

Hassani, Bertrand Kian; Bahini, Yacoub

Article

Relationships between ESG disclosure and economic growth: A critical review

Journal of Risk and Financial Management

Provided in Cooperation with:

MDPI – Multidisciplinary Digital Publishing Institute, Basel

Suggested Citation: Hassani, Bertrand Kian; Bahini, Yacoub (2022) : Relationships between ESG disclosure and economic growth: A critical review, Journal of Risk and Financial Management, ISSN 1911-8074, MDPI, Basel, Vol. 15, Iss. 11, pp. 1-23, <https://doi.org/10.3390/jrfm15110538>

This Version is available at:

<https://hdl.handle.net/10419/275015>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<https://creativecommons.org/licenses/by/4.0/>

Review

Relationships between ESG Disclosure and Economic Growth: A Critical Review

Bertrand Kian Hassani ^{1,2,3,*} and Yacoub Bahini ¹

¹ QUANT AI Lab, C. de Arturo Soria, 122, 28043 Madrid, Spain

² Department of Computer Science, University College London, Gower St., London WC1E 6EA, UK

³ CES, MSE, Université Panthéon Sorbonne, 106-112 Boulevard de l'Hôpital, 75013 Paris, France

* Correspondence: bertrand.hassani@quant.global

Abstract: The literature on the relationship between ESG disclosure and economic growth is relatively non-existent. Thus, this paper highlights the importance of taking this relationship into account in current sustainable policies. The main objective of extra-financial Disclosure is to mitigate Information Asymmetry. During this discussion, we show that ESG disclosure may not reduce information asymmetry as intended. We also show that complete extra-financial disclosure targeted by current policies is not optimal. There is an optimal disclosure threshold depending on the level of sustainable development of the country, the size of the companies and their development potential. Moreover, current ESG disclosure policies direct economies towards less polluting sectors, which is not necessarily optimal from an economic standpoint and could negatively affect economic activity and, therefore, the population's well-being. We also provide some policy implications and suggestions for future research on the ESG disclosure literature.



Citation: Hassani, Bertrand Kian, and Yacoub Bahini. 2022. The Relationship between ESG Disclosure and Economic Growth: A Critical Review. *Journal of Risk and Financial Management* 15: 538. <https://doi.org/10.3390/jrfm15110538>

Keywords: ESG; economic growth; greenwashing; sustainable investments; regulation

JEL Classification: Q01; O40; E02; O16; F64; G38; M14

Academic Editors: W. Brent Lindquist and Svetlozar (Zari) Rachev

Received: 9 October 2022

Accepted: 7 November 2022

Published: 18 November 2022

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Increased awareness of global warming reinforced by the recent extreme climatic events, acknowledgement of ethical problems such as discrimination in companies, and sustainable matters in general during the pandemic led companies to address environmental, social, and corporate governance (ESG) matters in a more structured manner. Though ESG development may seem superficial, it is one of the key reforms, not only in the development of a socially responsible business environment but also as a structural evolution of the economy as a whole. ESG initiatives and investments are already significant and continue to grow. In this context, various options are being considered to integrate ESG considerations into corporate decision-making and country sustainable policies. Integrated reporting (disclosure) is a leading approach to achieving the target of Sustainable Development Goals (SDGs). The EU is continuously tightening its Corporate Sustainability Reporting Directive (CSRD). Very recently, a political agreement has been reached to include non-listed large companies, listed small and medium-sized enterprises (SMEs) (excluding micro-enterprises), and non-EU companies with significant activities in the European Union. This agreement states that disclosures must be externally audited to limit greenwashing exposure (George 2022). It is also likely that the US new administration will also introduce some updated ESG mandates (M. A. Khan 2022).

Our main research question is whether current sustainability policies are economically justified or not. More precisely, the mandatory disclosure of ESG information, based on a taxonomy of economic activities for example, leads to a stigmatisation of certain sectors that are vital to human well-being.

ESG disclosure policies do not take into account, at least adequately, its macroeconomic implications. There is no literature regarding the relationship between ESG disclosure and economic growth to the best of our knowledge, though this might be the trigger to a virtuous circle. This paper aims to highlight the importance of such an issue to ensure that ESG processes are not just an exercise of regulatory compliance to satisfy certain political tendencies but should bring about sustainable economic growth. Indeed, ESG is supposed to incentivise economies to focus on sustainable sectors through market-oriented policies and regulatory instruments. This implies that ESG policies lead to economic growth, at least in the long run. However, this can be misleading according to the economic growth literature (Diaye et al. 2022).

This link between ESG disclosure and economic growth cannot be discussed without addressing some important topics affecting this relationship. The impact of public information on economic-market stability and investment decisions has received increasing attention over the last few decades. There is a quasi-consensus that extra-financial information exerts a significant influence on the stock market dynamics, especially in times of economic or political uncertainty¹ (Cepoi 2020; Hwang et al. 2021; Engelhardt et al. 2021). The extant literature provides substantial evidence that financial disclosures can reduce information asymmetry and thus decrease the cost of capital (Dhaliwal et al. 2011; Wong and Zhang 2022). As we will see in this paper, complete non-financial disclosure adopted by current policies is not optimal, and companies will continue to trade off the costs of disclosure against the costs of non-disclosure, taking into account the costs of non-compliance with current regulations.

Moreover, current efforts focus on sustainable transition management, and little thought is given to the post-transition period, i.e., after sustainable goals have been reached (e.g., reduction of Green House Gas). The lack of consideration for the characteristics of the post-transition period is a missing dimension of the current sustainable analysis. It could provide serious suggestions for encouraging sustainable investments by remunerating them during this post-transition period. It could also help with defining the optimal threshold for ESG Disclosure and giving an effective role to non-sustainable economic activities that will lead to the non-exclusion of these sectors and activities as we will see below.

In this perspective, our objective is to use the arguments of the existing literature on economic and information theory to show that the current trends are far from being optimal. In Section 2, we present the existing literature on the relationships between ESG-CSR-Disclosure and economic growth. In Section 3, we discuss important topics related to our subject. More precisely, in Section 3.1, we discuss the economic implication of disclosure. Section 3.2 discusses key aspects of sustainable investment and its implication on economic growth. Section 3.3 highlights the role of information asymmetry and trust in the context of sustainability. Section 3.4 presents the importance of considering the post-sustainability period in order to better measure the economic impact of this transition. Section 3.5 provides an overview of trends in ESG Investing to underline the non-optimality of current policies. Finally, we give some concluding remarks and policy implications.

