Project Management Department

ESG Investing

Overview of ESG Investing

ESG Investing: A Deep-Dive

Buy Recommendation (NVIDIA)

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Introduction to ESG Investing

ESG is a type of **"Sustainable Investing"** which includes impact investing, socially responsible investing (SRI), ESG and values-based investing

ESG Investing seeks **positive returns** and has benefits on society, the environment and the long-term performance of businesses

Used by investors to **evaluate** corporate **behaviour** and to **determine** the **future** financial **performance** of companies

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Examples of ESG Investing

Environmental Factors:

- Created by business activities (refer to "social factors") that may have actual or potential impacts on air, land, water, ecosystems and human health.
- These include managing resources and pollution, reducing emissions and climate impact.

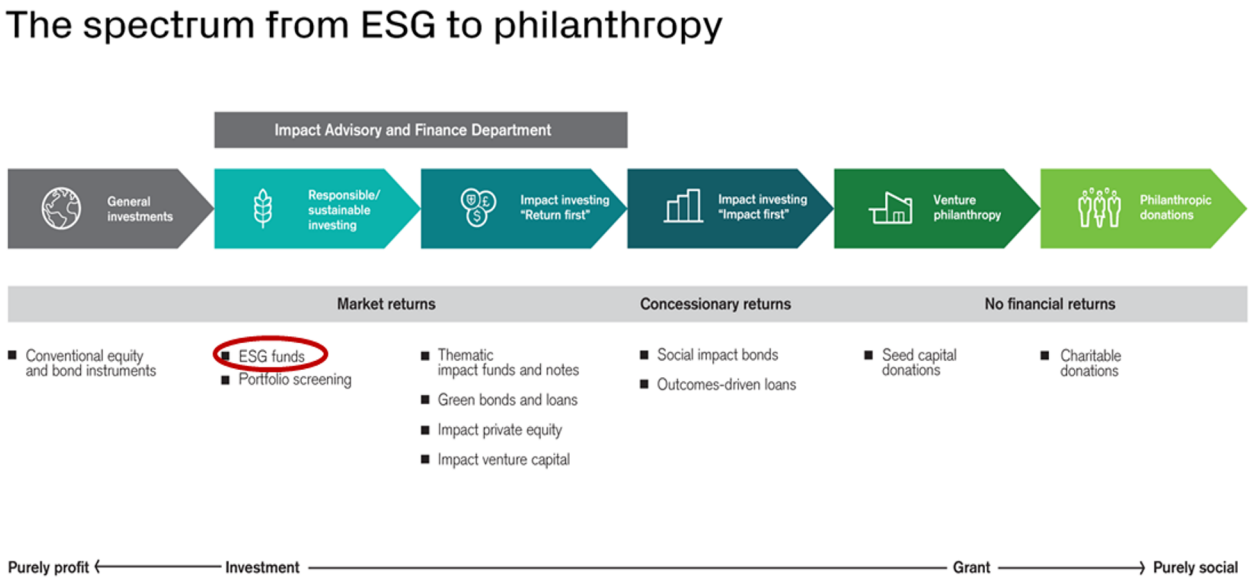
Social Factors:

- Refer to the impact that companies can have on society. They are reflected by companies social activities such as promoting health and safety, encouraging labour-management relations, protecting human rights and focusing on product integrity.

Governance Factors:

- Concerned about the way companies are run. It addresses areas such as corporate brand independence and diversity, corporate risk management and excessive executive compensation.
- This is achieved through company governance activities such as increasing diversity and accountability of the board, protecting shareholders and their rights, and reporting and disclosing information.

ESG Investing within the Landscape



Spectrum of ESG within the Investing Landscape

- ESG lies between general investing and impact investing in the philanthropy investment scale.
- ESG investing may provide market returns while charitable donations (at the extreme right) will not give any financial returns.

Sources: (Credit Suisse, 2018)

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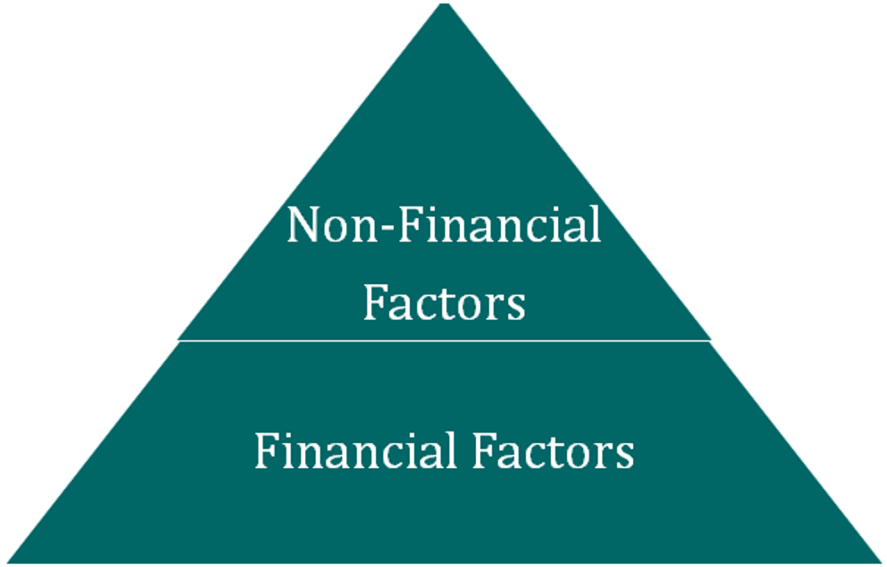
ESG vs. Traditional Investing

Fundamental analysis should be carried out first, which will analyze a company's financial factors as seen on the right bottom of the pyramid. This is the focus for **Traditional** investments.

ESG investing utilizes a secondary level of analysis which focuses on non-financial factors to provide a more comprehensive outlook on a company.

Note: They should not be separate entities but complementary to provide a complete picture.



*Disclaimer: This table does not reflect our intention to separate Traditional and ESG Investing.
Fundamental analysis should be carried out first and ESG is should be taken as a secondary level of analysis

Stakeholders in ESG

Immediate Stakeholders
- Companies
- Investors
- Regulators
- Society

Peripheral Stakeholders:
- Non-Government Organisations

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Challenges of ESG investing from a Macro Perspective

Challenge	Description	Mitigation
Lack of Standardization	The **broad** nature of ESG in general has made **metrics less standard** and **more subjective**. Not only are there many different metrics using different factors with different weights on those factors, but also the interpretation of these metrics for application on a personal portfolio may differ. This implies that even the available ESG analysis do not provide clear guidance on which companies are delivering superior ESG results. Source: (Swedroe, 2020)	Investors can consider joining or **forming** investor **coalitions** to amplify their demands for a single standard. Until standardization is achieved, investors can also consider **using popular metrics** that have gained widespread popularity, such as the **Stakeholder Capitalism Metrics** or **MSCI ESG ratings.**
Greenwashing and lack of Inspections	A flexible regulatory framework, which is prevalent with respect to ESG, opens up the possibility for companies to engage in **green washing*.** Moreover, there is **no validation** or auditing of the data presented by companies on ESG matters. Therefore, as a stakeholder, one cannot be fully assured of ESG data quality. This is in sharp contrast to financial reporting, for example, which requires auditing as a major part of the process.	Investors can run a **background check** on the management and their track record of past disclosures. Alternatively, investors may look at recent independent reports and articles on the functions of the company to draw parallels between the ESG claims made by the company and reality. For larger funds, if feasible, investors can also consider conducting their **own research** through employee surveys and interviews, on-field inspections and discussions with key personnel.

Challenges of ESG investing from a Macro Perspective

Challenge	Description	Mitigation
ESG Scores can be subjective	It can be **difficult** to **assign** an ESG "**score**" to a company since many of the **factors** like brand appeal, for instance, are **subjective**. This causes problems in definitions and significant dispersions in ratings of the same companies. In addition, it was found that the size of a firm affects the ESG score as the **score favors larger firms** with more resources. Thus, larger firms have an **advantage** over smaller firms, which would not be the case had ESG scores been stable. Source: (CNBC, 2019)	To counter the subjective nature of ESG scores, investors can follow the **due diligence process** in a sequential manner to arrive at as accurate a figure as possible. Using **specific numeric or policy indicators** can remove subjectivity and give scores as comparable figures. Further, it is also possible to look beyond company specific ESG scores. Although ESG scores can give investors the highlights of a company's ESG efforts and financial performance relative to its peers, it is also possible to approach the process from a **macro viewpoint**. This would involve analyses of the sector-specific issues that the company faces, a process commonly applied in popular financial analysis without much subjectivity. Source: (Zandbergen, 2017)

The Case for ESG Investing

ESG investments optimise risk-adjusted returns

- Enhance risk-adjusted return by reducing investment risk.

Millennials are 'woke'

- Millennials will make up 25% of workforce by 2025 and they are twice as likely as the general population to invest in companies with social or environmental goals.
- Social media usage has increased exponentially, and people are more aware about global events.
- The millennial generation is also more educated and are more aware about issues such as social equality.

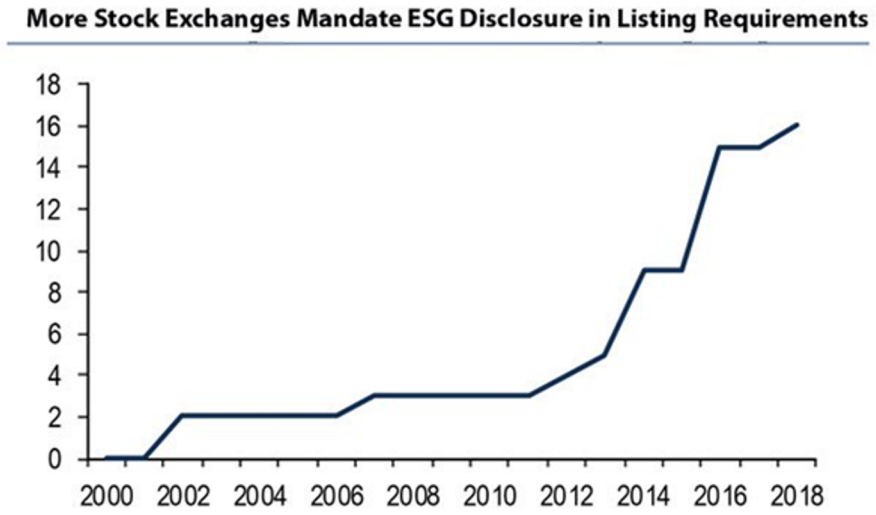
Sustainability challenges pose huge risks

- Solutions to climate change, ageing population, and inequality bring huge and unpredictable risks to global financial system.

Following ESG practices could attract investors

- In order to appear attractive to investors and consumers, companies are incentivised to adopt ESG practices since they otherwise might get left behind due to their less environmentally or socially beneficial practices.

Sources: (Janus Henderson Investors, 2019)



Source: SSE Report on Progress (2018)

$22.9 trillion of investments under management globally are oriented broadly toward Environmental, Social, and Governance (ESG) policies.

$8.7 trillion of investments under management in the U.S. (1/5 of all investments under professional management) are broadly oriented toward ESG policies.

95% of responding institutional investors plan to engage with companies they invest in about issues related to the Sustainable Development Goals (SDGs).

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ESG Financial Performance

A better ESG score translates to lower cost of capital as the risks that affect businesses are reduced with a strong ESG proposition. The following factors contribute to a reduction in cost of capital:

Facilitating Top Line Growth

- Stronger sustainability propositions attracts B2B and B2C customers, and provides better access to resources through stronger community and government relations.

Reducing Cost

- Lowering energy consumption and water intake results in a better cost structure.

Regulatory and Legal Interventions

- A company that is more responsible can achieve greater strategic freedom through deregulation.

