. Similar to the CMA and HML factors, the average of the RMW factor is also very close to zero. The RMW factor, which reveals the difference in returns between high- and low-profitability firms, shows no significant difference between 2010 and 2022. The sustainability factor, which is integrated into the model, shows that firms with high ESG score growth rates generate about 2.5% higher returns over the 13-year average compared to the others. Finally, the SMB factor, which indicates the difference between firms with small and large market capitalization, has a mean of 3%. The SMB factor provides information that small firms in Germany generate higher returns.

Table 75. Germany Correlation Coefficients and Variance Inflation Factors

Germany	Bx(Rm-Rf)	CMA	HML	RMW	ESG	SMB
Bx(Rm-Rf)	1					
CMA	0,0001	1				
HML	-0,0977	0,6297	1			
RMW	0,0630	-0,3698	-0,7459	1		
ESGt2	0,5434	0,0330	-0,3609	0,4961	1	
SMB	0,1666	0,5584	0,5814	-0,3117	-0,0482	1

Variable	VIF	1/VIF
HML	4,09	0,2446
RMW	2,98	0,3360
ESGt2	2,35	0,4263
CMA	2,12	0,4706
SMB	1,89	0,5282
Bx(Rm-Rf)	1,74	0,5735
Mean VIF	**2,53**	

The correlation coefficients and Variance Inflation Factors (VIF) values for Germany presented below.In the analysis made with the data of the firms operating in Germany, the test results made to examine the correlation relationship between the independent variables take values between -0.7459 and +0.6297. According to these results, the multicollinearity problem that may arise between independent variables does not constitute a significant problem. Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional dependence. Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity.

Table 76. Analysis Results of Germany

Germany				
Dependent Variable Ri-Rf				
Independent Variables	**Coefficients**	**Std. Errors**	**t-statistics**	**P-values**
Bx(Rm-Rf)	0,9742	0,1070	9,10	0,000
CMA	0,1107	0,0554	2,00	0,069
HML	-0,0510	0,0793	-0,64	0,532
RMW	0,0580	0,0816	0,71	0,491
ESGt2	0,0481	0,0964	0,50	0,627
SMB	0,0607	0,1276	4,76	0,000
Constant	0,0061	0,0063	0,96	0,355
Number of Firms				63
Observations per Firm				13
Number of Observations				819
R-squared				0,2793

According to the results of the analysis of 63 firms operating in Germany, the ratio of independent variables explaining the dependent variable is approximately 28%. The results also show that HML, RMW, and ESGt2 variables are not statistically significant. When these results are analyzed in detail, it is seen that although the value factor HML has a negative coefficient on returns, investors in the German market do not consider it with a clear strategy.

Similarly, although the RMW factor has a positive coefficient on returns, investors' investment strategies based on firm profitability are not statistically significant. Similar to the RMW factor, the sustainability factor ESGt2 also has a positive coefficient, but it is unclear whether investors have a clear strategy.

According to the analysis results, the statistically significant variables show that the market risk premium has a strong positive effect on returns, which is statistically significant. The CMA factor differentiates between conservative and aggressive investment tendencies and has a moderately positive effect on returns. Statistically significant at the 10% level, the CMA factor suggests that conservative investment tendencies are rewarded with higher returns in the German market. Finally, the firm size factor SMB indicates that firms with small market capitalization generate higher returns in the German market due to higher risk premiums.

3.3.2.2.4. Findings From Italy

The table includes summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) for the period 2010-2022 for 28 firms operating in Italy based on the model.

Table 77. Summary Statistics of Italy

Variable	Mean	Median	Std. Dv.	Min	Max	N
Ri-Rf	0,0278	0,01	0,3531	-0,93	2,00	364
Bx(Rm-Rf)	0,0142	0,00	0,1830	-0,49	0,46	364
CMA	-0,1169	-0,19	0,1503	-0,30	0,13	364
HML	-0,13	-0,26	0,1961	-0,35	0,19	364
RMW	0,1953	0,24	0,1221	-0,09	0,36	364
ESGt2	-0,0392	-0,05	0,0963	-0,19	0,12	364
SMB	0,0376	-0,01	0,1485	-0,09	0,49	364

Summary statistics for 28 Italian firms show that the average return on the risk-free rate is about 3%. This moderate value has a high standard deviation and extreme

outliers (-0.93 and 2.00). The 13-year average for the market risk premium is about 1%. This result shows the average sensitivity of firms to market movements on a 13-year average. The 13-year average for the investment factor is about -12%. This average value shows conservative investment tendencies have lower average returns than aggressive investment tendencies in Italy.

Similar to the CMA factor, the 13-year average for the HML factor is negative. The profitability factor RMW, on the other hand, has a high positive average. This average of the profitability factor indicates that firms with high profitability in the Italian market have higher average returns than firms with low profitability. The mean of the sustainability factor integrated into the model is negative. This result indicates that firms with high sustainability score growth rates earn lower returns than firms with low sustainability score growth rates. The firm size factor SMB averages 4% from 2010 to 2022. This average value indicates that firms with small market capitalization earn relatively higher returns.

Table 78. Italy Correlation Coefficients and Variance Inflation Factors

Italy	Bx(Rm-Rf)	CMA	HML	RMW	ESG	SMB
Bx(Rm-Rf)	1					
CMA	-0,3105	1				
HML	0,1087	-0,2373	1			
RMW	-0,1549	-0,1392	-0,6846	1		
ESGt2	0,3143	0,3882	-0,2511	-0,0843	1	
SMB	0,3915	-0,4770	0,1032	0,1984	-0,2957	1

Variable	VIF	1/VIF
RMW	2,77	0,3607
HML	2,70	0,3700
Bx(Rm-Rf)	2,00	0,4996
ESG	1,88	0,5310
CMA	1,84	0,5428
SMB	1,77	0,5650
Mean VIF	**2,16**	

The correlation coefficients and Variance Inflation Factors (VIF) values for all countries are presented above. The correlation coefficients and Variance Inflation Factors (VIF) values for all countries are presented below. The results of the correlation test conducted in order to test the relationship between the independent variables in the

analyzed model take values between -0.6846 and +0.3915. The results of the correlation test show that multicollinearity will not pose a significant problem in the model. Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional dependence. Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity.