2. Related Literature

2.1. ESG and Economic Growth

Empirical research on the relationship between ESG and economic growth instead focuses on ESG components. To the best of our knowledge, only two studies deal with the relationships between economic growth and ESG (all three pillars together) (Diaye et al. 2022 and Shkura 2019). Ref. Diaye et al. (2022) found a positive relationship between ESG and GDP per capita in the long run. However, in the short run, only two countries (Iceland and South Korea) benefit from this positive relationship. The author in Shkura (2019) highlight that ‘there is a set of macroeconomic indicators whose influence on Socially Responsible Investment (SRI) has been analysed, and it can be concluded that only indicators of openness can be linked with the regional SRI market development’. Thus, she does not find any evidence of a relationship between SRI and economic growth. This

can be caused by the fact that she does not test for long-term effects, while ESG can be considered a long-term concept. Thus, explicit distinction between short-and long-term effects is necessary, whereas little literature considers this aspect (Diaye et al. 2022).

Concerning the relationship between the individual ESG pillars and Economic Growth, the results are mitigated. Regarding the relationship between economic development and environmental quality, some authors propose that Economic Growth enhances the Environmental Impact of Economic Activity (Green Growth Theory) (D. Stern et al. 1996; Ozcan et al. 2020; Jacobs 2013; Nordhaus 2014; N. Stern 2007; Nordhaus 2008; and Asiedu et al. 2021). Other studies find a negative relationship between Environment and EG (Grossman and Krueger 1995; Yang et al. 2021; Acheampong 2018; Rahman 2020). In addition, finally, a group of researchers' results suggest that there is no evidence that environmental quality systematically deteriorates with economic growth (Grossman and Krueger 1995; Naomi and Akbar 2021).

Concerning the Governance pillar, many studies confirm that improved governance and institutions are necessary to improve economic performance (Cooray 2009; Huang and Ho 2017; Hadj Fraj et al. 2018; Kim et al. 2018; North 1990; and Alam et al. 2017). However, Ref. AlBassam (2013) points out that this statement is not valid in times of economic crisis. The social pillar still has the lowest status among the three pillars of ESG according to Parra and Moulaert (2011). However, it turned out that the Social Equality enhances the economic output significantly (Löfström 2009; Houtbeckers 2021). Other authors also support the existence of a positive relationship between Social Performance and Economic Growth (e.g., Cracolici et al. (2010) and S. Stern et al. (2015)).

It is important to recognize that not all economists believe in the need to maintain economic growth while improving ESG performances. According to Diaye et al. (2022), there are two groups of researchers in favor of economic degrowth to achieve global sustainable objectives. The first one is inspired by the "degrowth" theory (Schneider et al. 2010; Howarth 2012). This literature argues that achieving ESG goals and policies can lead to a reduction in consumption and production, which implies a contraction in economic growth. According to this theory, a decrease in economic growth is beneficial to the sustainable transition and known as "Sustainable Degrowth" concept (Martínez-Alier et al. 2010). According to those theorists (Sustainable Degrowth), increasing economic output (Economic Growth) will hasten climate change, biodiversity loss and the depletion of scarce raw materials (Martínez-Alier et al. 2010).

The second group's arguments is based on Social Comparison and Envy Theory. Social Comparison Theory² is the idea that individuals determine their own social and personal worth based on how they relate to others. This behaviour is systematically irrational, according to Morgan-Knapp (2014); therefore, it could be a source of economic degrowth.

2.2. CSR and Economic Growth

To address this section, it is essential to distinguish between the economic effects of mandatory disclosing (reporting) companies' CSR³ activities and those of the CSR activities themselves (without reporting/mandatory reporting). Here, we focus on the latter case, the former being discussed at the end of this section (Firms' Disclosure).

There is a small amount of literature exploring the link between CSR and economic growth (Škare and Golja 2014). According to the research papers that we have consulted, it seems that there is a positive link between CSR indicators and economic growth (Navarro Espigares and González López 2006; Škare and Golja 2014; Inekwe et al. 2020). The effects of CSR on Economic Growth are conveyed through various channels such as education, environmental projects (e.g., water sanitation), health care, rural development projects and equal opportunities (Ramasamy and Ting 2004; M. M. Khan 2016). According to Sharma and Sathish (2022), financial institutions (especially banks) play a major role in promoting CSR activities. As such, it is important to explore the link between financial development and CSR to better understand the relationship between CSR and economic growth.

The relationship between CSR/ESG and Financial Performance (FP) is being extensively investigated from a theoretical and empirical perspective. There are four conflicting theories regarding this relationship. The first hypothesis proclaims a positive relationship between CSR/ESG and FP (social impact hypothesis). This hypothesis converges with the stakeholder theory introduced by Freeman (1984). Effective CSR/ESG management will not only improve stakeholder satisfaction, but also financial performance (Aver et al. 2009; Kumar 2022). CSR/ESG practices could help increase competitive advantage, reducing risk (Ashwin Kumar et al. 2016) and costs given that ‘in many industries, a large share of corporate profits are at stake from external engagement’ (Henisz et al. 2019). ‘For example, satisfied employees will be more motivated to perform effectively, satisfied customers will be more willing to make repeat purchases and recommend the products to others, satisfied suppliers will provide discounts, etc.’ (Galant and Cadez 2017).

The second hypothesis claims that the integration of CSR/ESG policies has a negative impact on FP (trade-off hypothesis) (Naimy et al. 2021; Galant and Cadez 2017; Friedman 2007). ‘Examples of socially responsible actions include investments in pollution reduction, employee benefits’ packages, donations and sponsorships to the community, etc. The conventional view maintains that these expenses will deteriorate profitability and lead to ‘competitive disadvantage’ (Alexander and Buchholz 1978).

The third hypothesis assumes that this relationship is composed of two stages with a culmination point separating these two stages of CSR/ESG development (U shape or inverted U shape) (El Khoury et al. 2021 and Naimy et al. 2021). The integration of the CSR/ESG is therefore positively (resp. negatively) linked with FP until a certain level of CSR/ESG-FP development; then, it becomes negative (rep. positive). In addition, finally, the neutral hypothesis suggests that the positive and negative effects of CSR offset each other (Diaye et al. 2022; McWilliams 2001; La Torre et al. 2020).