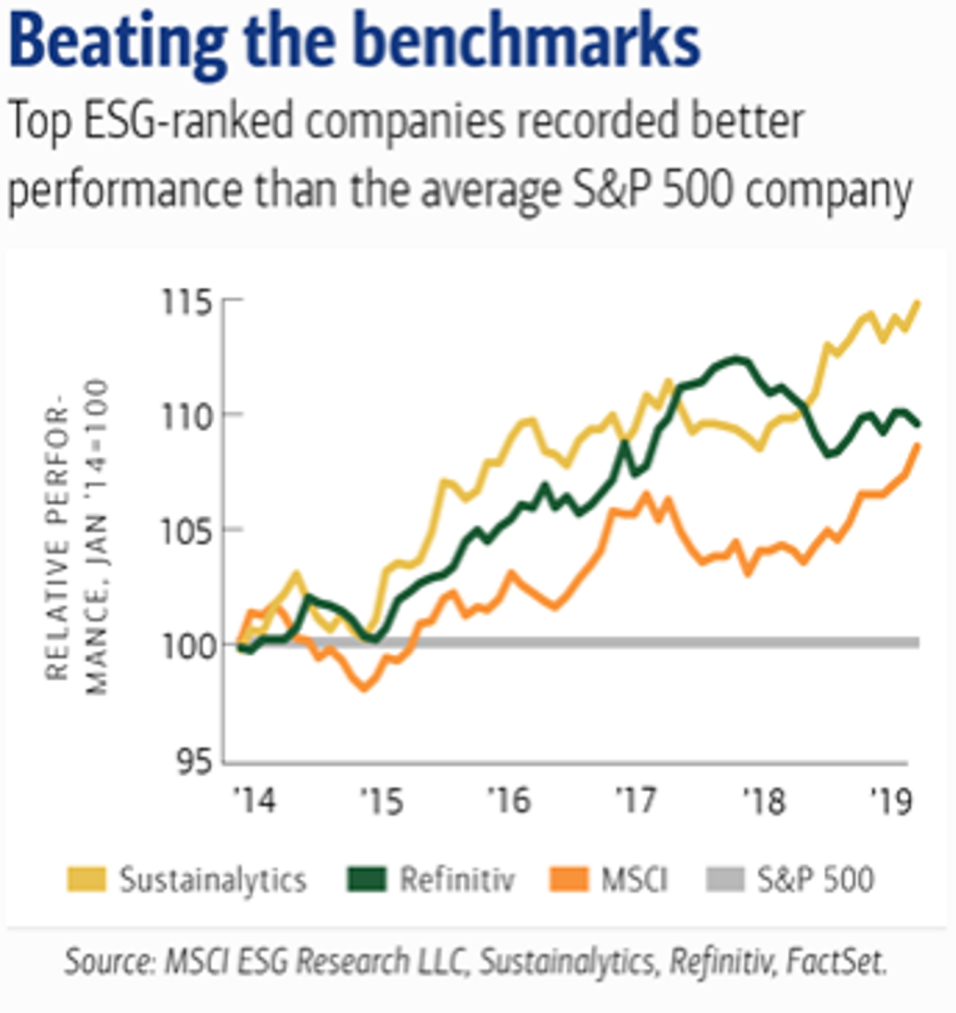
Productivity Upliftment

- As newer recruits and millennials demand purposeful work, businesses can achieve higher productivity, attract and retain talent through greater social credibility.

Investment and Asset Optimization

- Investment returns can be enhanced by allocating capital in more sustainable plants and equipment, and avoiding investments that may cause long-term environmental issues.

Sources: (McKinsey, 2019)



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Regulatory Landscape of ESG

Paris Climate Agreement, 2015

- Aim: Reduce greenhouse emissions, and limit global temperature increase.
- Stocks in sectors such as solar panels, electric cars, biofuel technology benefited from the agreement while the oil & gas sector took a hit.
- Caution: Agreement is not a binding legal treaty.

Impact of Biden's Presidency

- USA has rejoined the Paris Climate Agreement.
- Investments in funds focused on renewable energy will likely increase. Traditional energy funds have already been branching out to include more renewables.

SGX Regulations

- SGX requires listed companies to produce annual sustainability reports on a comply-or-explain basis.
- SGX will soon include the TCFD recommendations within its existing guidance to assist listed companies with their climate-related financial disclosures.

Sources: (European Union, 2015)
(Reuters, 2015)
(CNBC, 2020)
(MAS, 2020)

Catalysts in ESG Investing

Catalyst 1: Data & Technology

- Primary Driver A: Better interpretation of ESG related big data
- Primary Driver B: Progressive technology promises stakeholders more reliable investments

Catalyst 2: Resource & Environment

- Primary Driver A: Exposure to water related risks across indices
- Primary Driver B: Biodiversity degradation is increasingly becoming a concern for the authorities

Catalyst 3: COVID-19

- Primary Driver A: Building a Responsible and Resilient Supply Chain
- Primary Driver B: Business Infrastructure

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Catalyst 1: The Quantification of ESG Data

The quantification of ESG-related metrics are essential in lending greater credibility to ESG Investing as a means of investing.

With more numerics to back up the viability of ESG Investing as a profitable yet effective means of investing, investors will be more assured that ESG Investing is more than just a 'fad'.

Technological advancements in the field of big data has permitted for such a quantification of ESG-related metrics to be a feasible objective.

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Primary Driver A: Better interpretation of ESG related big data

- New technology based on machine learning and big data offers ways to apply ESG data in addition to conventional financial information.
- Quantification of challenging metrics like resource consumption and biodiversity allows for standardisation of key ESG factors
- Smart algorithms will increasingly allow for better interpretation of non-traditional financial information.

(Rudra, 2020)

Primary Driver B: Technological progress promises stakeholders more reliable investments

- Technologies such as artificial intelligence, blockchain, and virtual reality are creating unprecedented levels of transparency in revealing the real extent to which ESG initiatives and practices are being adopted by companies.
- Evolving technology helps companies better measure their ESG impacts and risks.
- Technology and the rise of transparency are here to stay. Gathering and processing data will become ever easier and cheaper.

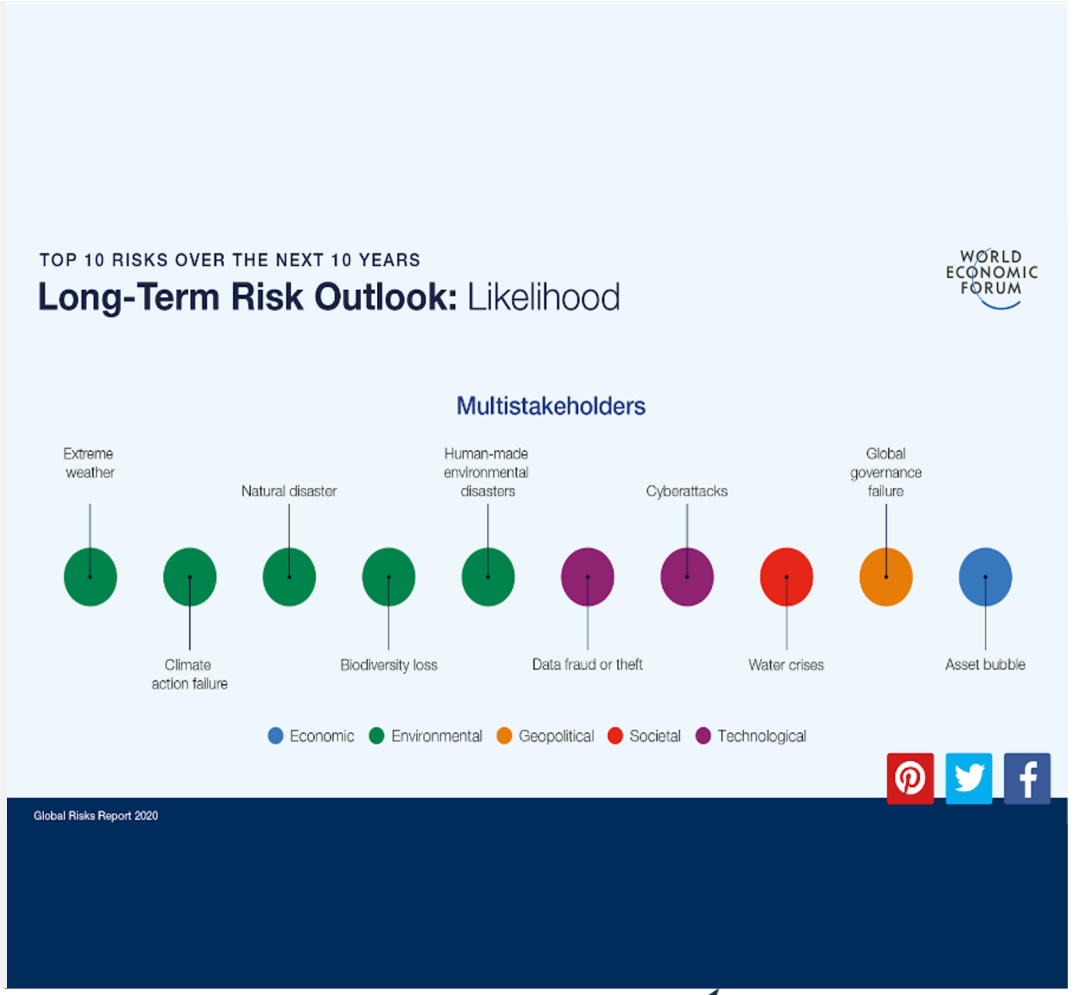
(Chau et al., 2020)

Catalyst 2: A Shift from Climate Change to Water Management and Biodiversity

Reporting on the 'E' factor of 'ESG' has long been dominated by data on greenhouse gas emissions, but investors and regulators are increasingly turning their attention to natural assets such as water, soil and biodiversity.

Majority of institutional investors have indicated water as a top ESG consideration behind only cyber security and anti-corruption.

Biodiversity loss was identified as the fourth most likely global risk over the next 10 years and the third most serious in terms of potential impact.



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Primary Driver A: Exposure to water related risks across indices

- Companies with direct operations and supply chains that are dependent on agriculture are exposed to water risks.
- Demand for water and water quality are the 2 key concerns with regards to the need for water management.
- Many companies (L'Oréal, Microsoft and Fujitsu) face medium to high water risks, hence high exposure to water related risks across indices calls for higher priority for water management.
- Companies that appropriately mitigate these risks and demonstrate good water stewardship characteristics will create value for their shareholders.

Primary Driver B: Biodiversity degradation becoming an increasing concern for authorities

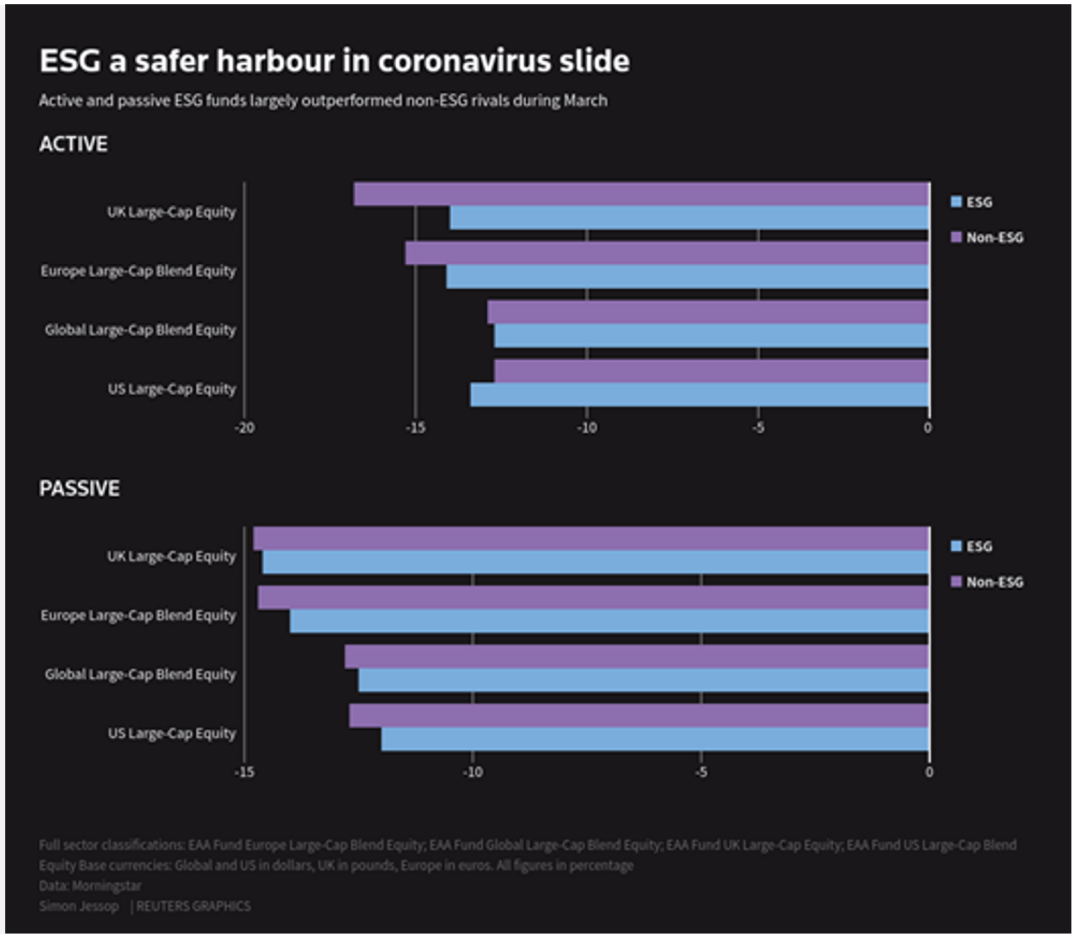
- Biodiversity or nature-related risks are systematically mispriced, leading to poor allocation of large pools of capital.
- The impact and the risk are not specific to agriculture and food systems. Sectors across the entire economy are highly exposed to nature-related risks, primarily through their supply chains.
- Companies leveraging on the sustainable aspect of existing products or committing R&D to bring more sustainable products to the market are more likely to find a competitive edge.
- Starbucks aims to reduce their carbon emissions and waste by expanding into plant-based menu options and reusable packaging.