Table 79. Analysis Results of Italy

Italy				
Dependent Variable Ri-Rf				
Independent Variables	**Coefficients**	**Std.Errors**	**z-statistics**	**P-values**
Bx(Rm-Rf)	0,9132	0,0870	10,49	0,000
CMA	-0,0121	0,1305	-0,09	0,926
HML	-0,0781	0,1303	-0,60	0,549
RMW	-0,3795	0,1631	-2,33	0,020
ESGt1	-0,0376	0,1732	-0,22	0,828
SMB	0,4713	0,1629	2,89	0,004
Constant	0,0590	0,0249	2,37	0,018
Number of Firms				28
Observations per Firm				13
Number of Observations				364
R-squared				0,3458

The results of the analysis of 28 firms operating in Italy show that the ratio of independent variables explaining the dependent variables in the model is approximately 35%. In addition, the market risk premium, RMW, and SMB factors in the model are statistically significant, while the other factors are not. When the results are analyzed in terms of the significant variables in the model, it is seen that the coefficient of the market risk premium is strongly positive. This result indicates the high sensitivity of the firms operating in Italy to market movements. The results for the RMW factor indicate that firms with high profitability in the Italian market are rewarded with high returns. This indicates that high profitability is not a determining factor in investor decisions in the Italian market. The last significant factor in the model, the SMB factor, has a strong positive effect on returns. This result indicates that small firms are rewarded with higher returns in the Italian market.

3.3.2.2.5. Findings From Japan

The table includes summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) of 361 firms operating in Japan for the period 2010-2022 based on the model.

Table 80. Summary Statistics of Japan

Variable	Mean	Median	Std. Dv.	Min	Max	N
Ri-Rf	0,1123	0,06	0,3341	-0,91	4,41	4693
Bx(Rm-Rf)	0,0733	0,07	0,1856	-0,39	1,03	4693
CMA	0,0315	0,02	0,0554	-0,06	0,15	4693
HML	0,0053	0,00	0,1128	-0,25	0,25	4693
RMW	-0,0192	-0,01	0,0874	-0,19	0,10	4693
ESGt2	-0,0192	-0,03	0,0552	0,10	0,12	4693
SMB	0,0276	0,03	0,0520	-0,09	0,10	4693

Summary statistics for 361 firms operating in Japan show that the average return on the risk-free interest rate is about 11%. This average value has a high standard deviation and high minimum and maximum values. This shows that market returns are uneven and that there are significant return differentials across firms. The 13-year average of the market risk premium is about 7%. The average for the CMA factor, representing the return spread between conservative and aggressive investment strategies, is 3%. This result shows that conservative investment tendencies in Japan generated relatively higher returns between 2010 and 2022. The mean for the HML factor is close to zero. This average value indicates no significant difference in returns between firms with a high book-to-market value ratio and firms with a low book-to-market value ratio.

The RMW average of the profitability factor is low negative, indicating that there is a small difference between the returns of firms with high profitability and firms with low profitability in the 13-year average. Similar to the RMW factor, the 13-year average value of the sustainability factor is negative. The average of the sustainability factor shows that firms in Japan that attach more importance to ESG activities do not achieve positive results in terms of returns. The average value of the SMB factor, which represents the difference in returns between firms with low market capitalization and firms with high market capitalization, is approximately 3%. This result suggests that between 2010 and 2022 in Japan, firms with low market capitalization had relatively more favorable returns than firms with high market capitalization.

Table 81. Japan Correlation Coefficients and Variance Inflation Factors

Japan	Bx(Rm-Rf)	CMA	HML	RMW	ESG	SMB
Bx(Rm-Rf)	1					
CMA	-0,1104	1				
HML	-0,1390	0,5999	1			
RMW	-0,1923	-0,6892	-0,7890	1		
ESGt2	-0,3352	0,4390	0,0277	0,1831	1	
SMB	-0,0668	0,5955	0,6791	-0,3733	0,4044	1

Variable	VIF	1/VIF
RMW	16,28	0,0614
HML	11,20	0,0892
CMA	8,35	0,1197
SMB	4,80	0,2081
ESGt2	3,11	0,3212
Bx(Rm-Rf)	2,31	0,4328
Mean VIF	**7,68**	

The correlation coefficients and Variance Inflation Factors (VIF) values for all countries are presented above. The results of the correlation test between the independent variables in order to detect the multicollinearity problem take values between -0.7890 and 0.6791. These results show that the problem of possible multicollinearity in the model is low. Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional dependence. Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity.

Table 82. Analysis Results of Japan

Japan				
Dependent Variable Ri-Rf				
Independent Variables	**Coefficients**	**Std. Errors**	**t-statistics**	**P-values**

Bx(Rm-Rf)	1,0206	0,0297	34,33	0,000
CMA	0,0493	0,3179	0,16	0,879
HML	0,1727	0,1368	1,26	0,231
RMW	0,0021	0,2559	0,01	0,993
ESGt2	0,0417	0,0777	0,54	0,601
SMB	0,4247	0,2014	2,11	0,057
Constant	0,2413	0,0099	2,44	0,031
Number of Firms				361
Observations per Firm				13
Number of Observations				4693
R-squared				0,3281

The analysis results of 361 firms show that R^2, the ratio of the independent variables in the model explaining the dependent variable, is approximately 33%. Other model results indicate that the market risk premium is statistically significant and has a strong positive effect in explaining returns. The results for the investment factor CMA show that it has a moderate positive effect on returns, but it is not statistically significant. Similar to the CMA factor, HML, RMW and ESGt2 variables have a positive effect on returns but are not statistically significant at any level of significance. The firm size factor has a positive effect on SMB returns and is statistically significant at the 10% significance level. This result indicates that a portfolio of small-sized firms provides higher returns in the Japanese market.