Contrarily to the classical financial principle, lower risk reduces returns, and the integration of CSR/ESG factors lessens volatility and enhances returns if well allocated (Ashwin Kumar et al. 2016; Naimy et al. 2021). The effect of CSR/ESG on CFP differs according to its environmental, social and governance pillars. A positive relationship between ESG pillar (individually) and CFP was found by some empirical research (Xie et al. 2019; Zhang and Ouyang 2021; La Torre et al. 2021). A negative relationship was found by other authors (La Torre et al. 2021). Naimy et al. (2021) and Zhang et al. (2020) found U-shape and inverted U-shape according to which ESG pillar we consider. “A convex relationship was obtained between Environmental and Accounting Performances and between Governance and Price-to-Book ratio, while a concave relationship was depicted between Social and accounting performances” (Naimy et al. 2021).

On other hand, there is a non economical contestability of ESG/CSR policies existing in the economic literature. Notably, Freeman and Dmytriiev (2017) present three arguments for critics of CSR that have negative effects on Economic Activities, namely, *Violating obligation to shareholders*, *Covering wrongdoing* and *Creating false dichotomies*. According to the authors, the first argument, *Violating obligation to shareholders*, has been refuted by both academics and lawyers, and the two other arguments are also questionable⁴.

Firms’ Disclosure

Corporate disclosure is a means of communication between management and external investors and stakeholders in general. The demand for corporate disclosure arises from the problem of information asymmetry and agency conflicts between management and outside investors (Healy and Palepu 2001). Some authors believe that disclosure reduces information asymmetry (Healy and Palepu 2001; Lambert et al. 2007). The literature shows that the reduction of information asymmetry promotes Economic Growth through various channels that we can summarise in two. First, the collection and analysis of information by Financial Intermediation that leads to reducing monitoring costs and optimising Funds allocation. Second, low asymmetry reduces the fraction of Saving (increases investments) that leads to Capital Accumulation and thus Economic Growth (Fu 1996; Diamond 1984;

Williamson 1987; Greenwood and Jovanovic 1990; Bencivenga and Smith 1991; Capasso 2004)

By disclosing, companies can benefit from a reduced cost of capital and/or increased cash flow to their shareholders, thereby increasing their value. “However, providing information to the public is not a costless task. The costs of disclosure include the costs of producing and disseminating information, such as the costs of adopting an information system to collect, process and report information about the company, as well as the costs of hiring accountants and audits, etc.” (Hassan and Marston 2010). In addition, disclosure is a strategic cost since the information disclosed by a company can be used by its competitors, which could result in considerable costs for the disclosing company (Verrecchia 1983; Darrough and Stoughton 1990).

In the case of voluntary disclosure, the literature suggests that each stakeholder endogenises the maximum level of information disclosure. “This choice involves trading off the reduction in the information asymmetry component of the cost of capital that results from increased disclosure quality against the costs of reduced incentives, litigation costs and proprietary costs” (Core 2001)⁵. For these reasons, according to Core (2001), Mandatory Disclosure should be more efficient for the companies with low growth opportunities. For companies with high growth opportunities, mandatory disclosure is not effective because it is expected to be of low quality and have an insignificant effect on information asymmetry. For these firms, some reduction in information asymmetry through voluntary disclosure is optimal, and the optimum is determined as a function of the quality of mandated disclosure and a trade-off of lower capital and litigation costs against higher proprietary and incentive costs. After this optimal choice, high-growth firms use more voluntary disclosure, but they likely still have greater information asymmetry than low-growth firms’ (Core 2001).

3. Discussion

ESG investing is part of the growing awareness of sustainable development. Recently, investors, lenders and other stakeholders around the world have increasingly incorporated environmental, social and governance factors into their business decisions. To integrate ESG aspects into their decisions, stakeholders must be able to accurately capture ESG-related information disclosed by companies (Feng and Wu 2021). However, institutional investors claim that ESG information provided by companies is insufficiently available and lacks quality, making the investment decision more delicate (Ilhan et al. (2019) and Krueger et al. (2021)).

3.1. Economic Implications of Firms’ Disclosure and Reporting

The main benefits of corporate disclosure are to mitigate information asymmetries between the company and its investors as well as between investors, on the one hand, and between companies, on the other (economic competitiveness) (e.g., Christensen et al. (2021)). The roles played by Sustainable Information Disclosure are more or less known. It is designed to support the transition to a sustainable economy and a fairer society. However, current sustainable policies do not have a solid and understandable economic justification. Though these policies certainly have some positive effects (on the environment for example), they could also have adverse consequences on the economy and on the global welfare.

The positive effects can be summarised as follows: First, by mitigating adverse selection, disclosure encourages pro-ESG investors to continue their sustainable strategies. This should lower the return that investors require and thus decrease the cost of capital for sustainable projects, more liquidity and more reliable anticipation of cash flow (e.g., Lambert et al. (2007) and Lambert et al. (2011)). Second, disclosure may increase investor awareness or willingness to hold securities with high ESG ratings. This would increase the number of pro-ESG investors, which improves risk sharing in the economy (Securities and Exchange Commission 2022; Diamond and Verrecchia 1991; Merton 1987). Third, ‘disclosure facilitates the monitoring of managers by corporate outsiders such as analysts

or institutional investors, thereby improving managerial decision-making and leading to more efficient corporate investments' (Christensen et al. 2021). Finally, disclosure by one firm can provide useful information about other firms (e.g., its customers and suppliers) in the form of information transfers and spillovers, which can influence their (other firms') information transparency.

There are very serious negative effects of ESG Disclosure which could lead to challenging current approaches such as the application of taxonomy. First, the absence of worldwide standardised non-financial mandatory reporting generates an asymmetry of information in particular at the international level. Second, revealing a given firm identity can allow other competing firms (and investors) to anticipate its strategies and undermine its objectives. This behaviour can dissuade new pro-ESG investors and thus cause liquidity risk (e.g., BDF (2019b) and Alfieri (2014)). If this effect is relevant, a compromise (to protect companies from their competitors) between total opacity and transparency must be found to ensure balance and stability. Specialists should treat this issue more deeply to anticipate its undesired effects on sustainable transition. Third, mandatory disclosures of sustainability information will not change the behavioural optimisation of companies. Firms will always make a trade-off between lower capital and litigation costs, which encourages disclosure, and higher ownership and incentive costs, which discourage it. Naturally, the "optimum" corresponds to a specific disclosure threshold which would drive effective reporting and green-washing avoidance. Finally, companies level of development will have to be considered for effective reporting. This means that optimal disclosure thresholds will have to be set according to the size and potential development of the firms.