Catalyst 3: Active and Passive ESG Funds have largely outperformed non-ESG rivals during the COVID-19 Pandemic

ESG programs are often perceived as long-term luxuries that can be temporarily shelved in uncertain times

However, the outperformance of ESG Funds indicate investors' confidence in ESG programs as a means of navigating through this period of uncertainty

This is largely due to the fact that ESG programs have the potential to spur innovation to mitigate the risk of the current and future crises



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Primary Driver A: Building a Responsible and Resilient Supply Chain

- COVID-19 has proven to be the biggest test on the highly-interconnected global supply chain network in the last century
- To effectively mitigate the effects of supply chain disruption, businesses are now seeking to practice more effective Enterprise Risk Management through diversification and network agility
- This seeks to allow companies to not only mitigate the short-term challenges posed by COVID-19, but also to actively take steps to navigate future Environmental and Social risks in a Volatile, Uncertain, Complex and Ambiguous (VUCA) world

Primary Driver B: Business Infrastructure

- The 'S' (Social) aspect of ESG has often been overlooked by companies, who often prioritise on the 'E' aspect which receives more public attention
- This has resulted in many businesses experiencing difficulties with Employee Management during the COVID-19 pandemic due to a lack of policies and procedures to facilitate remote-working (e.g. sick leave policy)
- COVID-19 has thus resulted in businesses placing greater emphasis on Business Infrastructure to create a more conducive working environment for employees so as to mitigate revenue loss and negative publicity

Overview of various ESG Strategies

Objectives of ESG Strategies

Align portfolios with investors' moral and ethical values

Mitigate ESG risks

Influence a company to change its business model or stop an objectionable practice

Considerations of ESG Strategies

Introduces tracking error, calculated as the standard deviation of the differences between screened and unconstrained index returns and potentially impacts performance

Reduces diversification

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1. Exclusionary Screening

Definition	Examples
Investors can remove companies from their portfolio that do not align with their moral or ethical values such as companies that deal with alcohol or weapons.	Equity fund that excludes companies that generate more than 5% of their revenue from the sale of tobacco products

2. ESG Integration

Definition	Examples
Investors can incorporate ESG data alongside traditional financial analysis into their securities selection process.	Actively managed fixed income fund that considers ESG issues during the securities selection process.

Sources: (CNBC, 2019)

(State Street Global Advisors, 2018)

3. Positive Screening: Best-in-Class

Definition	Examples
Investors will give a score to the companies in a representative index based on ESG factors. It rewards leaders on ESG metrics by overweighting the stocks within this index. Investors lean their portfolio towards companies that outperform their peers in ESG measures.	Funds that achieve certain criteria such as top 30% scoring companies in ESG criteria.

4. Positive Screening: ESG momentum

Definition	Examples
Companies improving ESG measures more quickly than peers.	Fund that shows improvement in ESG scores rapidly compared to its peers.

5. Positive Screening: Thematic Investing

Definition	Examples
Investors will lean their portfolios towards companies that solve specific ESG challenges. This allows investors to invest in companies which have projects directly related to their main cause of support e.g. climate change.	Funds which focus on a single ESG-related area, such as green energy or good board governance.

Sources: (CNBC, 2019)

(State Street Global Advisors, 2018)

6. Impact Investing

Definition	Examples
Investing in specific projects designed to achieve specific measurable goals such as affordable housing. Targets a measurable positive social and/or environmental impact.	Community investment fund that provides micro financing to low-income or disadvantaged communities.

7. Active Ownership

Definition	Examples
Entails engaging with companies and voting company shares on a variety of ESG issues to initiate changes in behaviour or in company policies and practices.	Any fund (including those not tagged as ESG funds) where the asset manager or asset owner is committed to active ownership.

Sources: (CNBC, 2019)

(State Street Global Advisors, 2018)

Key Insights on ESG Strategies

- In ESG investing, it is up to each investor to **understand what's most important to him or her**, se that as a guide to find the companies and funds that align with that (Caminiti, 2020).
- **Working with a financial advisor that is ESG-aware** is a good way to sort through different ESG funds. This allows the investor to understand the different reports and research so that the ESG investment lines up with what's most important to that particular investor.
- Investors can consider **ranking the factors as GES instead of ESG** as governance is a key anchor, determining the long-term effects on environment and social sustainability.
- Investors can consider Microsoft and iShares MSCI Global Impact ETF (SDG) as key sustainability leaders to follow.

Source: (Caminiti, 2020)

Seven of the top ESG metrics by IHS Markit

1. **A formal, overarching ESG policy** which provides an overview of a company's social responsibility and environmental position.
2. **Assignment of ESG responsibility** within the management team, reflecting the level of ESG integration across the organisation.
3. **A corporate code of ethics** to guide management and employees as they carry out organisational objectives.
4. **Diversity** among employees, board members and management, promoting a wider range of perspectives in decision-making.
5. **A formal environmental policy** showing the management team's ability to monitor and address the environmental costs of the organisation's operations.
6. **The ability to estimate carbon emissions**, both direct and indirect, including those produced by the wider value chain.
7. **Health and safety record**, using accident and incident rates to measure safety of working environments.

Source: Alva

What should ESG investors seek in ESG metrics?

Sector-specific E&S Metrics

1. **CO2 Emissions:** Low relative levels of Total CO2 emissions performed well for Basic Resources and Manufacturing industries. Low relative Scope 1 emissions worked well for both Electric and Multi Utilities.
2. **Oil & Gas:** Two new metrics specific to the sector worked well – **carbon embedded reserves** and **gas flaring.**
3. **Manufacturing sectors** (including consumer products and capital goods): **Employee turnover** stood out positively, as did product impact metrics related to **environmentally friendly products**. Consistent with policies broadly, most **supply-chain** policies tested negatively, with 'environmental monitoring in the supply chain' the positive exception.

Source: Goldman Sachs Group

Hybrid ESG Metrics

A **hybrid measurement system** that combines social and environmental impact with standard measures of financial performance would make the connection explicit.

Examples of hybrid metrics:

- Ratio of EBITDA to CO2 Intensity
- Employee productivity (e.g. KPI, the number of Sales made) to wages
- Cost of goods sold to labour conditions in the supply chain.

Hybrid metrics could help to fill out the emerging architecture of social and environmental impact reporting, increase the accuracy of earnings forecasts and reward companies that perform best in social and financial dimensions.

Source: Institutional Investor

Current Industry Standards for ESG

Despite the greater adoption of ESG investing among investors, there is still an absence of a standardised ESG framework globally.

1. Stakeholder Capitalism Metrics

- Developed by Deloitte, KPMG, Ernst & Young and PwC
- Released by the World Economic Forum in early 2020
- One of the most important developments towards a standardised global reporting framework
- Based off existing standards and disclosures from **5 independent global framework and standard-setters**
- Facilitate consistent and precise reporting and disclosures & aids in investors' decision-making
- Comprise of **22 core metrics** and **additional expanded metrics** categorised across the 4 pillars of governance, planet, people and prosperity [appendix 2].

Principles of Governance	• Anti-corruption • Governance body composition
Planet	• Greenhouse gas emissions (GHG) • Land use and ecological sensitivity
People	• Diversity and inclusion • Pay equality • Health and safety
Prosperity	• Economic contribution • Total tax paid • Total R&D expenses

How it works:

1. Company adopts this standard and reports ESG information according to the stated metrics.
2. Investors will be able to use this ESG standardised information for their decision-making. For instance, as part of fundamental analysis and comparisons.

Sources: (Forbes, 2020)
(World Economic Forum, 2020)

Current Industry Standards for ESG

2. MSCI ESG Rating

- Rated over 8,500 companies and more than 680,000 equity and fixed income investment products globally.
- Adopts a rules-based methodology to measure a company's ability to manage long-term, industry ESG issues.
- Ranging from AAA being the best to CCC being the worst, the ratings cover various investment products such as equity, fixed income, loans, mutual funds, ETFs and even countries

How it works:

1. Information related to ESG is extracted using artificial intelligence.
2. Extracted information translated into constructive insights by MSCI's analysts.
3. The ratings are derived based on **35 ESG key issues** under **3 main pillars: environment, social and governance** that are **weighted** according to its **impact** and **time horizon** [appendix 3].
4. The ratings are used by investors for fundamental analysis, portfolio construction, risk management, benchmarking investment products and making regulatory disclosures.

Source: (MSCI, 2020a)
(MSCI, 2020b)

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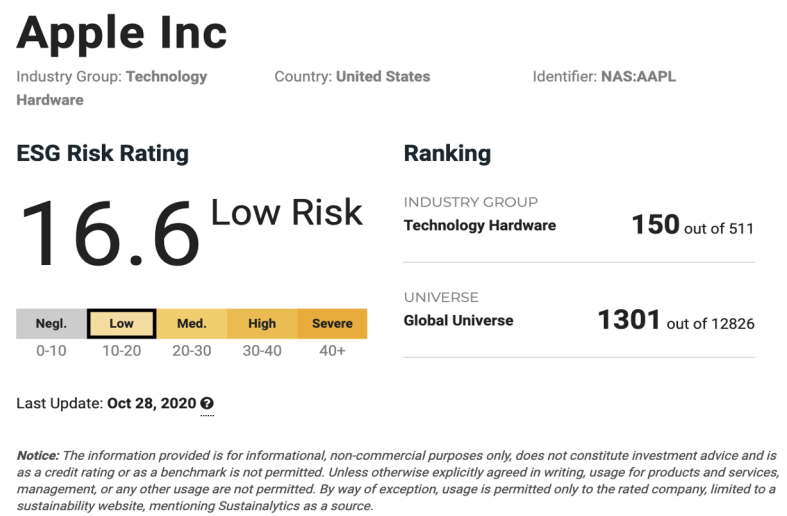
One way to easily incorporate ESG into your daily investing easily will be to use ESG screeners to identify investments that fit your ESG goals. Investors can utilise free ESG screeners online to determine ESG scores of investment products and make relative comparisons across asset classes.