3.3.2.2.6. Findings From United Kingdom

The table contains summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) for 181 companies operating in the UK between 2010 and 2022, depending on the model established.

Table 83. Summary Statistics of United Kingdom

Variable	Mean	Median	Std. Dv.	Min	Max	N
Ri-Rf	0,1079	0,08	0,3612	-0,91	3,4	2353
Bx(Rm-Rf)	0,0185	0,02	0,1050	-0,56	0,51	2353
CMA	0,0215	0,02	0,1370	-0,13	0,43	2353
HML	-0,0084	-0,04	0,1350	-0,19	0,33	2353
RMW	0,0246	0,05	0,1280	-0,35	0,17	2353
ESGt2	-0,0023	0,01	0,0396	-0,08	0,06	2353
SMB	0,0223	0,04	0,0737	-0,15	0,13	2353

In the United Kingdom, where there are 181 firms in the analyzed dataset, summary statistics show that the average return of firms over the risk-free interest rate is

11% in the period 2010-2022. This value, which has a high standard deviation (0.3612) and high minimum and maximum values (-0.91 and 3.4), indicates volatility and high risk in returns.

The 13-year average of the investment factor is around 2%. This result shows that portfolios with conservative investment strategies provide relatively better returns than aggressive investment strategies over the 13-year average. The average of the value factor is close to zero but negative. This result shows that value stocks do not have a positive average difference in terms of return. The average of the RMW factor, which represents the difference in portfolio returns between firms with high profitability and firms with low settings, is 2.5%. This result shows that firms with high stability achieve higher returns on average. The average of the sustainability factor included in the model is negative but very close to zero. This result shows that portfolios consisting of companies with high ESG growth rates in the UK do not produce a significant difference in returns. The factor SMB shows that portfolios consisting of small companies provide relatively better returns on average.

Table 84. United Kingdom Correlation Coefficients and Variance Inflation Factors

U.K	Bx(Rm-Rf)	CMA	HML	RMW	ESG	SMB
Bx(Rm-Rf)	1					
CMA	0,2516	1				
HML	0,3490	0,5031	1			
RMW	-0,4517	-0,6841	-0,9438	1		
ESGt2	-0,1907	-0,2783	-0,0654	0,1734	1	
SMB	0,5204	0,2860	-0,1379	-0,0378	-0,2456	1

Variable	VIF	1/VIF
RMW	26,30	0,0380
HML	18,03	0,0554
CMA	3,49	0,2861
Bx(Rm-Rf)	2,22	0,4508
SMB	2,07	0,4827
ESGt2	1,15	0,8694
Mean VIF	**8,88**	

The correlation coefficients and Variance Inflation Factors (VIF) values for all countries are presented above. The correlation test results, which were conducted to determine the relationships between the independent variables in the model, take values

between -0.9438 and +0.5204. Various robust standard error estimators were used to prevent measurement errors that may arise due to the high correlation between the RMW and HML variables. Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional dependence. Additionally, the results of the VIF analysis conducted for each country serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity.

Table 85. Analysis Results of United Kingdom

United Kingdom				
Dependent Variable Ri-Rf				
Independent Variables	**Coefficents**	**Std. Errors**	**t-statistics**	**P-values**
Bx(Rm-Rf)	1,3317	0,0831	16,01	0,000
CMA	-0,2563	0,0929	-2,76	0,006
HML	-1,4070	0,1897	-7,41	0,000
RMW	-1,3269	0,2265	-5,86	0,000
ESGt1	0,3749	0,2086	1,80	0,074
SMB	0,3764	0,1052	3,58	0,000
Constant	0,1020	0,0057	17,86	0,000
Number of Firms				181
Observations per Firm				13
Number of Observations				2353
R-squared				0,2187

The analysis results of 181 companies show that the explanation ratio of the independent variables in the established model to the dependent variable is approximately 22%. The coefficient of the market risk premium has a strong positive effect on returns. This strong effect of the market risk premium is statistically significant at the 1% significance level. This result shows the significant effect of the general movements of the market on the returns of the companies. The results of the CMA factor show that the high investment levels of companies in the United Kingdom have negative effects on returns. Similar to the CMA factor, value stocks also have a negative effect on returns. This result can be interpreted as growth stocks performing better than value stocks for the HML factor. The results of the RMW factor have a negative effect on returns similar to the CMA and HML factors. This shows that the risk-free returns of companies with high profitability decrease.

The results of the sustainability factor included in the model have a positive effect on explaining returns and are statistically significant at the 10% significance level. These results show that investors adopt companies with high ESG activities in the United Kingdom and reward them with higher returns. The firm size factor SMB provides information that the returns of small firms are statistically higher than those of large firms at the 1% significance level.

3.3.2.2.7. Findings From United States

The table contains summary statistics (mean, median, standard deviation, minimum, maximum and number of observations) for 610 companies operating in the United States between 2010 and 2022, depending on the established model.

Table 86. Summary Statistics of United States

Variable	Mean	Median	Std. Dv.	Min	Max	N
Ri-Rf	0,1296	0,11	0,3473	-0,83	7,2	7930
Bx(Rm-Rf)	0,1164	0,12	0,1738	-0,56	0,87	7930
CMA	0,0007	-0,01	0,0742	-0,12	0,15	7930
HML	-0,0092	-0,02	0,1238	-0,29	0,18	7930
RMW	0,0100	0,00	0,0672	-0,12	0,13	7930
ESGt2	-0,0007	0,01	0,3149	-0,06	0,05	7930
SMB	0,0215	0,01	0,0606	-0,05	0,15	7930

The summary statistics of the variables in the established model show that the firms' average returns exceeding the risk-free interest rate are approximately 13% in the 13-year period. The average returns above the risk-free interest rate have a high standard deviation (0.3473) and high minimum and maximum values (-0.83 and 7.2). Therefore, it is understood that some firms made significant losses while others made very high profits in the 13 years. The median value shows that half of the 13-year returns of 610 firms are above 11%.