ESG disclosure does not yet show its efficiency. According to Haji et al. (2022), there is a recent finding as follows: 'Empirical research finds no significant changes in reporting quality and generally concludes that CSR reporting continues to be ceremonial rather than substantive after the regulations—consistent with corporate legitimisation and "greenwashing" views. In contrast, growing evidence shows both positive and negative capital-market and real effects of the regulations'.

3.2. ESG Policies and Economic Returns

ESG disclosure pushes economics to focus on sustainable sectors through market-oriented policies and regulatory instruments. This corresponds implicitly to the growth hypothesis policy. That means that ESG performance is what brings about economic growth. However, this policy will only be efficient if ESG performance engenders economic growth or if there is a bi-directional causality. At the same time, no consensus exists in the literature about the direction of causality between ESG performance and economic growth (Ho et al. (2019) and Diaye et al. (2022)).

According to economic literature, if economic growth affects ESG performance (unidirectional), then ongoing ESG policies (disclosure-taxonomy, etc.) will not be effective in achieving sustainable transition. Thus, it would be more efficient to consider conservation policies in this case. That is, economic growth is what brings about ESG performance. According to Ho et al. (2019), referring to Mlachila et al. (2017), Fodha and Zaghoud (2010), McCulloch et al. (2013) and Cracolici et al. (2010), there are three ways through which economic growth affects ESG performance. 'First, the increase in the rate of growth implies an increase in the country's capacity to achieve and sustain high investment rates, leading to technological advancement that creates innovation. Second, rising levels of employment and income raise the funds from which effective ESG policies can be financed. Third, a better standard of living, generated by economic growth, may change lifestyles; people will give greater attention to environmental amenities, social challenges and governance'. Therefore, researchers and policymakers will need to explore more economic channels (economic indicators) through which we can improve sustainability indicators. It is therefore important to further explore the links between ESG and economic growth in order to better manage the transition and make it more effective. Maybe, in most countries,

there is a bi-directional causality (e.g., [Asiedu et al. \(2021\)](#)), which implies that current ESG policies are effective but can be reinforced by macroeconomic policies.

Moreover, Section 2.2 shows that the literature does not establish an evident positive relationship between CSR and economic growth. Thus, the exclusion of firms whose activities are not classified as sustainable should negatively affect growth. On the contrary, the inclusion of these companies in the transition process could be beneficial for sustainability since these same companies could finance sustainable projects such that R&D, health care, rural development, etc. ([Sharma and Sathish 2022](#); [Ramasamy and Ting 2004](#); [M. M. Khan 2016](#)). According to [Chang et al. \(2022\)](#), exclusion of non-sustainable companies creates a sort of monopolistic market, and mandatory ESG disclosure (Government Intervention) will not allow environmental CSR to make the environment-growth trade-off more flexible and achieve the first optimum.

3.3. Uncertain Effects of Disclosure

ESG is currently a widely discussed topic. Awareness, regulation and economic returns are shifting perspectives. However, ESG management requires much more information to ensure relevant actions, as management comes with measurement. As such, authorities have enhanced companies' disclosure requirements. Although the primary objective of mandatory ESG disclosure rules is to improve the supply of ESG information, it is not clear that these regulations improve the ESG information environment ([Krueger et al. 2021](#)). Indeed, the asymmetry of information between lenders and borrowers triggers anti-selection, which is destructive to markets, and influences opportunistic behaviours (moral hazard). The economics of information theory suggests that a lender would acquire information until the marginal cost of acquiring additional information equals the marginal benefit ([Goldman and Johansson 1978](#); [Stigler 1961](#)).

Similarly, the borrower would not convey complete information because of signalling costs ([Milde and Riley 1988](#); [Sharpe 1990](#); [Spence 1973](#)). This causes information asymmetry between lender and borrower. According to [Grossman and Stiglitz \(1980\)](#), information is expensive, and available information is reflected in the price according to the market efficiency concept. A significant asymmetry of information amplifies economic crises and causes financial instability. Complete divulging (symmetry) of information collapses trade and markets because prices tend to zero.

ESG disclosure reporting should allow investors to have 'green' information for free. However, 'green' information represents only a part of overall market information. Thus, even with complete disclosure, the marginal cost of acquiring additional information (the entire market) is still not zero. Therefore, ceteris paribus, the overall cost of investment decreases (lender side) due to the decrease of the risk incurred by investors (they are more informed), which will lower the cost of capital for the borrowers. This gives a positive signal to companies and investors.

The first research on the concept of asymmetric information and the underlying market mechanisms dates back to the 1970s with the famous article by [Akerlof \(1978\)](#). It shows how asymmetric information can lead to the reduction of transactions or even the destruction of the market (green-market in our case). ESG disclosure aims to avoid this inconvenience for a sustainable market. However, disclosure can cause a reduction in a transaction on a sustainable market or even lead to its destruction in several cases. First, when the project's information is sufficiently available, [Ioannou et al. \(2022\)](#) show how a gap between a stated ESG policy, and its implementation (greenwashing) negatively impacts customer satisfaction. Second, if the development of technologies will not follow the rapid and optimistic evolution of sustainable objectives, corporations will not be able to achieve their ESG targets and will be constrained to re-orientate their technology policy by using polluting or less-efficient technologies. Finally, intensifying competition (local, regional or global) can lead many companies to suffer losses or go bankrupt. In fact, studies find that a majority of firms lack an overall plan for approaching ESG/CSP⁶ and delivering results ([Hopkins et al. 2009](#)), and 'most are failing around launching a

hodgepodge of business initiatives without any overarching vision or plan' (Lubin and Esty 2010). The failure to meet the expectations of various stakeholders will generate market fears and, consequently, increase the corporate's risk premium and ultimately result in lost profit opportunities. Saygili et al. (2022) results are an example of a negative effect of environmental disclosures on CFP⁷/ESG.

If companies are not able to fulfil their obligations (because of the aforementioned limitations), they will only have two options: either to be transparent, in which case they run the risk of having a bad reputation, or to publish false information taking the regulatory and reputational risk. In both cases, they will not be able to engage in effective transition. The hypothesis of possible manipulation of extra financial reports is credible. According to Callery and Perkins (2021): 'findings demonstrate that firms routinely manipulate intermediary ratings with false claims, undermining institutional and societal goals' and 'may exploit the lack of sufficient audit oversight in disclosure to strategically mask false or otherwise misleading claims'. Thus, as long as there is no mechanism for verifying the veracity of reported data, extra-financial reporting can have a reverse effect. Without verification of the reported data, a case of information asymmetry arises since only the company knows the accuracy of the published data. Maybe there are already efforts in this direction, but it may not be enough because the attention of legislators is focused on methods and reporting harmonisation.