Name	Sustainalytics' ESG Risk Ratings (MorningStar)
Pros	• Over 4,400 stocks across various industries and exchanges • Clear in showing ESG scoring (User-intuitive) • Shows potential Industry comparisons
Cons	• Limited coverage • Advanced features are not free (Controversy rating, Top material ESG Issues) • Lack of in-depth analysis and explanation provided

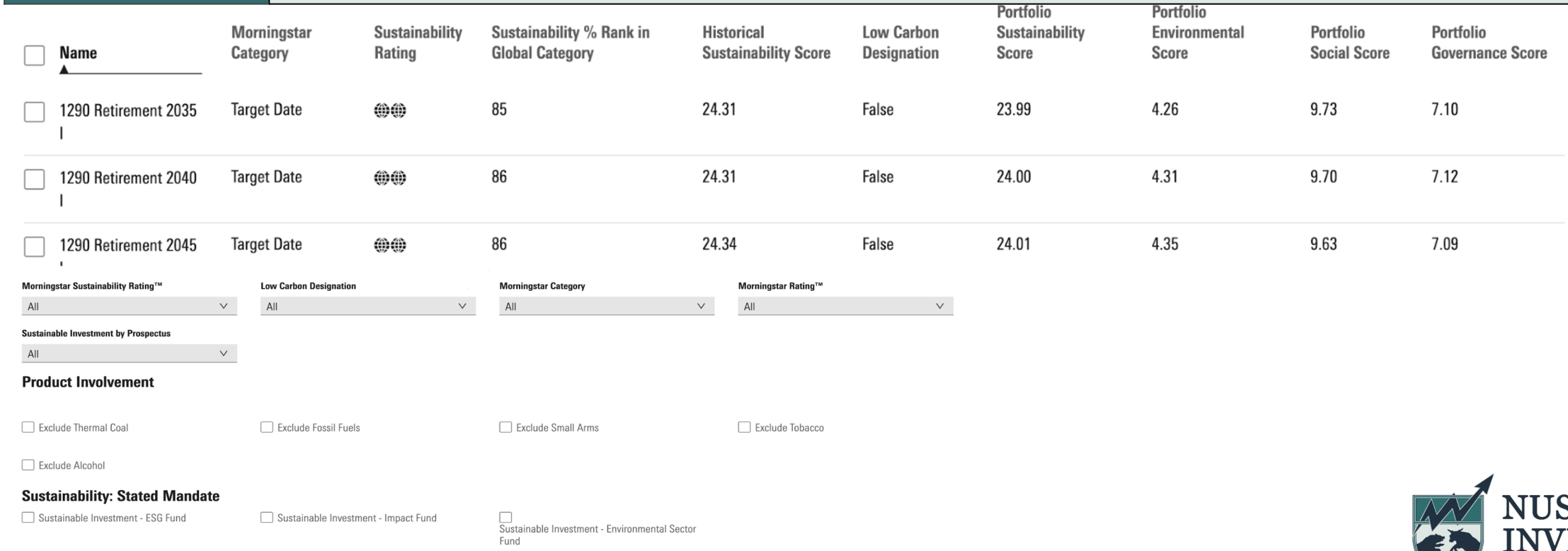


Industry Comparison

	ESG RISK RATING		INDUSTRY RANK
HP Inc	12.3	Low	51 out of 511
Nokia Oyj	13.3	Low	77 out of 511
Dell Technologies, Inc.	16.0	Low	136 out of 511
Canon Inc	17.5	Low	176 out of 511
Apple Inc	16.6	Low	150 out of 511

Link: https://www.sustainalytics.com/esg-ratings/

Name	Morningstar Sustainability Screener
Pros	• Covers only investment funds • Allows you to select which factors to exclude • Filter based on personal preference
Cons	• Does not cover individual stocks • Advanced features requires premium subscription • Lack of in-depth analysis and explanation provided



Name	Morningstar Category	Sustainability Rating	Sustainability % Rank in Global Category	Historical Sustainability Score	Low Carbon Designation	Portfolio Sustainability Score	Portfolio Environmental Score	Portfolio Social Score	Portfolio Governance Score
1290 Retirement 2035 I	Target Date		85	24.31	False	23.99	4.26	9.73	7.10
1290 Retirement 2040 I	Target Date		86	24.31	False	24.00	4.31	9.70	7.12
1290 Retirement 2045 I	Target Date		86	24.34	False	24.01	4.35	9.63	7.09

Link: https://www.morningstar.com/esg-screener

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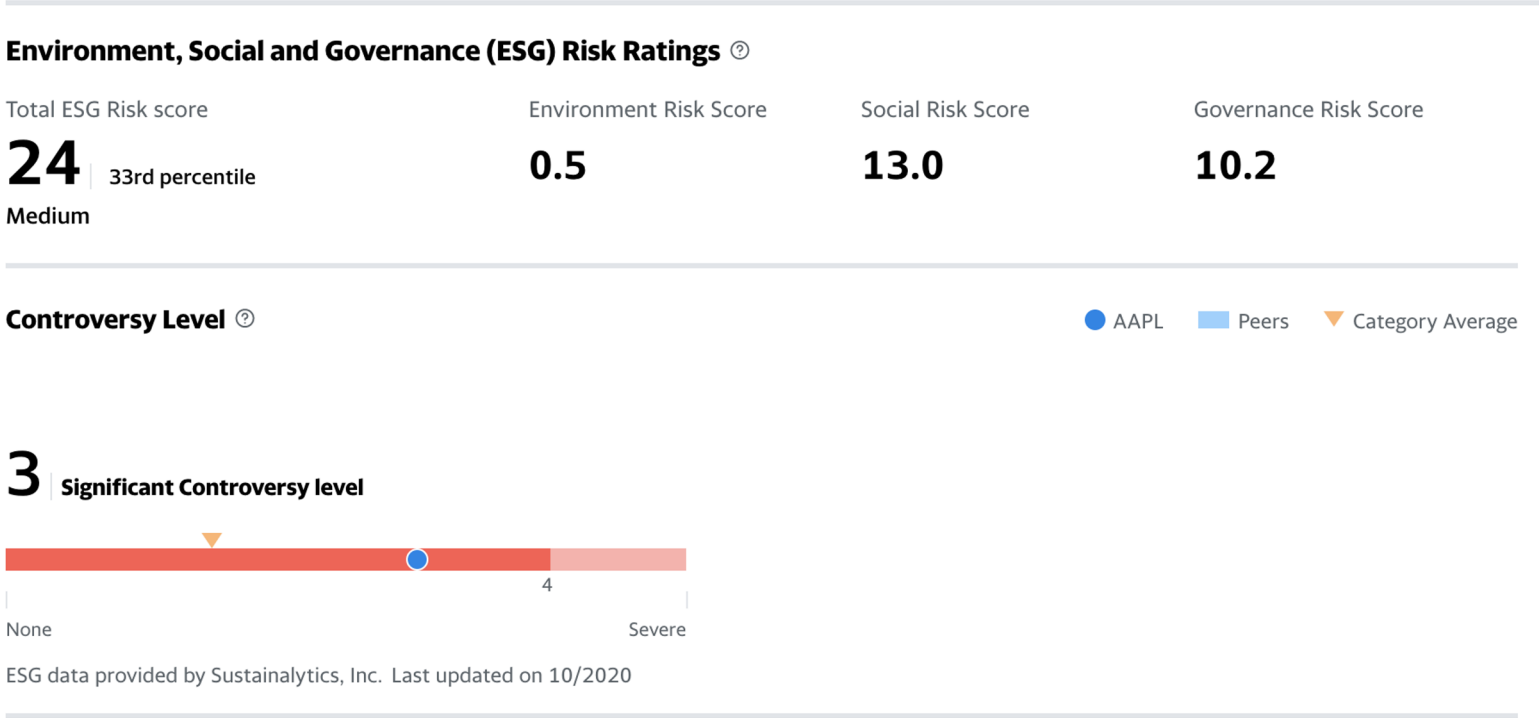
Name	Yahoo Finance Stock Screener
Pros	• Comprehensive screening across equity, ETF, mutual fund, futures, Index • Customizable screening based on personal preference • Peer comparison
Cons	• Lack of in-depth analysis and explanation provided



ESG Risk Score for Peers

Name	Total ESG Risk score	E	S	G
3008.TW LARGAN PRECISION CO	24	10	6	9
ZTCOF ZTE CORPORATION	24	3	8	13
AAPL (this company) Apple Inc.	24	0	13	10
APH Amphenol Corporation	24	10	6	8
034220.KS LG Display	23	9	6	9

Link: https://finance.yahoo.com/screener/

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Protection against greenwashing

- Anti-fraud laws ensure that it is illegal for companies to publish information that may mislead potential investors. However, while this is set out to be a powerful prevention tool, it has not achieved its goal. A limited survey of companies that receive significant pressure to publish ESG reports concludes that companies would use generic disclaimers in their reports.

- Companies would engage in greenwashing to draw in potential investors whilst providing protection against potential litigation risks of false information. Hence, as investors, it is important to know that we are responsible for our own actions when investing and have to conduct individual due diligence to ensure that the companies they invest in are ESG-friendly.

- Thus, investors should look try to beyond ESG scores. While ESG scores can show investors the ESG efforts and financial performance of a company relative to its peers, they may not be accurate. Lack of clarity on the methodologies underpinning scoring mechanisms and their diversity by ESG rating firms do not enable investors to effectively compare investments which are marketed as sustainable, thus contributing to the risk of greenwashing. Investors can avoid greenwashing by reviewing the investment product's objective for sustainable investment practices and fund performance through prospectus and annual reports.

- In conclusion, no ESG investment can be immune to greenwashing. Above is just one way which investors can look into avoiding it. Being critical and challenging ESG credentials is essential in ensuring that the investment is what it claims to be.

Sources: (Huber, Kuratek, Hall, & Brennan, 2020)
(Zandbergen, 2017)
(Huddleston, 2020)
(Jones, 2020)

BUY Recommendation

NVIDIA [NASDAQ: NVDA]

BUY

Price Target: $601
Current Price: $541 (As of 5 Feb 2021)
Upside Potential: 11%

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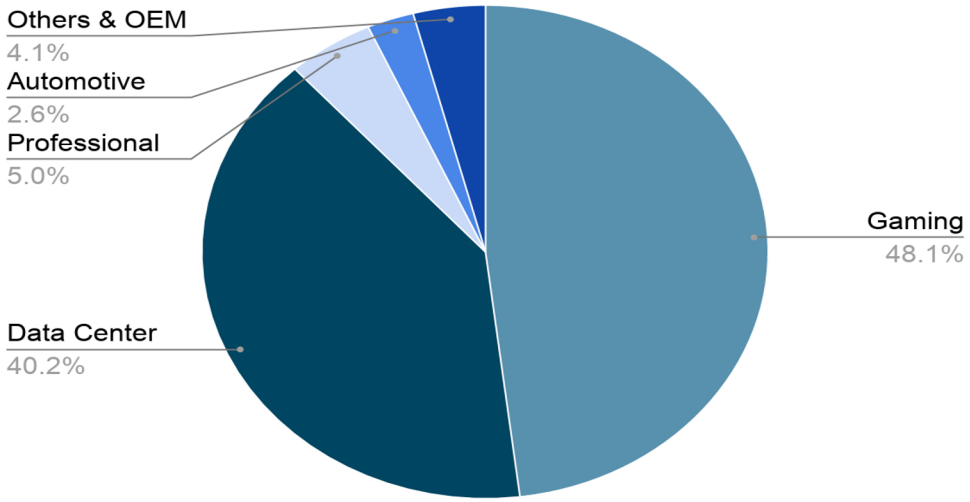
- **Business Model:** NVIDIA is a multinational technology company that specialises in Graphic Processing Units (GPUs) and system on a chip units (SoCs). Founded in 1993, the company targets the gaming, professional visualization , data centre and automotive markets.

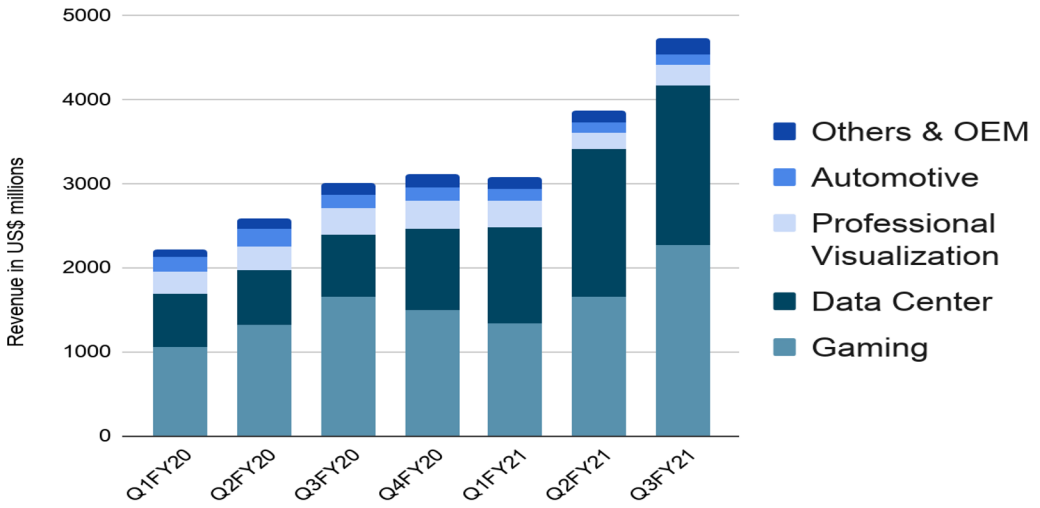
- **Revenue Sources:** Substantial revenue comes from the Data Center and Gaming sectors. Other revenue sources include the Professional Visualisation and Automotive sector.