The average of the market risk premium is approximately 12%. This average indicates positive sensitivity to the market risk premium in the US. The average investment factor for RMW is very close to zero. This shows that the 13-year average returns between portfolios with conservative investment strategies and portfolios with conservative investment strategies are almost the same. Similar to the CMA factor, the HML factor average is also close to zero. This shows that there is no difference between value stocks and growth stocks in the 13 years. The 13-year average of the profitability

factor is 1%. This result shows that companies with high profitability are ahead of companies with low profitability by a tiny margin compared to their returns. The average of the sustainability factor included in the model is very close to zero. This result shows no difference between companies with high ESG scores and companies with low ESG scores in the US during the period in question. The average of the firm size factor SMB is around 2%. This result shows that companies with a small market share are ahead of companies with large market value by a small margin in returns during the 13 years in the US.

Table 87. United States Correlation Coefficients and Variance Inflation Factors

U.S	Bx(Rm-Rf)	CMA	HML	RMW	ESG	SMB
Bx(Rm-Rf)	1					
CMA	-0,1294	1				
HML	-0,1296	0,9130	1			
RMW	-0,0095	-0,8409	-0,6906	1		
ESGt2	-0,0749	-0,6412	-0,5362	0,5266	1	
SMB	0,1297	0,7636	0,6862	-0,7887	-0,7287	1

Variable	VIF	1/VIF
CMA	15,64	0,0639
HML	7,64	0,1309
RMW	5,67	0,1765
SMB	4,66	0,2147
ESGt2	2,67	0,3743
Bx(Rm-Rf)	1,18	0,8464
Mean VIF	**6,24**	

The correlation coefficients and Variance Inflation Factors (VIF) values for all countries are presented above.The correlation test results, which were conducted to determine the relationship between the independent variables, ranged from -0.8409 to +0.9130. Since these results showed a high correlation between the independent variables, various strong robust estimators that can solve problems such as multicollinearity were used. Correlation coefficients for independent variables that exceed ±80% are highlighted in bold. To address cases of high correlation, robust and bootstrap standard errors have been used to mitigate issues of multicollinearity, heteroskedasticity, and cross-sectional dependence. Additionally, the results of the VIF analysis conducted for each country

serve as a validation, with the critical value for the average VIF set at 10. The average VIF values obtained in the results do not indicate any adversity.

Table 88. Analysis Results of United States

United States				
Dependent Variable Ri-Rf				
Independent Variables	**Coefficients**	**Std.Errors**	**t-statistics**	**P-values**
Bx(Rm-Rf)	0,7160	0,0449	15,93	0,000
CMA	-1,5782	0,1961	-8,05	0,000
HML	0,7329	0,1139	6,43	0,000
RMW	-0,4917	0,0589	-8,34	0,000
ESGt2	-1,0841	0,2377	-4,56	0,001
SMB	0,5772	0,1561	3,70	0,003
Constant	0,0459	0,0093	4,94	0,000
Number of Firms				610
Observations per Firm				13
Number of Observations				7930
R-squared				0,1942

The model results, which analyzed 610 companies operating in the USA, show that the explanation ratio of independent variables to the dependent variable, R^2, is approximately 20%. When the results regarding the variables used in the model are examined, the market risk premium strongly affects company returns. This effect is statistically significant at the 1% significance level.

When the results are examined in terms of the investment factor CMA, the results are statistically significant but have a negative effect on returns. This result shows that companies with a riskier and more aggressive investment strategy can achieve higher returns.

When we examine the results in terms of the value factor, the market risk premium and the CMA factor are statistically significant at the 1% significance level. The HML factor, which has a positive effect on returns, provides information that high-value assets offer higher returns than low-value assets in the American market. The RMW factor, which expresses the difference between the returns of companies with high and low profits, has a negative coefficient on returns, and this effect is statistically significant. This result shows that in the American market, high-profit firms are considered less risky

than low-profit firms and provide lower returns because they are thought to have lower risk premiums.

The sustainability factor, added to the model later, is statistically significant at the 1% significance level like the factors explained earlier. The sustainability factor, which has a negative coefficient in explaining returns, shows that the returns of firms focusing on ESG activities are also disadvantaged. This suggests that environmental, social, and governance-oriented strategies are associated with high costs in the American market. However, the effects of sustainability activities may be different in the long run. Finally, the value factor SMB shows that firms with small market values positively affect returns, which is statistically significant.

3.4. Results and Discussion

The results of both new models used in the study will be evaluated and interpreted collectively in this section.

3.4.1. Integrated Analysis of Esgt1 Model for Developing Countries

The aggregated analysis results for developing countries for the ESGt1 model are given below

Table 89. Analysis Results of E-7 Countries

	China	India	Brazil	Indonesia	Mexico	Russia	Türkiye
Bx(Rm-Rf)	0.4299***	0.9289***	1.1126***	0.8574***	1.0943***	1.0707***	-0.5633**
	(0.038)	(0.1231)	(0.1297)	(0.1542)	(0.0990)	(0.1006)	(0.1590)
CMA	0.2064	0.0603	0.0087	-0.1587**	-0.3127**	-0.0155	-0.2895*
	(0.1540)	(0.1733)	(0.1211)	(0.0663)	(0.0592)	(0.1204)	(0.1092)
HML	0.2917***	0.1335**	-0.0322	0.1267	0.0377	-0.1237	0.5178***
	(0.0631)	(0.0539)	(0.1143)	(0.0951)	(0.0363)	(0.1476)	(0.1328)
RMW	0.2315*	0.0770	0.2033	0.1182	-0.3814***	-0.1523	-0.5945**
	(0.1269)	(0.1453)	(0.1732)	(0.1251)	(0.0683)	(0.1190)	(0.2069)
ESGt1	0.2505	-0.0578	-0.1580	0.0789	0.0015	-0.0713	1.5210***
	(0.1767)	(0.0784)	(0.1248)	(0.0535)	(0.0804)	(0.0830)	(0.1987)
SMB	-0.1740	0.4400**	0.3288	0.3264***	0.4181***	0.3015***	1.6756***
	(0.1570)	(0.1560)	(0.1550)	(0.0472)	(0.0482)	(0.0719)	(0.2521)
constant	0.0076	0.0261*	0.0509**	0.0165	0.0272***	0.0936***	-0.0208
	(0.006)	(0.0127)	(0.0159)	(0.0217)	(0.0056)	(0.0175)	(0.0321)
R^2	0,0765	0,3199	0,2673	0,1961	0,1777	0,3252	0,5271

Note: Standard errors are reported in parentheses, and significance at ten percent, five percent, and one percent levels is indicated by *, **, and ***, respectively.