3.3.1. Adverse Selection and Moral Hazards in Green-Projects

'As regards monitoring the development of the green bond market and assessing the effectiveness of this type of financial instrument, the data readily available is incomplete at this stage and, in many cases, does not provide information on the final recipient sector of the funds, nor on the precise nature of the project financed. In this sense, the development of an official taxonomy of green projects and statistics on the sectors financed beyond statistics on issuers appears to be a necessity. These needs are not limited to the green bond market alone, but extend to all green financing methods' (BDF (2019a)). New regulations, including taxonomy, should give more information from all sectors and companies. However, the incompleteness and lack of data can persist even longer in most cases. Thus, there will always be a lack of extra-financial information.

According to Akerlof's principle, if a lack of extra-financial information remains significant, the lenders (investors) will apply high-interest rates for the lack of complete information on the borrowers' projects. Thus, good borrowers leave the green market, and only bad environmental projects remain. This principle is similar to Gresham's Law in monetary economics, 'bad money tends to drive out good'. This selection concept (of bad projects) is called 'Anti-selection' or 'Adverse selection' by Akerlof. Stiglitz and Weiss (1981) transpose Akerlof's analysis to the credit market and explain that the interest rate increase has less impact than the loss incurred by the borrower to go bankrupt. For these authors, asymmetric information impacts credit rationing, defined by Jaffee and Stiglitz (1990) as 'the refusal of a loan on terms to which borrowers were willing to take on debt'. This mechanism comes from a rise in prices, which, combined with adverse selection, causes the consequent entry of risky borrowers into the market. If the lender cannot identify the risk due to asymmetric information, the number of loans will decrease, and the supply of loans will fall.

The credit risk one considers here includes the risk that the credit goes to other non-sustainable projects. Rationally, two instruments are used by lenders when they are not sufficiently informed, increasing interest rates and limitation of loan supply. If the demand for credit increases, then interest rates will rise. However, sustainable debt is growing exponentially (Figure A5); consequently, an increase in sustainable debt's interest rates can be expected. On 25 May 2022, France issued the first inflation-indexed green bond (Benoit and Rolland 2022). This could be a starting point for a significant increase in green interest rates around the world. Although it could be caused by the conflict in Ukraine and the consequences of the COVID-19 crisis, this change is likely to be irreversible

and will remain over time. This means that a large part of this increase would be linked to the rapid increase of green-sustainable debt combined with the presence of greenwashing on the market. According to the literature, we can legitimately expect a continuous rise in the green-interest rate followed by a rapid exit of some pro-ESG investors from the green market.

3.3.2. Information, Trust and Financial Returns

ESG performance, and the trust it drives, ‘can facilitate financial contracting by mitigating adverse selection and moral hazard problems’ (Amiraslani et al. (2022)). ‘During the 2008–2009 financial crisis, firms with high social capital⁸, measured as corporate social responsibility (CSR) intensity, had stock returns that were four to seven percentage points higher than firms with low social capital. High-CSR firms also experienced higher profitability, growth, and sales per employee relative to low-CSR firms, and they raised more debt. This evidence suggests that the trust between the firm and both its stakeholders and investors, built through investments in social capital, pays off when the overall level of trust in corporations and markets suffers a negative shock’ (Lins et al. 2017). The results obtained by Amiraslani et al. (2022) also align with this finding concerning the 2008 crisis. ‘During the 2008–2009 financial crisis, which represents a shock to trust and default risk, high-social-capital⁹ firms benefited from lower bond spreads’ (Amiraslani et al. 2022). However, they find no relationship between social capital and bond spreads from 2006 to 2019.

The COVID-19 pandemic led to enormous uncertainty in financial markets alongside a dramatic decline in stock prices and higher financial volatility. Hwang et al. (2021) shows that (for Korean firms) ‘in the first quarter of 2020, when the impact of the COVID-19 pandemic occurred, firms’ earnings dropped significantly; however, we found that the higher the performance of ESG activities, the smaller the decline in earnings’. In 16 different European countries, Engelhardt et al. (2021) found that firms with better ESG performance had significantly higher cumulative abnormal returns and exhibited significantly lower idiosyncratic volatility at the beginning of 2020 (during the COVID-19 pandemic). Lins et al. (2017) and Cornett et al. (2016) find clear evidence about the positive effect of ESG practice on Firm Performance (FP) during GFC (Global Financial Crisis). Thus, though ESG adoption is still in its early innings, its effects seem to be more pronounced in times of severe crises.

3.4. Post-Transition Conditions

Until now, the focus has been on achieving sustainable development goals such as the greenhouse gas (GHG) emissions reduction target. However, we believe it is important to start thinking about post-transition conditions not only to anticipate the management of that period (post-transition) and its specificities but also to add a missing dimension to ESG analyses. In fact, as we will see below, understanding the economic and financial situation of this post-ESG-transition period can offer us interesting insights for managing the transition more efficiently and fairly. By a fair manner, we mean that investors, firms or any other party contributing financially to the transition should be rewarded once objectives have been achieved. For example, once GHG concentration targets are reached, actors in this transition should be financially rewarded, as we will see below. ESG disclosure should help reach this goal by giving transparent and necessary information for this compensation.

3.4.1. A Simple Model Including Post-Transition Period

Literature on post-sustainable transition is quasi-nonexistent. The only source using a comprehensive model is KI (2022). The authors use a simple but interesting model to explain the long-run evolution of stock return with two companies, green and brown. They also consider three different periods of investing (Figure 1): ‘pre-ESG-awakening’, ‘ESG awakening’ and ‘post-ESG-awakening’ eras. In the first era, investors do not care about ESG factors. In the second, investors increasingly take care of the ESG factor. Finally,

in the last period, ‘when investors preferences have settled into a new equilibrium around ESG, many care about ESG but some don’t, and the sizes of these camps are fairly stable’ (KI 2022). The authors show that companies with high ESG ratings are likely to achieve higher returns during the ESG-Awakening period when:

- Investors’ preferences for good ESG companies are increasing;
- The share of ESG investors is increasing; and
- Unexpected new financial benefits from ESG are realised because two former conditions generate an increasing greenium (Figure 1).