- **Acquisition of Arm Limited:** NVIDIA announced a definitive agreement to acquire Arm Limited in a transaction valued at US$40 billion. Arm is a Cambridge based venture that designs semiconductors. This will enable NVIDIA to utilise Arm's ecosystem to accelerate innovation while expanding into high-growth markets (Gaming and 5G), and increase NVIDIA's non-GAAP gross margin and earnings per share.

Revenue by Segment (Q3 FY21)



Quarterly Revenue Growth by Segment



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Key Financials

• Share Price	$541.24
• Market Cap	$333.07B
• EV	$330.2B
• 52 Week Low-High	$180.68 - 589.70
• Financial Year End	25 Jan 2020

(US$M)	FY18A	FY19A	FY20E	FY21E
Revenue	11,716	10,918	17,527	22,785
EBITDA	4,066	3,227	5,138	7,264
ROA	0.338	0.183	0.226	0.255
ROE	0.493	0.260	0.312	0.337

Management

Name	Position	Background
Jen-Hsun Huang	President and CEO	Co-founder of NVIDIA. Previously, he was a director at LSI Logic and microprocessor designed at AMD Inc.
Colette M. Kress	VP and CFO	Colette has over 25 years of experience serving a range of finance roles at major technology companies, such as CFO at Cisco and Corporate VP at Microsoft.
Ajay K. Puri	VP, Worldwide Field Operations	Responsible for global sales and regional marketing of all NVIDIA products and services. Previously worked for over 22 years at Sun Microsystems, serving as Senior Vice President.
Debora Shoquist	VP, Operations	Responsible for the company's IT, operations and supply chain functions. She has over 15 years of executive experience in general management, manufacturing and operations.
Timothy S. Teter	VP, General Counsel and Secretary	Has over 20 years of experience at the law firm of Cooley LLP, where he most recently served as partner and focused on litigating patent matters.

Porter's Five Forces

Competition within Industry – High
Competition within the industry remains high. Products of this industry are relatively undifferentiated and players mainly seek to improve similar products that already exist – making products smaller, faster and cheaper. Furthermore, given the constant technological advancements, industry players are under the constant pressure to come up with better products and invest in R&D.

Threats of New Entrants – Low
Barriers to entry are considered high given the high capital requirements and hence high fixed costs of wafer fabs and purchasing tools. For example, with 30,000 systems a month the capital requirements range from US$500 million to US$2.5 billion. Moreover with significant economies of scale, it is easy for existing players to have a cost advantage, making threats of new entrants a weaker force.

Threats of Substitutes – Low
Competitive pressure from substitutes is low given the niche market for microprocessing chips and semiconductor technologies. Additionally, the high costs involved from R&D efforts to keep up with technological advancements reduces the threat of substitutes. Despite downstream products, such as virtual-reality headset and smart speakers, having substitutes, the alternatives are not close substitutes.

Bargaining Power of Buyers – Moderate
NVIDIA gets most of its revenue from big players in the industry including Microsoft Corporation and Apple Inc. and their buyers have relatively more power and influence over NVIDIA's products offerings. However, given the market share of the semiconductor industry being largely concentrated among the bigger semiconductor manufacturers, it is not as easy for buyers to negotiate on prices.

Bargaining Power of Suppliers – Low
The semiconductor industry naturally does not encourage supplier power. There is an abundance of suppliers offering materials for production with strong competition. Therefore, with little product differentiation, industry players need not purchase raw materials from specific suppliers. Hence, there is little opportunity for supplier hold-up.

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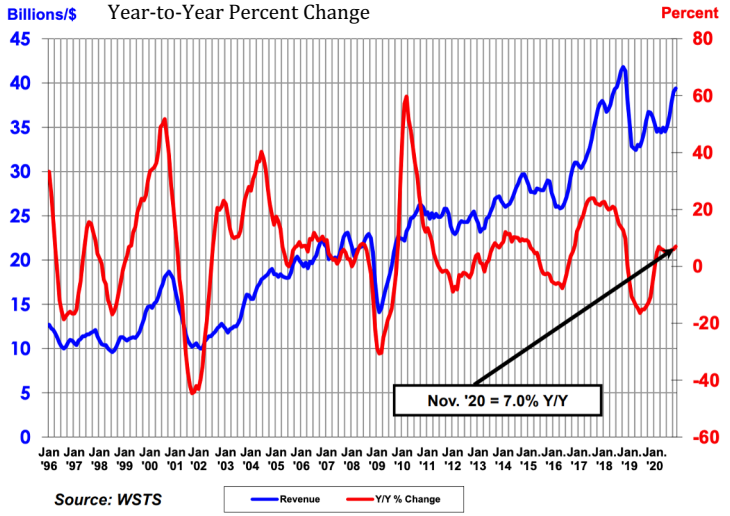
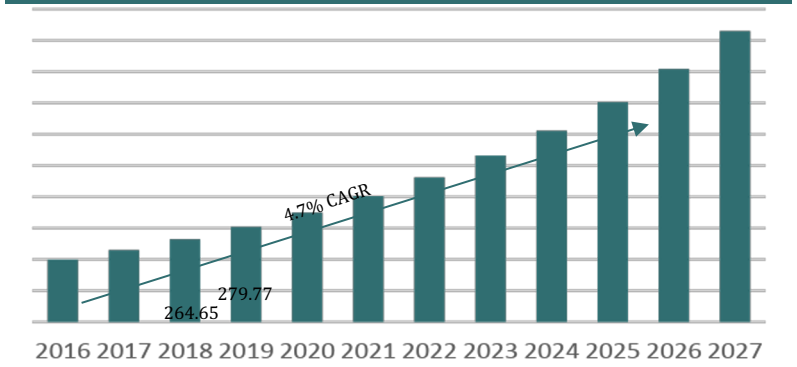
Industry Outlook

Worldwide Semiconductor Revenues



Worldwide Semiconductor Market Size



Continued Market Growth: The global market for semiconductors is expected to reach US$726.73 billion by 2027, representing a 2019-27 CAGR of 4.7%.

1. Technological Advancements to Boost Demand

The rise of AI, IoT and ML technologies improves the efficiency and speed of memory chips to process large data, leading to increased demand of semiconductors. With increased demand for modern memory chips in industrial applications, market growth is expected. Technological advancements, such as virtual reality and cloud computing, would also increase demand for semiconductors.

2. Global Climate and Developments Driving Semiconductor Demand

Despite the US-China trade war driving revenue contractions, with China expected to suffer a ~16% decrease in market share, and automotive production in Asia being severely impacted due to the outbreak of COVID-19, working from home as a new normal has drastically surged the networking and communication and data processing applications all over the world.

3. Consumer Consumption Increasing

Rising consumption of consumer electronic goods due to rising household disposable income levels, rapid population growth and urbanisation drives demand for semiconductors. Integrated Circuit chips are increasingly integrated into electronic devices, including smartphones, washing machines, TVs and refrigerators.

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Investment Thesis (Non-ESG)

Acquisition of Arm Limited

Acquisition of Arm Limited creates a premier AI computing company with the combination of NVIDIA's leading AI computing platform with Arm's vast CPU ecosystem. This will accelerate Arm's server CPU growth which increases Data Center, AI and IOT opportunities, and will enable NVIDIA to advance computing for smartphones and computers for Arm's customers, which include Apple, Samsung and Qualcomm. This acquisition will immediately increase NVIDIA's non-GAAP gross margin and non-GAAP earnings per share.

GPU Industry

NVIDIA continues to be the market leader in the GPU space, a sector poised for strong growth through 2025. With their proprietary CUDA technology, NVIDIA currently dominates 90% of the market where companies use GPU at hyperscale and has 3x the revenue of the next largest GPU vendor (AMD) in the gaming industry. This industry is poised to see major growth due to the upcoming 5G era and continued growth in the gaming sector.

Collaboration of NVIDIA Drive with NIO's Supercomputers

Collaboration with Chinese automobile maker NIO allows NVIDIA to position themselves as technology leaders in the autonomous car market. The Integration of NVIDIA Drive Orin with NIO's supercomputer, Adam, will be deployed in NIO's ET7 model, which is expected to be shipped starting 2022. The autonomous car market is expected to reach $220.44 billion by 2025, at a CAGR of 36.5%.

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MSCI ESG Metrics (ESG Investment Theses)

- The MSCI ESG Metrics acts as **an investment thesis** for NVIDIA based on their ESG scores
- MSCI provides an overall ESG rating for the companies, ranging from **CCC to AAA**. A higher score is indicative of a company that is able to sustainably maintain their returns over a sustained period.
- NVIDIA is ranked as the **leader** in ESG metric amongst 67 other companies in the semiconductor industry.

	Weightages for Semiconductor industry
Environmental	28.9%
Social	32.8%
Governance	38.3%

- Each pillar under the MSCI ESG Metric has a certain weightage, which varies according to the industry.
- The semiconductor & semiconductor equipment industry places **high emphasis on Governance** in the MSCI ESG Ratings.
- This metric acts as a **comparable company analysis** against its industry peers **Intel and AMD.**

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Environmental Pillar (Weight: 28.9%)

Metrics	NVIDIA Corporation	Advanced Micro Devices, Inc.	Intel Corporation
Climate Change Carbon Emissions Product Carbon Footprint Financing Environmental Impact Climate Change Vulnerability	A	BBB	AA
Natural Capital Water Stress Biodiversity and Land Use Raw Material Sourcing	AA	BBB	BBB
Pollution and Waste Toxic Emissions and Waste Packaging Material and Waste Electronic Waste	AAA	A	BBB
Environmental Opportunity Clean Technology Green Building Renewable Energy	AA	BBB	AAA

	NVIDIA Corporation	Advanced Micro Devices, Inc.	Intel Corporation
Climate Change Carbon Emissions Product Carbon Footprint Financing Environmental Impact Climate Change Vulnerability	• Targets a 15% per employee GHG emissions reduction in FY20 • Aims to source 65% of electricity from renewable sources by FY25 and attained 34% as of FY20. • Sets requirements for suppliers to verify their GHG emissions by a third party	• Commits to sourcing renewable energy for offices, best-in-class manufacturing wafer suppliers and efficiently powering AMD-enabled devices	• Has a track record where Scope 1 and 2 emissions decreased about 31% on an absolute basis, since 2020 • Collaborates actively to minimize emissions (e.g. eliminating use of Class 1 ozone-depleting substances in manufacturing) • Invested more than $200M in more than 2,000 energy conservation projects since 2012, resulting in cumulative savings of more than 4.5 billion kWh • 100% green power purchase for US, 100% renewable energy for European operations, 50% renewable energy for Israel and 71% globally
	Evaluation: *NVIDIA generally attains goals it sets out to achieve. However, given NVIDIA's large market capitalization of 325.49B, it is definitely able contribute more to sustainable efforts. For example, Intel with a smaller market capitalization of 211.19B is able to source 71% of electricity from (>65%) green energy.*	*Evaluation:* *AMD sets goals to contribute towards sustainability but lacks environmental disclosure. Hence, investors are not able to verify the impact of AMD's sustainable efforts.*	*Evaluation:* *Intel sets and attains goals to contribute to environmental sustainability and is comparatively generous in contributing towards energy conservation projects. Coupled with transparent environmental disclosure, it can be concluded that Intel performs relatively well in the climate change aspect.*
	Rating: A	*Rating: BBB*	*Rating: AA*