The analysis results vary across countries. The total number of firms included in the analysis for each country significantly influences the outcomes. The first limitation of

this study is the use of firms with consistent and accessible ESG scores for the period between 2010 and 2022. The results could have differed if the time period had been shortened to include more firms in the analysis. When the results are evaluated compared to the existing literature, the findings of the first model (ESGt1) regarding market risk premiums are statistically significant for all E-7 countries. These results align with Halbritter and Dorfleitner's (2015) and Sahut and Pasquini-Descomps (2015) studies.

Regarding the CMA factor, the results are statistically significant and have a negative coefficient in Indonesia, Mexico, and Türkiye. However, in China, India, and Brazil, the results are statistically insignificant and have a positive coefficient. In Russia, the results are both statistically insignificant and have a negative coefficient. The general findings for the HML factor indicate that it is statistically significant, with a positive coefficient only in China, India, and Türkiye. These results contrast with the study by Statman and Glushkov (2009) but align with Sahut and Pasquini-Descomps (2015). For Indonesia and Mexico, the HML factor results are positive but statistically insignificant, aligning with Halbritter and Dorfleitner's (2015) study.

The RMW factor, which indicates that more profitable companies achieve higher returns, is statistically significant in China, Mexico, and Türkiye but is insignificant in other countries. This outcome reflects whether investors prioritize profitable companies in their investment decisions. Since the RMW factor relates to the profitability levels of companies in previous years, the results indicate whether investors in each country prefer reliable companies or those offering higher risk premiums.

When examining the ESG factor, which was integrated into the Fama & French five-factor asset pricing model, the results reveal that it negatively affects returns in India, Brazil, and Russia. Conversely, it positively affects returns in China, Indonesia, Mexico, and Türkiye. However, the ESG factor is statistically significant only in Türkiye among the E-7 countries. These findings align with the studies by Celik et al. (2017), Auer and Schuhmacher (2016), and Zehir and Aybars (2020), while they contrast with Galema et al. (2008).

The ESG factor is statistically significant and has a positive impact only in Türkiye. This indicates that ESG scores have a distinguishing positive feature for companies in Türkiye and that these scores are considered by investors. The statistically

significant and positive impact of the ESG factor in Türkiye aligns with the studies by Galema et al. (2008), Derwall et al. (2005), Kempf and Osthoff (2007), Dimson et al. (2015), De and Clayman (2015), and Boido et al. (2022). However, these findings contradict the studies by Sahut and Pasquini-Descomps (2015), Breedt et al. (2019), Zehir and Aybars (2020), and Fu (2024). Türkiye stands out among the analyzed countries with its higher ESG and sub pillars scores, which appears to have influenced the results.

When evaluating the results for the SMB factor, it is statistically significant and positively explains returns in all countries except China and Brazil. In these countries, portfolios consisting of small market capitalization firms better explain returns, indicating that small firms offering higher risk premiums provide higher returns. The results for India, Indonesia, Mexico, Russia, and Türkiye align statistically with the studies by Sahut and Pasquini-Descomps (2015) and Halbritter and Dorfleitner (2015). However, the findings from China and Brazil contradict these studies. The study by Statman and Glushkov (2009) is statistically consistent with the SMB factor results obtained for China and Brazil.

3.4.2. Integrated Analysis of Esgt1 Model for Developed Countries

The aggregated analysis results for developed countries for the ESGt1 model are given below.

Table 90. Analysis Results of G-7 Countries

	Canada	**France**	**Germany**	**Italy**	**Japan**	**United K.**	**U. S**
Bx(Rm-Rf)	1,0113***	1,0454***	0,9896***	0,9056***	1,0168***	1,1331***	0,6501***
	(0,2829)	(0,0913)	(0,0565)	(0,0663)	(0,0323)	(0,2696)	(0,0332)
CMA	-0,1123	0,0645	0,1354	-0,0113	-0,0825	-0,4631***	-0,3868**
	(0,1213)	(0,1423)	(0,1121)	(0,1227)	(0,2207)	(0,1389)	(0,1656)
HML	0,0720	0,0021	-0,1111	-0,0894	0,1160	-1,5007***	0,1872**
	(0,0967)	(0,1595)	(0,1630)	(0,1308)	(0,0846)	(0,1489)	(0,0916)
RMW	0,0233	-0,0748	0,0753	-0,3790**	-0,0814	-1,5554***	0,1528
	(0,1233)	(0,0921)	(0,1214)	(0,1764)	(0,1496)	(0,2861)	(0,1133)
ESGt1	-0,1194	-0,1898*	-0,0454	-0,0933	-0,0920*	-0,4552***	1,2218***
	(0,1159)	(0,0947)	(0,1102)	(0,0979)	(0,0425)	(0,1330)	(0,2002)
SMB	0,5692***	1,1321***	0,6430***	0,4618***	0,5647***	0,5827*	1,3838***
	(0,0809)	(0,0809)	(0,1453)	(0,1624)	(0,1691)	(0,3017)	(0,1146)
constant	0,0325*	0,0561***	0,0045	0,0569**	0,2496***	0,0946***	0,0341***
	(0,0171)	(0,0123)	(0,0067)	(0,0228)	(0,0060)	(0,0161)	(0,0037)
R^2	0,1615	0,3221	0,2576	0,3450	0,3284	0,2267	0,1791

Note: Standard errors are reported in parentheses, and significance at ten percent, five percent, and one percent levels is indicated by *, **, and ***, respectively.