Once markets are in the post-awakening equilibrium, ‘highly rated ESG companies will tend to earn lower returns, which is quite a curious result’ (KI 2022). This comes from the assumption that stocks have identical financial performance. However, ‘Pro-ESG investors are happy because higher valuations with lower cost of capital provide incentives for adopting and investing more in ESG. These pro-ESG investors are (on average) fine with earning lower returns for companies that operate in ways they like. However, interestingly, even “anti-ESG” investors are happy because they get to invest in higher-returning stocks in the long-run—either because they earn higher equilibrium returns on brown companies or can benefit from conversion to green companies¹⁰. In this sense, ESG investing really can be a win-win’ (KI 2022).

Stock Valuation

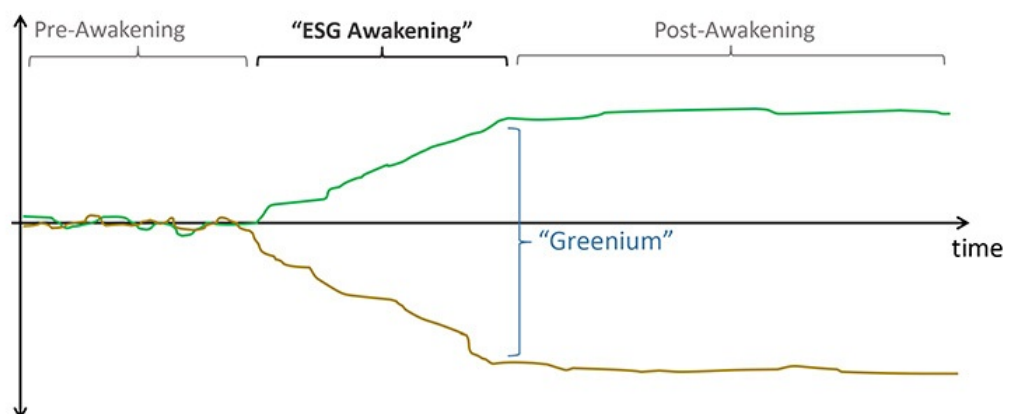


Figure 1. Green Inc. and Brown Inc. Stock Prices, Source: KI (2022).

3.4.2. Discussion of This Model and Its Contribution to the Literature on ESG and Economic Growth

KI’s model assumes perfect information about ESG (complete disclosure) and competitive markets during the ESG awakening. In KI (2022), it is also clear that pro ESG investors drive that transition during the awakening period. They accept lower monetary returns to improve ESG criteria that give green companies a lower capital cost. The green companies are rather driven by monetary return in this model, like the non-green ones. Therefore, green companies invest in ESG criteria each year so that marginal cost equals their marginal monetary return. Since investors’ preferences for good ESG companies are increasing, and the share of ESG investors is increasing too, the production share of green companies will increase during the awakening period (*ceteris paribus*), and the production of brown companies will decrease. From the end of this period, the green-market share will be stable during the post-ESG (awakening period). At this point, if the objectives of sustainable development have not been achieved, this means that the sustainable objectives were not feasible. This is because investors’ awareness during the ESG awakening era was not sufficient.

The non-accomplishment of the sustainable objectives and non-sufficient ESG awareness may be due to problems of technological development, lack of human skills and raw materials (for new equipment). In addition, non-complete ESG disclosure and/or the

presence of greenwashing that affects trust and access to information can also inhibit sustainable transition, as discussed above. These factors (technological, raw material, trust, and lack of information problems) can lead to a non-regular transition period, which means that the number of effective pro-GSE investors will rise and fall over time due to physical (e.g., technology) constraints or a change in preferences (e.g., lack of trust). Thus, one can face an irregularity in greenhouse gas emissions. It can decrease at some time's intervals of the awakening period and increase over others. In other words, there could be successive periods of U-shaped GHG emission. Thus, if these factors are sufficiently improving over time, the long-run trend of GHG emission will decrease; otherwise, it will increase over time, and environmental targets cannot be reached.

Including this dimension (i.e., post-transition condition) in companies' optimisation cited in Section 3.1 could support a higher optimal threshold of disclosure. Moreover, the fact that we have an equilibrium on the post transition implies that complete mandatory disclosure of extra-financial information is not necessary. Partial disclosure should be sufficient to reach the post transition equilibrium. Furthermore, total exclusion of some economic activities is not optimal following the same reasoning. Once this equilibrium is reached (post awakening era), disclosure will no longer be efficient, and only another economic instrument (e.g., R&D and urban organisation) will be able to mitigate the negative impact of economic activities.

One believes that any transition should not exceed a certain level of annual growth rate. Otherwise, there should be an unversed U-shaped relationship between ESG/CSR performance and Economic Growth; and a U-shaped form of sustainable performance (e.g., GHG emission). Failure of some experiments shows this critical point (irregular transition). 'There have already been instances of initially hyped low-carbon companies collapsing just as if their potential had been overestimated by Schumpeterian speculators, including photovoltaic cell makers Solarworld in Germany and Solyndra in the US. However, these instances hardly triggered systemic financial instability, just as the burst of the YieldCo bubble in the US in 2015 (which saw share prices drop by 60%) did not destabilise wider stock markets (CPI, 2016). In short, at this moment, there does not yet seem to be a general "mania" in the low-carbon sunrise industries' (Semieniuk et al. (2021)).

Literature must explore this post-sustainable transition with intertemporal macroeconomic maximisation models to find out the main rules of the optimal transition trajectory to lead economies to stay on the optimal path. These studies should explore the role of R&D in the innovation and efficiency of both brown and green technologies and other factors (e.g., preferences, costs evolution, raw material scarcity) to determine the optimal speed of this transition. A slow sustainable transition will be harmful to global warming. On the other hand, accelerating the sustainable transition beyond the optimal level will be detrimental to the economy and the sustainable transition itself.

3.5. What Insights Can Be Learned from the Evolution of Sustainable Investments?

Since investors may be sensitive to specific factors, such as the sustainable investing strategy employed by corporations (El Khoury et al. (2022)), we will investigate the evolution of SRI strategies to learn from them. 'Hence, academic and investment studies and corporate managers need to better distinguish between different types of responsible investment strategies and their performance implications on investors in order to better assess the ESG-FP relationship. They also have to consider other mediating factors such as innovation and operational efficiency metrics that might drive better corporate performance when combined with responsible' (El Khoury et al. (2022)). This section presents global and regional distinctions in the evolution of the IRS, with articulation in both the data presented and regional particularity. The interest of this survey is to try to raise some real issues that current sustainable policies are facing, based on the theories discussed in the previous parts of this paper. In this perspective, we will discuss in this section some aspects that can be summarised in the following point:

- The irregularity of sustainable investment that may legitimately lead to non-optimality and/or asymmetry of information;
- The various levels of sustainable development in different regions, implying that it is impossible to enforce an unique global disclosure policy (see Section 3.4);
- For efficient sustainable policies, we have to take into account the economic indicator of openness because it seems that regions influence each other even if they are not at the same stage of sustainable development (i.e., an ESG “spillover” effect is observed).