Source: AMD, NVIDIA and Intel

	NVIDIA Corporation	Advanced Micro Devices, Inc.	Intel Corporation
Natural Capital Water Stress Biodiversity and Land Use Raw Material Sourcing	• Implements an array of water conservation measures, such as low-flow plumbing and the use of recycled water for toilet flushing. Newest headquarters achieved a 42% reduction in domestic water demand. • Requires key manufacturers to report their water usage and analyze their water reduction goals. • Includes energy efficiency and other sustainability metrics when evaluating a land for use. • Ensures that the source of minerals used in products comes from socially responsible sources. • Only uses conflict-free minerals from the Democratic Republic of Congo.	• Water usage in operations decreased by 9% since 2018 and 10% since 2014. • Collects rainwater and reuses grey water at facilities in Austin, Texas and Bengaluru and Hyderabad, India. • Founder of the Public-Private Alliance for Responsible Minerals Trade and an active participant in Responsible Minerals Initiative. • Utilises standardized tracing processes developed by the RMI and collects reports from suppliers to ensure transition to conflict-free sources. 100% of mineral suppliers, smelters or refiners are 100% compliant.	• Invested more than $267 million in water conservation projects at global facilities since 1998, saving an estimated 1.4 billions gallons of water annually. • Treats and returns 75% to 85% of water withdraws back to municipal water treatment operations for reuse and consumes the remaining 15% to 25% through evaporation or landscape irrigation. • Aims to restore 100% of their water by 2025. • Approximately 96% of Intel's suppliers use only smelters and refiners whose products are responsibly sourced with an increasing compliance rate from 2013.
	Evaluation: *NVIDIA generally utilizes natural capital more responsibly than their competitors with stringent internal compliance policies. However, NVIDIA lacks reporting of effectiveness (evaluating goals and reviewing performance).*	*Evaluation:* *AMD is working to ensuring sustainable raw material sourcing. Efforts to ensure sustainable biodiversity and land use as well as active disclosure on effectiveness of reusing water would improve its ESG efforts.*	*Evaluation:* *Intel has the highest disclosed investments in water conservation projects but generally has less emphasis on sustainable biodiversity and land use and raw material sourcing.*
	Rating: AA	*Rating: BBB*	*Rating:BBB*

Source: AMD, NVIDIA and Intel

	NVIDIA Corporation	Advanced Micro Devices, Inc.	Intel Corporation
Pollution and Waste Toxic Emissions and Waste Packaging Material and Waste Electronic Waste	• Sets an annual goal of 80% for landfill diversion. In FY20, NVIDIA achieved a 78% overall rate, implementing a range of measures to improve diversion rate • Usage of 100% recycled fibres in their bulk carton packages and 80% of their consumer packages • Designs their containers to maximize package density and reduce package size. • Their retail boxes have maintained a recyclability rate above 70%, and their key packaging suppliers are compliant with NVIDIA's environmental requirements • Aims to donate IT equipment to local community organization	• Commits to compliance with international law and regulations on restrictions on amount of hazardous substances in products • Offers packaging that meets EU Packaging Directive and in 2019, 100% recyclable material was used to make packaging • Redesigned packaging for selected products to reduce recycled materials usage by ~50%, shipping fuel use and emissions per unit • Products to extend life of computing platforms to reduce electronic waste	• Participant of the RBA's Chemical Management Workgroup developing industry-wide chemical management initiatives such as Clean Electronics Production Network, eliminating the toxic chemical exposure in the supply chain • Replaced packaging foam with recyclable material • Aims to produce high percentage of sustainable packaging through collaboration with packing suppliers • Collaborates to identify shared solutions for used electronics • Reuses 55-60% of returned products and electronic components that cannot be reused or resold are reclaimed for metal
	Evaluation: *NVIDIA has made conscious effort in waste management on various fronts. It is more adept than their competitors in dealing with wastes. NVIDIA could venture further in reusing used electronic products.*	*Evaluation:* *AMD offers an attractive solution to extend life of computing platforms and is active in sustainable packaging. However, the breath of its sustainability approach can be improved*	*Evaluation:* *Intel generally lacks tangible statistics to verify its sustainability commitments. However, Intel generally handles electronic waste well.*
	Rating: AAA	*Rating: A*	*Rating: BBB*

Source: AMD, NVIDIA and Intel

	NVIDIA Corporation	Advanced Micro Devices, Inc.	Intel Corporation
Environmental Opportunity Clean Technology Green Building Renewable Energy	• Currently aiming to improve energy efficiency by focusing on Parallel processing, which uses much less energy than other computational forms. GPUs are optimized for performance per watt over absolute performance. • Newest building is LEED Gold certified, including smart lighting systems, solar panels, and other energy- and water-efficient designs. • Aims to source 65% of electricity use from renewable energy by FY25 and achieved 34% as of FY20	• On track on their target to deliver at least 25x more energy efficiency in processors from mobile products with 2014 as baseline • Used 42 million kwh in renewable energy certificates in the US, which represented 33% of global energy use • LEED Silver certification for the Fab 8.1 fabrication facility in New York and LEED Gold® certification at Fab 8 Admin 1 and 2 buildings in New York • Reduced energy use by 15% since 2014 but increased by 5% from 2018-2019	• Building new ecosystem for energy production, distribution and consumption by replacing centralized carbon-based generation with decentralized, smart grids of cleaner renewable energy • Aimed to increase the energy efficiency of computers and data centre server products 25x by 2020 from 2010 levels but only managed to achieve 8.5x for data centre products and 14x for notebooks • Achieved goal to design all new buildings to a minimum LEED Gold certification between 2015 and 2020 • Achieved 100% renewable energy use across their global manufacturing operations
	Evaluation: *NVIDIA has shown effort in improving energy efficiency of its products and moving towards green building. However, NVIDIA lacks in efforts to increase usage of renewable energy*	*Evaluation:* *AMD is moving towards improving energy efficiency of its products and has made progress moving towards green buildings. More progression is required to shift towards renewable energy on top of reducing energy use*	*Evaluation:* *Intel generally has a good track record in seizing environmental opportunities. Despite not being able to meet its targets on improving energy efficiency, Intel is ahead in improving energy efficiency*
	Rating: AA	*Rating: BBB*	*Rating: AAA*

Source: AMD, NVIDIA and Intel

Social Pillar (Weight: 32.8%)

Metrics	NVIDIA Corporation	Advanced Micro Devices, Inc.	Intel Corporation
Human Capital Labour Management Health & Safety Human Capital Development Supply Chain Labour Standards	AA	BBB	AAA
Product Liability Product Safety & Quality Chemical Safety Consumer Financial Protection Privacy & Data Security Responsible Investment Insuring Health & Demographic Risk	AAA	BBB	BB
Stakeholder Opposition Controversial Sourcing Community Relations	AA	BBB	AAA
Social Opportunities Access to Communication Access to Finance Access to Healthcare Opportunities in Nutrition and Health	AA	BBB	AAA

	NVIDIA Corporation	Advanced Micro Devices, Inc.	Intel Corporation
Human Capital Labour Management Health & Safety Human Capital Development Supply Chain Labour Standards	• Offers courses for developers to learn technical aspects of AI and vocational support is provided through the career services program. • A strong Diversity and Inclusion program to ensure no discrimination or harassment against people. • Lost-time incident rate is 0.01 per 100 full time employees, which is much lower than industry average. • Member of the Responsible Business Alliance (RBA) and has adopted their Code of Conduct for responsible supply chain management to identify and prioritize any risks to their supply chain	• Rigorous focus on Diversity and Inclusion to ensure equal representation for all employees. AMD employee policies and processes are implemented to promote equal opportunity without regard to age, ancestry, color, marital status, medical condition, mental or physical disability, national origin, race, religion, political and/or third-party affiliation, gender, sexual orientation, gender identity, or veteran status • 100% Corporate Equality Index score from the Human Rights Campaign • Earned full membership in the Responsible Business Alliance (RBA). Conducts supplier responsibility initiatives with all direct suppliers.	• Achieved their 2020 goal of reaching full representation of women and underrepresented minorities (URM) 2 years ahead of schedule. The diversity and Inclusion Program has led to 27.4% increase in URM from 2015-19. • Days away case rate of 0.13, compared to industry average of 0.4. • Increased its annual spending with diverse-owned suppliers to $1 billion. • Founding Member of the Responsible Business Alliance (RBA), holding themselves and their suppliers to the high expectations of human rights standards.
	Evaluation: *While NVIDIA has done well to ensure that its employees are well trained with skills and knowledge regarding diversity and ethics, given the company's market share, NVIDIA could've allocated more fiscal initiative, such as Intel's $1 billion pledge.*	*Evaluation:* *Despite AMD's strong diversity and inclusion policies, the company fails to achieve the same standards as its competitors.*	*Evaluation:* *Intel performed the best in this category, achieving its diversity goals 2 years early and ensuring that they utilise their monetary strength in order to further extend their support for diversity.*
	Rating: AA	*Rating: BBB*	*Rating: AAA*

Source: AMD, NVIDIA and Intel

	NVIDIA Corporation	Advanced Micro Devices, Inc.	Intel Corporation
Product Liability Product Safety & Quality Chemical Safety Consumer Financial Protection Privacy & Data Security Responsible Investment Insuring Health & Demographic Risk	• Cross-functional teams to manage product quality. • Customer Quality Engineering provides direct customer support for all quality-related issues. • Product Quality Engineering uses root cause failure analysis and suggests corrective actions. • Cybersecurity team that analyzes metrics and investigates emerging threats. • Global Environmental, Health and Safety management framework aligns with ISO 45001 (Industry standard framework).	• Cybersecurity is top priority at AMD, extending from policies that govern corporate operations to technologies that keep their data and intellectual property safe. Ensures the products are designed to help protect their customers' information. • AMD Product Security Incident Response Team (PSIRT) that is responsible for investigating potential vulnerabilities and address these issues with the customers	• Known for their strong safety culture, aims to ensure more than 50% of their employees participate in their global corporate wellness program by 2030. • Company wide certification to the ISO 14001 standard to ensure a comprehensive environmental, health and safety management system.
	Evaluation: *NVIDIA outperformed its competitors in this aspect, due to their ability to split product quality into two different teams that specialise in attending to the customers while analyzing the root cause of the issue. NVIDIA also meets the generally accepted EHS requirements as well.*	*Evaluation:* AMD does well to focus on cybersecurity and information safety through their PSIRT, which ensures that their intellectual property and customer safety are protected.	*Evaluation:* Despite Intel meeting the company wide certification, the company fails to achieve any immediate goals with regards to safety culture, and instead only has long term plans for 2030.
	Rating: AAA	*Rating: BBB*	*Rating: BB*

Source: AMD, NVIDIA and Intel

	NVIDIA Corporation	Advanced Micro Devices, Inc.	Intel Corporation
Stakeholder Opposition Controversial Sourcing Community Relations	• Members of the Responsible Minerals Initiative (RMI) and Public-Private Alliance (PPA) for Responsible Minerals Trade to improve transparency for responsible sourcing. • Due Diligence program (for conflict materials) is designed to conform to the recommendations of the Organization for Economic Cooperation and Development (OECD).	• Founder of the Public-Private Alliance (PPA) for Responsible Minerals Trade, focused on helping governments step away from illicit mineral Trade. • Active participant of the Responsible Minerals Initiative (RMI) which oversees if subject minerals originate from conflict free sources.	• Members of the Responsible Minerals Initiative (RMI) and Public-Private Alliance for Responsible Minerals trade to improve transparency for responsible sourcing. • Intel's Due Diligence Program has made positive progress on 3TG and Cobalt, identifying risks and focusing on responsible mineral sourcing.
	Evaluation: *NVIDIA, like its competitors, is a part of the RMI and PPA, and has its due diligence program that ensures that it avoids conflict minerals while complying with OECD's recommendations. It lacks the leadership presence of Intel.*	*Evaluation:* *AMD, being the founder of PPA, does well in this aspect. It is also a member of the RMI, like its competitors*	*Evaluation:* *Intel stands apart of its competitors due to the positive progress they've made on 3TG and Cobalt, ensuring that its goals are tangible.*
	Rating: AA	*Rating: BBB*	*Rating: AAA*

Source: AMD, NVIDIA and Intel

	NVIDIA Corporation	Advanced Micro Devices, Inc.	Intel Corporation
Social Opportunities Access to Communication Access to Finance Access to Healthcare Opportunities in Nutrition and Health	• NVIDIA's philanthropic giving exceeded more than $5.3 million in FY20. • Launched "AI for Healthcare", an initiative to help the healthcare community to use AI to tackle challenges like drug discovery and disease detection. NVIDIA Clara platform which increases diagnostic accuracy and reduces the cost of care. • NVIDIA creates advanced computing tools that enable developers and scientists to innovate in robotics, healthcare, finance, transportation, and customer service. Collaborates with dozens of universities and research organisations in performing AI Research	• Working closely with customers to improve image quality to help doctors detect anomalies and improve the accuracy and timeliness of diagnoses. • Partnered with customers to demonstrate the uses of virtual reality for learning to increase access to computers and training, and promote extensive curriculums	• Over 1.2 million hours of volunteer work amongst employees and retirees in 2019-2020. • Winner of the 2020 Goodie Award, presented to Intel in recognition of the specialised skills that the employees donate to nonprofits. • Intel-Red Cross team utilises the AI to create detailed mapping for disaster relief. • Launched Intel AI for youth, an AI readiness program that empowers youth to create their own social impact projects. Intel Future Skills is a comprehensive curriculum that enables participants to build technology, tenacity and confidence. • Intel Foundation has donated over $75m in the past year (2019) to various social causes.
	Evaluation: *While NVIDIA certainly contributes to the community in terms of providing computing and AI, NVIDIA fails to provide similar amounts of philanthropic support like Intel, especially given its market share.*	*Evaluation:* *AMD contributes to the medical and education sector in terms of utilising their technology. However, it fails to provide the same calibre of support to the community as its competitors.*	*Evaluation:* *Intel does best in this section, due to their massive contributions through the means of donations and volunteer hours. Additionally, Intel utilises its technology for several social causes including disaster relief and education.*
	Rating: AA	*Rating: BBB*	*Rating: AAA*