The test results, which were included in the Fama and French 5-factor model using the sustainability scores of the companies (ESGt1) and analyzed in developed countries, are given collectively in the table above. When the findings are evaluated in general, it is understood that the market risk premium is statistically significant in all countries and has a positive effect. This effect shows that companies are positively sensitive to market movements in all seven developed countries. These results are consistent with Halbritter and Dorfleitner's (2015) and Sahut and Pasquini-Descomps (2015) studies.

The results of the investment factor CMA are not statistically significant in Canada, France, Germany, Italy and Japan. This result shows that conservative and aggressive investment strategies do not significantly affect returns in these markets. However, the results of the CMA factor are statistically significant in the United Kingdom and the United States. The CMA factor has a similar negative effect on returns in the United Kingdom and the United States. This negative effect shows that investors in both markets do not value conservative investment strategies. This result may be related to investors expecting the companies they invest in to have high investment levels.

Similar to the CMA factor, the results of the HML factor were not found to be statistically significant in the other five countries except the United Kingdom and the United States. It was understood that investors did not have a clear strategy between value stocks and growth stocks in the countries where the HML factor was not found to be statistically significant. The results of the HML factor have a strong negative effect on returns for the United Kingdom, while it has a moderate positive effect in the United States. According to these results, it is understood that value stocks are evaluated and adopted differently by investors in the United Kingdom and the United States. The results for the United States contradict the study conducted by Statman and Glushkov (2009) but are consistent with Sahut and Pasquini-Descomps (2015). In contrast, the results for the United Kingdom are consistent with the study conducted by Sahut and Pasquini-Descomps (2015) and inconsistent with the results of the study conducted by Statman and Glushkov (2009).

The RMW factor, which represents the difference between the returns of firms with high and low profitability, was not found to be statistically significant at any level in 5 countries except Italy and the United Kingdom. According to the analysis results,

this situation provides information that there is no significant difference in whether investors in Canada, France, Germany, Japan, and the United States take the firm and its profitability into consideration in their investment strategies. In Italy and the United Kingdom, the RMW factor has a negative effect on returns. This situation shows that firms with high profitability provide lower returns in these two markets. It provides information that investors in Italy and the United Kingdom do not primarily consider firm profitability in their investment strategies.

The sustainability factor, later included in the model, represents the difference in returns between firms with high ESG and low ESG scores. While the ESGt1 factor results were not found to be statistically significant in Canada, Germany, and Italy, they were found to be significant at different statistical levels in France, Japan, the United Kingdom, and the United States. The findings regarding the countries where the factor consisting of sustainability scores were not found to be statistically significant are consistent with the studies conducted by Çelik et al. (2017), Auer and Schuhmacher (2016), and Zehir and Aybars (2020). The ESGt1 factor was found to be significant at the 10% significance level in France and Japan. In comparison, it was found to be significant at the 1% significance level in the United Kingdom and the United States.

The results of the sustainability factor have a negative effect on returns in countries other than the United States. This negative result suggests that the sustainability activities of firms in the relevant markets are not adopted or prioritized by investors in their investment strategy decisions. The results for France, Canada, and Japan are consistent with the results obtained from the studies conducted by Sahut and Pasquini-Descomps (2015), Breedt et al. (2019), and Fu (2024). In the United States, sustainability activities were found to have a strong positive effect on returns due to their positive reception by investors. The findings for the United States are similar to those of Kempf and Osthoff (2007), Dimson et al. (2015), De and Clayman (2015), and Boido et al. (2022).

The firm size factor SMB is statistically significant in all markets. This result shows that firms with small market values are generally seen as opportunities by investors, suggesting that they may have higher returns and, therefore, are rewarded with

high returns. The results are statistically consistent with the studies conducted by Sahut and Pasquini-Descomps (2015) and Halbritter and Dorfleitner (2015).

3.4.3. Integrated Analysis of Esgt2 Model for Developing Countries

The aggregated analysis results for developing countries for the ESGt2 model are given below.

Table 91. Analysis Results of E-7 Countries

	China	India	Brazil	Indonesia	Mexico	Russia	Türkiye
Bx(Rm-Rf)	0,3726***	0,8316***	1,1293***	0,8921***	1,1422***	1,0724***	-0,6358
	(0,0379)	(0,1498)	(0,1160)	(0,1508)	(0,0419)	(0,0889)	(0,4655)
CMA	0,0815	-0,0241	0,0143	-0,2242**	-0,3547***	-0,0092	-0,0345
	(0,1527)	(0,1495)	(0,1218)	(0,0883)	(0,0917)	(0,1113)	(0,1756)
HML	0,2324***	0,1298***	-0,0649	0,0526	0,0412**	-0,1452	-0,2813
	(0,0583)	(0,0417)	(0,1104)	(0,0538)	(0,0154)	(0,1182)	(0,1696)
RMW	0,3517***	-0,0418	0,1487	-0,0338	-0,4193***	-0,1191	-1,1034***
	(0,1178)	(0,1418)	(0,1680)	(0,1694)	(0,1051)	(0,1009)	(0,3372)
ESGt2	-0,3215**	0,1695***	-0,2048**	-0,2256	-0,0219	-0,1188***	-2,2530***
	(0,1540)	(0,0523)	(0,0953)	(0,1589)	(0,0393)	(0,0290)	(0,2732)
SMB	-0,3925***	0,5693***	0,3421***	0,3593***	0,4184***	0,2812***	0,6085
	(0,1262)	(0,1695)	(0,1423)	(0,0466)	(0,0669)	(0,0629)	(0,5953)
Cons.	0,1122	0,0259**	0,0632***	0,0274	0,0235**	0,0824***	0,0633
	(0,1000)	(0,0118)	(0,0151)	(0,0154)	(0,0080)	(0,0123)	(0,0801)
R^2	0,0793	0,3023	0,2678	0,1967	0,1748	0,3269	0,1976

Note: Standard errors are reported in parentheses, and significance at ten percent, five percent, and one percent levels is indicated by *, **, and ***, respectively.