3.5.1. Global Sustainable Investment Growth

ESG is becoming the mainstream of the finance and investment worlds. By the end of this year (2022), the AUM is expected to reach USD 41 trillion, around a 16% increase in the past two years (2020–2022) (Kishan 2022). Although it is increasing significantly, global sustainable investment appears to be tapering off: 15% increase between 2018 and 2020, 34% between 2018 and 2016 and 25% between 2014 and 2016 (GSIR n.d.). Thus, the peak of the its growth rate seems to be reached in 2018. The substantial decrease between 2018 and 2020 is due to a changed measurement methodology for European data according to GSIR (n.d.) (Figure A2). If we follow the trend of sustainable investment in Europe, we will have around USD 16 billion in 2020 instead of USD 12.017 billion, which would have given a global increase of sustainable investment by around 26% instead of 15%. According to the results obtained using the Bloomberg scenario (Figure A1), we should obtain a bi-annual growth of global sustainable investments between 13.5% and 22.5% for the 2020–2026 period, roughly equivalent to the last two years (2020–2022). Thus, we are likely to be in a constant medium-term growth rate path, and we will very likely have a period of decrease in this rate. This confirms our claims that the peak of the global sustainable investment growth rate is already reached. However, global sustainable investment is expected to grow for several years despite its slowdown.

Thus, global sustainability would be in the middle of the “ESG Awakening” phase mentioned in Section 3.4. It is time to address the criticisms of current mandatory disclosure policies—cited above—in order to re-boost the transition and prevent it from slowing down.

3.5.2. Regional Sustainable Investment Growth

Global absolute growth of AUM: The absolute sustainable investment assets continue to increase in all regions (Figure A2). Figure A4 shows that Europe and the United States share the most important global sustainable investments. They represent around 92% of the global AUM in 2012 and 82% in 2020. After having been in the lead for years, Europe’s share in global sustainable investments is steadily decreasing from 64% in 2012 to 34% in 2020, while the US’s share in global sustainable investment is steadily increasing from 27% in 2012 to 48% in 2020. It, therefore, exceeded that of Europe in 2018. Japan’s part is significantly and constantly increasing, going from 0% in 2012 to 8% as of 2020.

Regional evolution of AUM: The share of sustainable investments in total AUM in Europe has been declining since 2014, from 58.8% in 2014 to 41.6% in 2020. In all other regions, this share is increasing except for Australia-NZ, where the share has been decreasing since 2018. The most significant increase is Canada’s passing from 20.2% in 2014 to 61.8% in 2020. Thus, Canada is now the market with the highest proportion of sustainable investment assets, followed by Europe (42%), Australia/NZ (38%), the United States (33%) and Japan (24%). Over the period 2016–2020, the most important increase in sustainable investment assets was in Japan (506%), followed by Canada (123%), the United States (96%), Australia-NZ (76%) and Europe (0%). The sustainable investments share in the United States’ total AUM reached 33.2% by 2020, from only 11.2% in 2012. Considering Europe and Canada as examples, we can assume that the peak of the percentage of sustainable investment assets within total AUM is around 60% (Figure A3). Therefore, if these two regions do not increase this proportion, it will be legitimate to expect a decline in this proportion in the rest of the regions within a few years, in particular in the United States. Sustainable investments should still be increasing for a longer period than their share in

global AUM. Still, as seen above, it will start to decline within an undefined but shorter period than we would have expected.

Once the peak of the percentage of sustainable investment assets within total AUM (around 60%) is reached, it can stabilise at this level for a given period or decline directly. This is what happened in Europe, giving a U-shape form. Thus, we would have already arrived at the post-ESG-awakeness period in Europe and Canada (See Section 3.4).

In what follows, we analyse the evolution of sustainable investment strategies.

Investing strategies: The relevant investing strategies are the following:

- Negative/exclusionary screening. Negative/exclusionary screening implies the exclusion from a portfolio of some companies based on particular ESG criteria;
- Integration of ESG factors. In this strategy, investment managers systematically and explicitly include ESG factors in financial analysis when determining the investment choice;
- Corporate engagement and shareholder action represent the usage of shareholder power to influence corporate behaviour through various ways, including proxy voting based on ESG criteria;
- Positive/best-in-class screening. This strategy includes investing in companies that are selected on the grounds of positive ESG performance when compared to industry peers;
- Norms-based screening. According to this strategy, investing is done after the application of screening of possible investment choices against minimum standards of business practice;
- Sustainability-themed investing. In this strategy, investments are directed towards specific themes or assets related to sustainability;
- Impact/community investing is a strategy directed towards the resolution or alleviation of environmental or social problems or towards socially excluded communities.

By 2020, ESG integration has become the largest sustainable investment strategy, as shown in Figure A6, with a total of \$25.2 trillion in assets under management. It is also the most commonly reported strategy in most regions. The next most commonly deployed sustainable investment strategies are negative/exclusive screening (USD 15.9 trillion), followed by corporate engagement/shareholder action (USD 10.5 trillion), followed by corporate engagement/shareholder action (USD 10.5 trillion) (Figure A11). Over the last ten years, we can see no particularly favoured investment strategy (Figures A7–A11). In 2012, four investment strategies were the most important and had almost the same importance. However, they did not follow the same pace of development. The two most important strategies, ESG integration and Negative-exclusionary-screening, followed the same development at the global level until 2018. The Negative-exclusionary-screening strategy slightly outpaced the ESG strategy over this period. In 2020, the Negative exclusionary-screening strategy retreated to its 2016 level, while the ESG Integration has grown significantly over the last two years from USD 17 to USD 25. Their growth rates over 2016–20 were −0.2% for Negative-exclusionary-screening and 143% for ESG integration. Thus, the dominance of ESG integration over Negative-exclusionary-screening is very recent, and it remains to be seen if it will last over time. The corporate-engagement-and-shareholder-actions strategy has been in third place since 2012 and is growing in importance but remains less important in absolute terms than the first two strategies. Between 2016 and 2020, it increased by 25% to reach USD 10,504 billion. The fourth most important strategy is Standard-Based-Screening. It has experienced an increasing development between 2012 and 2016 to reach USD 6195 billion in 2016, continuously decreasing to USD 4140 billion in 2020.