Source: AMD, NVIDIA and Intel

Governance Pillar (Weight: 38.3%)

Metrics	NVIDIA Corporation	Advanced Micro Devices, Inc.	Intel Corporation
Corporate Governance Board Pay Ownership Accounting	AAA	BBB	BBB
Corporate Behaviour Business Ethics Tax Transparency	AAA	AAA	AAA

	NVIDIA Corporation	Advanced Micro Devices, Inc.	Intel Corporation
Corporate Governance Board Pay Ownership Accounting	• Rigorous Code of Conduct that applies to the board, executive staff and employees. All directors attended at least 75% of board meetings. • Compensation of Directors is reviewed by the Compensation Committee with aid from a compensation consultant and peer group practices. • Has a named executive officer (NEO) compensation program which is designed on performance-based variable cash and long-term equity awards if pre-established corporate financial metrics are satisfied. • Ratification of the selection of PwC as Accounting firm for good corporate practice.	• AMD Worldwide Standards of Business Conduct ensures compliance with laws, regulations and ethical standards. This applies to all Board of Directors and employees worldwide. • Corporate Compliance Committee that oversees AMD's Worldwide Standards of Business Conduct and related policies.	• Comprehensive Code of Conduct that prohibits dishonesty, Illegal Activity, Retaliation, Conflicts of Interest, Misuse of Assets. Applies to all employees and board of directors regarding Intel related activities. This code of conduct applies to independent contractors, consultants, suppliers and other business partners. • Compensation Committee to aid the board of directors in the determination of executive compensation. • Employs auditors (includes both internal and external) to ensure that business conduct and records are consistent with relevant accounting standards (GAAP, IAS, and SEC regulations)
	Evaluation: *NVIDIA outshines the industry in this aspect due to its comprehensive program to tackle the board's contributions and establishing the board's pay. It also ensures good corporate practice by the ratification of the selection of PwC.*	*Evaluation:* *While AMD has a rigorous Code of Conduct, it does not thoroughly explain the boards Pay and Ownership metrics.*	*Evaluation:* *With Intel's comprehensive code of conduct coupled with its external and internal auditors, Intel succeeds in providing a clear and thorough explanation of the Board's goals. However, it could perhaps improve on its explanation for its board's compensation.*
	Rating: AAA	*Rating: BBB*	*Rating: BBB*

Source: AMD, NVIDIA and Intel

	NVIDIA Corporation	Advanced Micro Devices, Inc.	Intel Corporation
Corporate Behaviour Business Ethics Tax Transparency	• Longstanding code of conduct that outlines core values and establishes expectation about Business conduct. Applies to executives, directors, employees and third-party companies. • Corporate hotline hosted by an independent third party for anonymous complaints about business practices. • Nvidia publishes clear and understandable details about their income taxes in their 10-K, including details on variance in effective tax rates due to income earned.	• AMD Aware is a multilingual web/telephone service that allows anonymous reports about suspected breaches of the AMD Worldwide Standards of Business Conduct. • Anti-Corruption policy that focuses on Anti-Bribery and record-keeping of all benefits • Publishes a clear annual report with access to their filings with Securities & Exchange Committee (SEC) and corporate governance documents on their website.	• Open door Guideline, which enables employees to report concerns about the Code with any manager. • Intel Ethics and Compliance reporting portal, which is hosted by a third party and allows anonymous reporting regarding any breaches of Intel's Code of Conduct. • Intel's policy complies with all anti-corruption laws and requires employees to reflect all transactions in Intel's books and records.
	Evaluation: *All 3 companies have a comprehensive code of conduct that tackles bribery, anti-corruption and employee conduct. Furthermore, all the companies provide a clear and understandable report on their revenues and taxes (documents filed with the SEC). Lastly, all the companies also have an anonymous reporting channel that is hosted by a third-party. However, NVIDIA comprehensive code of conduct which extends beyond business conduct to cover the finance and employee ethics allows the company to outshine their competitors, who have satisfactorily achieved standards of the industry.*		
	Rating: AAA	*Rating: A*	*Rating: A*

Source: AMD, NVIDIA and Intel

ESG Scores

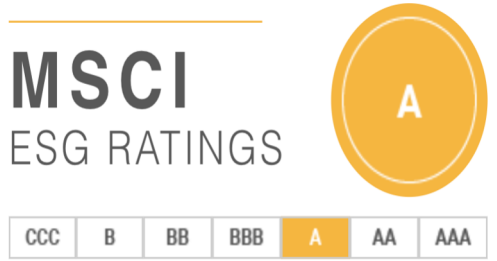
	NVIDIA Corporation	Advanced Micro Devices, Inc.	Intel Corporation
Environmental (28.9%)	AA	BBB	A
Social (32.8%)	AA	BBB	AA
Governance (38.3%)	AAA	A	A
Overall Score	**AAA**	**BBB**	**A**

- NVIDIA ranks the best in our ESG Valuation with an overall score of AAA, followed closely by Intel at A. NVIDIA acts as a leader in the industry, with Intel and AMD ranking average within the industry.
- Advanced Micro Devices ranks in last with a score of BBB.
- As such, we firmly believe that NVIDIA is the best company within the semiconductor industry from an ESG perspective. This matches MSCI's overall rating for the three companies.

NVIDIA Corporation

Advanced Micro Devices

Intel Corporation



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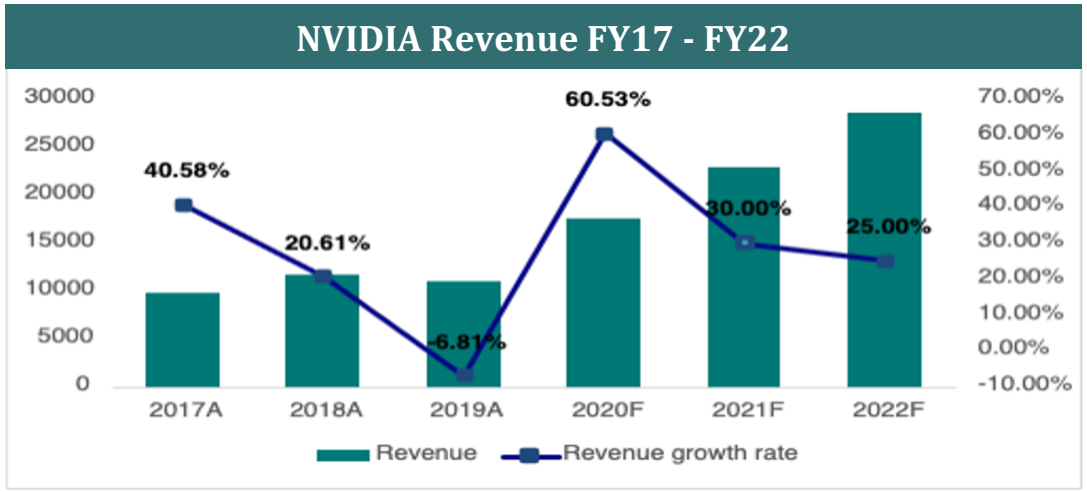
DCF Valuation

Tax Rate:	21.0%
WACC:	7.92%
Weighted Present Value of TV:	360,091,193,172.75
Equity Value:	377,531,881,851
Shares Outstanding:	619,000,000
Exit Multiple Method	
Terminal EBITDA:	14,410 million
EBITDA Multiple:	65.85
PV of Terminal Value:	648,255,980,242
Gordon Growth Method	
Terminal Year FCF:	6,657,865,060
Terminal Growth Rate:	1.50%
PV of Terminal Value:	71,926,406,103.51

Revenue Projections



Sensitivity Analysis

Implied Share Price (RMB)

WACC \ Perpetual Growth Rate	601.65	0.00%	0.50%	1.00%	1.50%	2.00%	2.50%
6.50%		639.75	645.11	651.45	659.05	668.34	679.95
7.00%		621.19	625.70	630.96	637.18	644.64	653.75
7.50%		603.77	607.60	612.03	617.19	623.29	630.62
7.92%		589.90	593.27	597.13	601.60	606.81	612.99
8.50%		571.75	574.60	577.83	581.53	585.79	590.77
9.00%		556.92	559.41	562.21	565.39	569.01	573.20

Implied Share Price (RMB)

WACC \ Exit EV/EBITDA Multiple (x)	601.65	63.85	64.85	65.85	66.85	67.85	68.85
6.50%		642.05	650.55	659.05	667.54	676.04	684.53
7.00%		620.58	628.88	637.18	645.47	653.77	662.07
7.50%		600.98	609.09	617.19	625.30	633.41	641.52
7.92%		585.69	593.64	601.60	609.55	617.50	625.45
8.50%		566.05	573.79	581.53	589.27	597.01	604.75
9.00%		550.26	557.82	565.39	572.95	580.52	588.08

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DCF Valuation

US$ in millions	Historical				Projected				
	2016	2017	2018	2019	2020	2021	2022	2023	2024
EBIT(1-T)	1,528	2,536	3,005	2,248	3,696	5,267	6,584	7,901	9,086
D&A	187	199	262	381	459	597	746	895	1,030
Changes in Operating Working Capital	(679)	185	(857)	717	(2,122)	488	(1,835)	481	(1,664)
CapEx	(176)	(593)	(600)	(489)	(800)	(1,040)	(1,300)	(1,559)	(1,793)
FCF	860	2,327	1,810	2,857	1,234	5,312	4,196	7,718	6,658
PV of FCF					1,091	4,256	3,046	5,078	3,969

TV	360,091,193,173
EV	377,531,881,851
less: Net Debt	5,111,000,000
less: Non Controlling Interest	-
Implied Equity Value	372,420,881,851
Shares Outstanding	619,000,000
Price per Share	601.65
Current Share Price	541.24
% upside	11.16%

Appendix 1: ESG Metric

Metric	Type	Specific Indicator
GHG Emissions & Energy		
Total CO2 Emissions	Numeric	Tonnes of CO2 emissions per U$mn revenue
Scope 1 CO2 Emissions	Numeric	Tonnes of Direct Scope 1 CO2 and CO2 equivalents per U$mn revenue
Airlines GHG Emissions	Numeric	Tonnes of CO2 emissions per revenue passenger mile (RPM)
Carbon Embedded Reserves	Numeric	Tonnes of CO2 emissions embedded in total oil and gas reserves per U$mn revenue
Carbon Value at Risk (VAR)	Numeric	Tonnes of Direct Scope 1 CO2 multiplied by a U$30/t carbon price, shown as a % of U$ EBITDA
Gas Flaring	Numeric	Tonnes of gas flared by the company per U$mn revenue
Energy Usage	Numeric	Total energy usage in gigajoules per U$mn revenue
Renewable Energy %	Numeric	Total renewable energy as a % total energy usage
Emissions Targets	Target	Targets or objectives to reduce emissions
Energy Efficiency Targets	Target	Targets or objectives to be achieved on energy efficiency
Carbon Pricing Policy	Policy	Company has an internal corporate carbon pricing strategy
Renewable Energy Use Policy	Policy	Company use renewable energy

Source: Goldman Sachs Group, 2020

Appendix 1: ESG Metric

Metric	Type	Specific Indicator
Air Pollutants (non GHG)		
SOx and NOx Emissions **SO is Sulfur Oxide and NO is Nitric Oxide*	Numeric	Tonnes of SOx and NOx emissions per $mn revenue
VOC Emissions	Numeric	Tonnes of volatile organic compounds (VOC) emissions per U$mn revenue
SOx and NOx Emissions Reduction Policy	Policy	Initiatives to reduce, phase out SOx or NOx emissions
VOC Emissions Reduction Policy	Policy	Initiatives to reduce, phase out SOx or NOx emissions
Water		
Water Withdrawal	Numeric	Total water withdrawn in m3 per U$mn revenue
Water Recycling %	Numeric	Amount of water recycled as % of total withdrawal
Freshwater %	Numeric	Amount of freshwater withdrawal as % of total withdrawal
Water Efficiency Targets	Target	Targets or objectives to improve water efficiency