The aggregate results of the Fama and French 5-factor model, which includes the factor that takes into account the growth rate in the companies' sustainability scores, are given in the table above. These results are different from the model results where the factor created using only the companies' ESG scores is included.

The results of the market risk premium were found to be statistically significant in China, India, Brazil, Indonesia, Mexico, and Russia, except for Turkey, and had a positive effect on returns. This positive effect shows the high sensitivity of the companies to market movements. For Turkey, the results show the negative sensitivity of the companies to market movements. The market risk premium may produce different results due to the macroeconomic conditions of the countries, inflation, and various uncertainties. The relationships of the companies with the market movements are important, so this relationship may be due to the various characteristics of each country. While these results are inconsistent with the studies of Halbritter and Dorfleitner (2015) and Sahut and Pasquini-Descomps (2015) for Turkey, they are consistent for other countries.

The results of the investment factor CMA are not statistically significant in any country except Indonesia and Italy. These insignificant results show that investors in the relevant markets have not been able to understand the firm's investment strategies clearly. In Indonesia and Italy, on the other hand, firms with conservative investment strategies have a negative effect on returns.

The HML factor results, which represent the return difference between the portfolio of firms with a high book value/market value ratio and the portfolio of firms with a low book value/market value ratio, are statistically significant in China, India, and Mexico. The HML factor results do not overlap with the study of Statman and Glushkov (2009) in this respect but are consistent with Sahut and Pasquini-Descomps (2015). They show that investors in China, India, and Mexico believe investing in assets purchased at a low price relative to book value can increase returns.

The profitability factor RMW results are statistically significant in China, Mexico, and Turkey, but they have not been found to significantly affect returns in India, Brazil, Indonesia, and Russia. For China, the results show that high-profit companies are more attractive to investors and that investing in these companies has an increasing effect on returns. For Mexico and Turkey, the effect of the profitability factor is negative. This situation shows that companies with low profitability offer higher returns in both markets.

The results of the ESGt2 factor, which considers the sustainability score growth rate of companies, are statistically significant in countries other than Indonesia and Mexico and have a negative coefficient except for India. The findings regarding the countries where the sustainability factor is statistically significant and has a negative effect on returns are consistent with the studies conducted by Sahut and Pasquini-Descomps (2015), Breedt et al. (2019), and Fu (2024). In countries where the sustainability factor is statistically negative, investors generally evaluate companies' sustainability activities negatively, see them as cost-increasing, and therefore do not adopt them in their investment decisions. In India, the growth in sustainability activities and scores positively affects returns. This situation may result from the pressure that Indian companies are under due to the country's high emission amounts. The results of the sustainability factor for India contradict the studies by Sahut and Pasquini-Descomps (2015), Breedt et al. (2019), Zehir and Aybars (2020), and Fu (2024). However, they are

consistent with the studies by Galema et al. (2008), Derwall et al. (2005), Kempf and Osthoff (2007), Dimson et al. (2015), De and Clayman (2015) and Boido et al. (2022).

Finally, the firm size factor SMB is statistically significant in other developing countries except Turkey and has a strong positive effect on returns except China. These results show that large-scale firms in China earn higher returns than small-scale firms. On the other hand, small-scale firms earn higher profits than large-scale firms in India, Brazil, Indonesia, Mexico, and Russia. While the SMB factor results obtained for six countries other than Turkey statistically overlap with the studies conducted by Sahut and Pasquini-Descomps (2015) and Halbritter and Dorfleitner (2015), they differ from the results of the study by Statman and Glushkov (2009).

3.4.4. Integrated Analysis of Esgt2 Model for Developed Countries

The aggregated analysis results for developed countries for the ESGt1 model are given below

Table 92. Analysis Results of G-7 Countries

	Canada	**France**	**Germany**	**Italy**	**Japan**	**United K.**	**U. S**
Bx(Rm-Rf)	0,9707***	1,0805***	0,9742***	0,9132***	1,0206***	1,3317***	0,7160***
	(0,2617)	(0,0836)	(0,1070)	(0,0870)	(0,0297)	(0,0831)	(0,0449)
CMA	-0,0370	0,1636	0,1107*	-0,0121	0,0493	-0,2563***	-1,5782***
	(0,1098)	(0,1101)	(0,0554)	(0,1305)	(0,3179)	(0,0929)	(0,1961)
HML	0,0513	-0,1269	-0,0510	-0,0781	0,1727	-1,4070***	0,7329***
	(0,0656)	0,1754	(0,0793)	(0,1303)	(0,1368)	(0,1897)	(0,1139)
RMW	-0,0163	-0,0922	0,0580	-0,3795	0,0021	-1,3269***	-0,4917***
	(0,1423)	(0,0685)	(0,0816)	(0,1631)	(0,2559)	(0,2265)	(0,0589)
ESGt2	0,4378*	-0,2864***	0,0481	-0,0376	0,0417	0,3749*	-1,0841***
	(0,2229)	(0,0554)	(0,0964)	(0,1732)	(0,0777)	(0,2086)	(0,2377)
SMB	0,6611***	1,0780***	0,0607***	0,4713***	0,4247*	0,3764***	0,5772***
	(0,0840)	(0,0542)	(0,1276)	(0,1629)	(0,2014)	(0,1052)	(0,1561)
constant	0,0548**	0,0666***	0,0061	0,0590**	0,2413**	0,1020***	0,0459***
	(0,0230)	(0,0034)	(0,0063)	(0,0249)	(0,0099)	(0,0057)	(0,0093)
R^2	0,1617	0,3257	0,2793	0,3458	0,3281	0,2187	0,1942

Note: Standard errors are reported in parentheses, and significance at ten percent, five percent, and one percent levels is indicated by *, **, and ***, respectively.

The aggregate results of the Fama and French 5-factor model, which includes the factor that takes into account the growth rate in ESG scores, are given above. The results for a total of 1465 firms operating in Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States show that the market risk premium is statistically significant for all countries and has a strong positive effect on returns. This result is consistent with the studies of Halbritter and Dorfleitner (2015) and Sahut and Pasquini-

Descomps (2015) as it shows that firms in all countries are quite sensitive to the market risk premium and react strongly.

The results for the investment factor CMA show that the results of other countries, except the United Kingdom and the United States, are not statistically significant. This statistical insignificance shows that no significant relationship can be determined between the conservative and aggressive investment tendencies of investors in the relevant countries. In the United Kingdom and the United States, it shows that conservative investment tendencies are rewarded with negative returns. In the American and United Kingdom markets, focusing on aggressive investments (firms with high asset growth) is more advantageous in the United Kingdom market.

The results for the HML factor are similar to those for the CMA. These results indicate that growth stocks outperform high-value assets in the United Kingdom. In contrast, high-value assets outperform low-value assets in the United States. In the US market, value-oriented strategies (value stocks) may offer attractive opportunities for investors. Assets with high book value have high earning potential. The HML factor results for the US are only consistent with Sahut and Pasquini-Descomps (2015), while the results for the United Kingdom are similar to those of Statman and Glushkov (2009).

The results for the profitability factor are also similar to those for the CMA and HML. The RMW factor results, which are statistically significant only in the United Kingdom and the United States, are not significant in Canada, France, Germany, Italy, and Japan. It is understood that there is no significant difference between the returns of high and low-profit firms in countries where the RMW factor is not statistically significant. The RMW factor has a negative coefficient for the United Kingdom and the United States. This situation shows that companies with low profitability perform better in both markets than companies with high profitability. This situation indicates that investors see companies with high growth potential in the relevant countries as attractive.

The results regarding the factor considering the growth rate in ESG Scores were not found to be statistically significant in Germany, Italy, and Japan but were found to be significant in Canada, France, the United Kingdom, and the United States. ESG activities have a negative effect in France. This situation shows that companies focusing on ESG activities in the French market offer lower returns than others. Similarly, in the United

States, companies' sustainability activities and increasing ESG scores do not have a positive effect on returns. These findings are consistent with the studies conducted by Sahut and Pasquini-Descomps (2015), Breedt et al. (2019), and Fu (2024). This situation shows that ESG-focused investments can be disadvantageous due to high costs and limited return potential. In contrast, the sustainability factor affects returns differently in Canada and the United Kingdom. The sustainability factor, which has a moderate positive effect on returns, shows that firms that increase their ESG activities in the Canadian and UK markets can be a good option for sustainable and long-term returns. The ESGt2 factor results in Canada and the UK contradict the studies conducted by Sahut and Pasquini-Descomps (2015), Breedt et al. (2019), Zehir and Aybars (2020) and Fu (2024), while they have similar results to the studies conducted by Galema et al. (2008), Derwall et al. (2005), Kempf and Osthoff (2007), Dimson et al. (2015), De and Clayman (2015) and Boido et al. (2022).

When the results are examined collectively in terms of the size factor SMB, the results are statistically significant for all countries and have a positive coefficient on returns. The results for all countries are statistically consistent with the studies conducted by Sahut and Pasquini-Descomps (2015) and Halbritter and Dorfleitner (2015). It is understood that investors in all countries are trying to evaluate these opportunities because small firms generally have faster growth potential.

4. CONCLUSION

This thesis aims to examine and integrate the impact of sustainability on asset pricing models using data from companies operating in developed and developing countries. Due to its increasing importance, sustainability is addressed in different ways in different disciplines every day, and it is also closely related to finance.

The high level of competition among countries and international companies has ensured that environmental, social, and governance issues have been ignored due to high profitability and growth targets. It is thought that sustainability will become much more important today and in the near future. The fact that its importance has not yet been fully understood is due to the insufficient attention and sensitivity of governments, institutions, and companies. Although it is addressed by international organizations, governments, non-governmental organizations, companies and scientists, since the developments in environmental, social and governance issues have not reached a catastrophic level, all priority and sensitivity are not fully given to this area.

Current climate changes and wars are taking the whole world to an irreversible point day by day. Climate disasters and wars leave behind great economic and social destruction. These emerging situations leave high economic costs for governments to repair. In this case, the interaction of sustainability with finance emerges at the macro level.

In this study, where sustainability is examined on a company and country basis, positive relationships have been identified between sustainability activities and returns of companies in Turkey, America, the United Kingdom, Canada, and India. In this study, where 1775 companies from 14 countries were analyzed, it is seen that sustainability and ESG activities are still in the development stage. Different results emerged when the results obtained from the analysis were evaluated within the scope of countries in terms of both models (ESGt1 and ESGt2). This situation is highly related not only to companies and analysis results but also to investors' perspectives. Just as the conditions and circumstances of each country and company differ from each other, the interests and expectations of investors may also differ. Sustainability should not be seen as a subject that is considered and should be given importance only within the scope of governments

and companies. The high sustainability awareness of investors will constitute the main source of motivation for the work and development of companies in this regard.

The results obtained may differ depending on the change in the scope of the data set and the data source. Since the data obtained in this study is used annually, the change in the data frequency may also cause differences in the results. Developing legal and regulatory activities on companies before data-based and source-based changes is more important. It is important to separate governments and companies with sincere sustainability activities from those with a greenwashing strategy. In the current financial system, it is inevitable that sustainability activities will create a financial burden for companies. Therefore, it is valuable for companies that increase their sustainability activities to be able to differentiate positively in order to compensate for this financial burden on companies.

In future studies, different results can be obtained by differentiating the data set and data frequency and by adding country-specific macro variables to the models. Moreover, using ESG scores monthly, quarterly, or semi-annually instead of annually can lead to various different results. In any case, sustainability activities and sustainability studies are of great importance as they will shape the knowledge and perceptions of those interested in the subject, as well as governments, companies, and other stakeholders, in different ways.

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