Source: Goldman Sachs Group, 2020

Appendix 1: ESG Metric

Metric	Type	Specific Indicator
Waste		
Total Waste	Numeric	Tonnes of waste per U$mn revenue
Waste Recycling %	Numeric	Total waste recycled as a % of total waste
Hazardous Waste	Numeric	Tonnes of hazardous waste per U$mn revenue
Hazardous Spills	Numeric	Number of hazardous spills per U$mn revenue
Waste Reduction Initiatives	Policy	Initiatives to recycle, reduce, reuse, substitute, treat or phase out total waste
Take-back & Recycling Initiatives	Policy	Take-back procedures and recycling programs to reduce the potential risks of products entering the environment
Toxic: Chemicals Reduction Policy	Policy	Initiatives to reduce, reuse, substitute or phase out toxic chemicals or substances
Environment & Biodiversity		
Biodiversity Impact Reduction Policy	Policy	Reports on biodiversity impacts or activities to reduce impact on ecosystems
Project E&S Assessment	Policy	Evaluate projects on the basis of environmental or biodiversity risks

Source: Goldman Sachs Group, 2020

Appendix 1: ESG Metric

Metric	Type	Specific Indicator
Employee Engagement		
Employee Compensation	Numeric	Average salary, wages, fees, and benefits paid per employees per year (US$) - ranked relative to GICS1 regional peers
Employee Turnover	Numeric	% of employee turnover annually
Training Hours	Numeric	Average hours of training per employee per year
Flexible Working Policy	Policy	Provides flexible working hours or working hours that promote a work-life balance
Training and Development Policy	Policy	Policy to support the skills training or career development of its employees
Diversity		
Women Employees	Numeric	% of women employees
Women Mobility Gap	Numeric	Ratio of '% women managers' to '% of women employees'
Diversity and Opportunity Targets	Target	Set targets on diversity and equal opportunity
Safety		
Lost Time Injury Rate	Numeric	Total LTIR for employees and contractors per million hours worked
Total Injury Rate	Numeric	Total injuries and fatalities including no-lost-time injuries per one million hours worked
Fatalities Rate	Numeric	Total employee and contractor fatalities per 1000 employees
Employees H&S Systems	Policy	Health and safety management systems in place (e.g. OHSAS 18001)
Customer H&S Policy	Policy	Policy to protect customer health & safety

Source: Goldman Sachs Group, 2020

Appendix 1: ESG Metric

Metric	Type	Specific Indicator
Supply Chain Management		
Child Labour Policy	Policy	Policy to avoid the use of child labor
Forced Labour Policy	Policy	Policy to avoid the use of forced labour
Materials Sourcing Policy	Policy	Environmental criteria (e.g. life cycle) to source or eliminate materials
Improve Supply Chain H&S Policy	Policy	Policy to improve employee health & safety in its supply chain
Env Criteria Supplier Selection	Policy	Environmental criteria (ISO 14000, energy consumption, etc.) in the selection process of its suppliers or sourcing partners
Env Monitoring Supply Chain	Policy	Company conducts surveys of the environmental performance of its suppliers
Env Supply Chain Termination	Policy	Company willing to end a partnership with a sourcing partner if environmental criteria are not met
Supplier ESG Training	Policy	Provides training in environmental, social or governance factors for its suppliers
ESG Accountability		
Audited CSR Report	Accountability	Does the company have an suited CSR Report?
ESG Linked Compensation	Accountability	Does the company have ESG linked compensation incentives for management?
Extractive Industries Transparency Initiative	Accountability	Company supports the “Extractive industries Transparency Initiative (EITI)”

Source: Goldman Sachs Group, 2020

Appendix 1: ESG Metric

Metric	Type	Specific Indicator
Supply Chain Management		
Child Labour Policy	Policy	Policy to avoid the use of child labor
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Source: Goldman Sachs Group, 2020

Appendix 1: ESG Metric

Metric	Type	Specific Indicator
Product & Service Quality		
Data Privacy Policy	Policy	Policy to protect customer and general public privacy and integrity
Quality Management Systems	Policy	ISO 9000 certification or any industry specific certification
Responsible Marketing Policy	Policy	Policy on responsible marketing ensuring protection of children?
Product & Service Impact		
Coal % Energy Capacity	Numeric	% of total energy generation capacity from coal and lignite
Renewables % Energy Capacity	Numeric	% of total energy generation capacity from renewables (wind, solar, biomass, small-scale hydro, waste and all other types of renewable energy)
Clean Energy Revenue	Impact - Special	% of company's value attributable to its activities in renewable energy, energy smart technologies, carbon capture and storage (CCS), and carbon markets
Environmental Products	Impact - Product Portfolio	At least one product line or service designed to have positive effects on the environment or which is environmentally labeled and marketed
Renewable / Clean Energy Products	Impact - Product Portfolio	Products or technologies for use in the clean, renewable energy (such as wind, solar, hydro and geothermal and biomass power)
Water Technologies	Impact - Product Portfolio	Products or technologies that are used for water treatment, purification or that improve water use efficiency

Source: Goldman Sachs Group, 2020

Appendix 1: ESG Metric

Metric	Type	Specific Indicator
Product & Service Impact		
Sustainable Building Products	Impact - Product Portfolio	Products and services that improve the energy efficiency of buildings
Eco-design Products	Impact - Product Strategy	Specific products which are designed for reuse, recycling or the reduction of environmental impacts
Sustainable Packaging	Impact - Product Strategy	Policy to improve its use of sustainable packaging
Health / Safety Products and Services	Impact - Product Strategy	Products and services that foster specific health and safety benefits for the consumers (healthy, organic or nutritional food, safe cars, etc.)
Product Access Low Price	Impact - Product Strategy	Products designed for lower income categories (e.g. bridging the digital divide, telecommunications, low cost cars and micro-financing services)
Green Building Policy	Impact - Product Strategy	Environmental technologies and/or environmental principles used in the design and construction of its buildings
ESG Integrated AUM	Impact - Product Strategy	ESG screening criteria or environmental factors in the investment selection process for AUM
No Product Recalls	Impact - Special	No mass recalls or complete withdrawal of products due to defects or safety reasons

Source: Goldman Sachs Group, 2020

Appendix 2: Stakeholder Capitalism Metrics (Core Metrics)

Principles of Governance	Planet	People	Prosperity
· Covers a company's commitment to ethics and societal benefit	· Looks at themes of climate sustainability and environmental responsibility	· Focuses on the roles human and social capital play in business	· Examines business contributions to equitable, innovative growth — economic prosperity on a wider basis than simply a company's own profit generation, including community investment and tax
Core Metrics			
· Setting Purpose · Governance Body Composition · Material issues impacting stakeholders · Anti-corruption · Protected ethics advice and reporting mechanism · Integrating risk and opportunity into business process	· Greenhouse gas (GHG) emissions · TFCD Implementation · Land use and ecological sensitivity · Water consumption and withdrawal in water-stressed areas	· Diversity and inclusion · Pay equality · Wage level · Risk for incidents of child, forced or compulsory labour · Health and safety · Training provided	· Absolute number and rate of employment · Economic contribution · Financial investment contribution · Total R&D expenses · Total tax paid

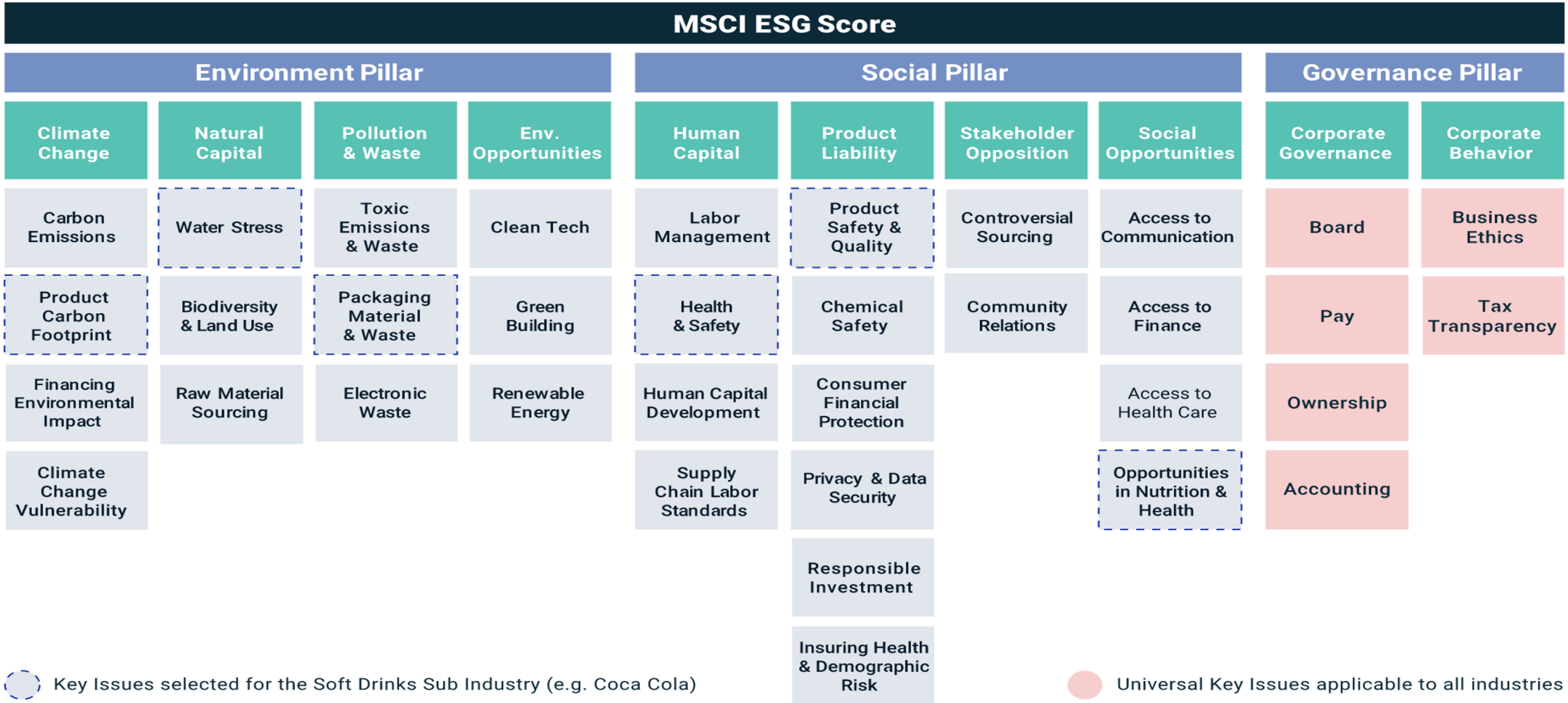
Source: World Economic Forum et al., 2020

Appendix 2: Stakeholder Capitalism Metrics (Expanded Metrics)

Principles of Governance	Planet	People	Prosperity
Expanded Metrics			
· Purpose-led management · Progress against strategic milestones · Remuneration · Alignment of strategy and policies to lobbying · Monetary losses from unethical behaviour · Economic, environmental and social topics in capital allocation framework	· Paris-aligned GHG emissions targets · Impact of GHG emissions · Land use and ecological sensitivity · Impact of land use and conversion · Impact of freshwater consumption and withdrawal · Air pollution · Impact of air pollution · Nutrients · Impact of water pollution · Single-use plastics · Impact of solid waste disposal · Resource circularity	· Pay gap · Discrimination and harassment incidents and the total amount of monetary losses · Freedom of association and collective bargaining at risk · Human rights review, grievance impact & modern slavery · Living wage · Monetized impacts of work-related incidents on organization · Employee well-being · Number of unfilled skilled positions · Monetized impacts of training – increased earning capacity as a result of training intervention	· Infrastructure investments and services supported · Significant indirect economic impacts · Social value generated · Vitality Index · Total social investment · Additional tax remitted · Total tax paid by country for significant locations

Source: World Economic Forum et al., 2020

Appendix 3: MSCI ESG Scoring Metrics



Source: MSCI, 2020b

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