By 2020, ESG-integration, the largest strategy, is largely pushed by the US, with over than 60% of the total (world) ESG-integration assets. It is also the most popular strategy in the United States, with a clear shift from Negative-exclusionary screening to ESG integration between 2018 and 2020. This shift to ESG integration can be explained by US-SIF-Foundation (2020): ‘The institutional ESG incorporation trends revealed through this research should be understood as representing the most transparent institutional in-

vestors in the United States'. In addition, this report specifies that, in terms of assets, fund managers (in the United States) integrate ESG factors fairly equally across environmental, social and governance categories. The Negative-exclusionary-screening strategy is the most widely adopted in Europe, with over than 65% of the total (world) Negative-exclusionary-screening assets. There has been a very slight shift in Europe from ESG integration to Negative-exclusionary-screening, in contrast to the United States.

We conclude that there is not enough ESG strategy diversification and stability by region. This fact is more pronounced in the USA and Europe, representing more than 80% of the market. The tendency to adopt only one strategy for several years and then shift to another is questionable. It can reflect a lack of information and perspective on cost evolution and technological development (Asymmetry of information). It may also be caused by the non-optimality of the current sustainable investment trajectory caused by different factors discussed in the previous sections of this paper (e.g., exclusion of some economic activities).

To our knowledge, there is no evidence in the literature that ESG strategies for a given region are affected by ESG strategy evolution in other regions, but this relationship most likely exists. For example, ESG integration and Negative/exclusionary screening are moving in opposite directions in the US and Europe. ESG integration is increasing in the USA and decreasing in Europe. Negative/exclusionary screening is decreasing in the USA and increasing in Europe. Thus, the evolution of ESG integration in the USA is reversing the evolution of ESG integration in Europe and causing a shift to Negative/exclusionary screening. This fact can be partially explained by the finding of [Shkura \(2019\)](#): 'There is a set of macroeconomic indicators whose influence on SRI has been analysed and it can be concluded that only indicators of openness can be linked with the regional SRI market development'. Therefore, it is obvious that new empirical studies are needed to clarify this relationship.

4. Conclusions

Literature on relations between ESG disclosure and economic growth is non-existent and that between ESG performance and economic growth is quasi non-existent ([Diaye et al. 2022](#)). This paper calls for the importance of taking these relationships into account in current sustainable disclosure policies. Otherwise, we will face disastrous economic consequences if we continue on an economically unjustified path. There are several reasons for this ultimate issue. First, extra-financial disclosures may not reduce information asymmetry because firms will continue to endogenize their disclosure in all circumstances in order to optimise their economic decisions. Therefore, there must be an optimal threshold for disclosure that is not currently considered. Second, the scope of disclosure should be set according to the firms' sizes and their potential development and the country or economical regions which is not the case at present. Third, current ESG-disclosure policies direct economies towards less polluting sectors, which could have negative consequences on economic activity and the well-being of the population. This implicitly means that ESG performance is what brings about economic growth, which is not necessarily the case, at least in some countries, for given periods. This can explain, in part, why ESG disclosure does not yet show its efficiency ([Haji et al. 2022](#)). In fact, if economic growth brings about ESG performance, then focusing on economic growth will systematically improve ESG performance indicators. For example, in this case, we would not necessarily have to reorient the activity towards 'sustainable sectors', but rather innovate the polluting sectors. Thus, in this specific situation, 'sustainable sectors' will no longer make sense. Despite this limitation, recent literature provides clear evidence of the positive effect of ESG practice on firm performance (FP) during the GFC (Global Financial Crisis). Thus, although ESG adoption is still in its early stages, its effects appear to be more pronounced during times of severe crisis. Finally, current disclosure policies do not take into account the post-transition period in economic evaluation, which is a missing dimension in the current sustainable analysis. However, it could provide serious

suggestions for encouraging sustainable investments by remunerating them during this post-transition period. Preliminary results of the analysis of this post-transition period confirm that disclosure should be partial and that the equilibrium of this period will depend on economical returns of both sustainable and non-sustainable sectors or activities.

This paper raises serious economic questions about current sustainable policies, in particular the mandatory disclosure of extra-financial information that is an important contribution to the existing literature of ESG Disclosure. Further research should explore the optimal threshold level of disclosure, possible alternatives policies to the current approach stigmatizing certain economic activities.

Furthermore, literature must explore the post-sustainable transition with inter-temporal macroeconomic maximisation models to find out the main rules of the optimal transition trajectory to lead economies to stay on the optimal path. These studies should explore the role of R&D in the innovation and efficiency of both brown and green technologies and other factors (e.g., preferences, costs evolution, row material scarcity) to find out the optimal rate of this transition. A slow, sustainable transition will be harmful to global warming. An acceleration of the sustainable-transition beyond the optimal level will be detrimental to the economy and to the sustainable-transition itself.

Funding: This research received no external funding.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

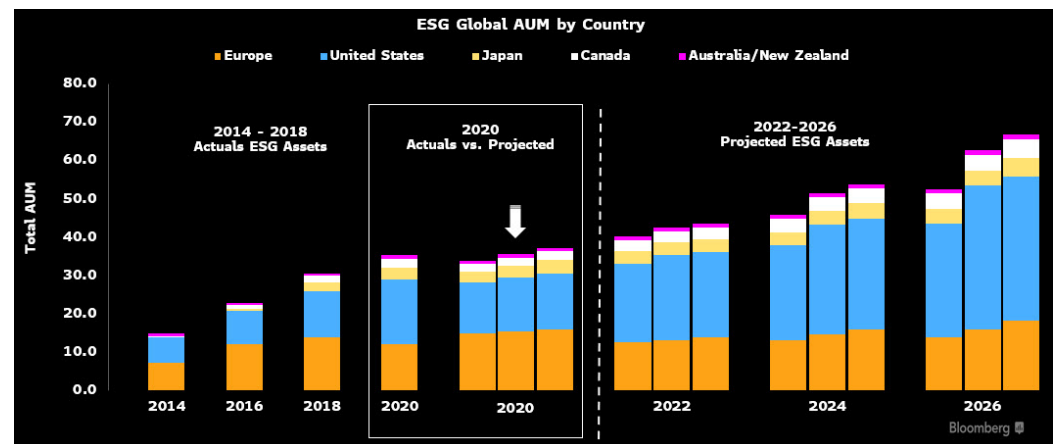


Figure A1. ESG AUM by countries Bloomberg, low, medium and high scenarios. Source: Global Sustainable Investment Alliance, Bloomberg Intelligence.

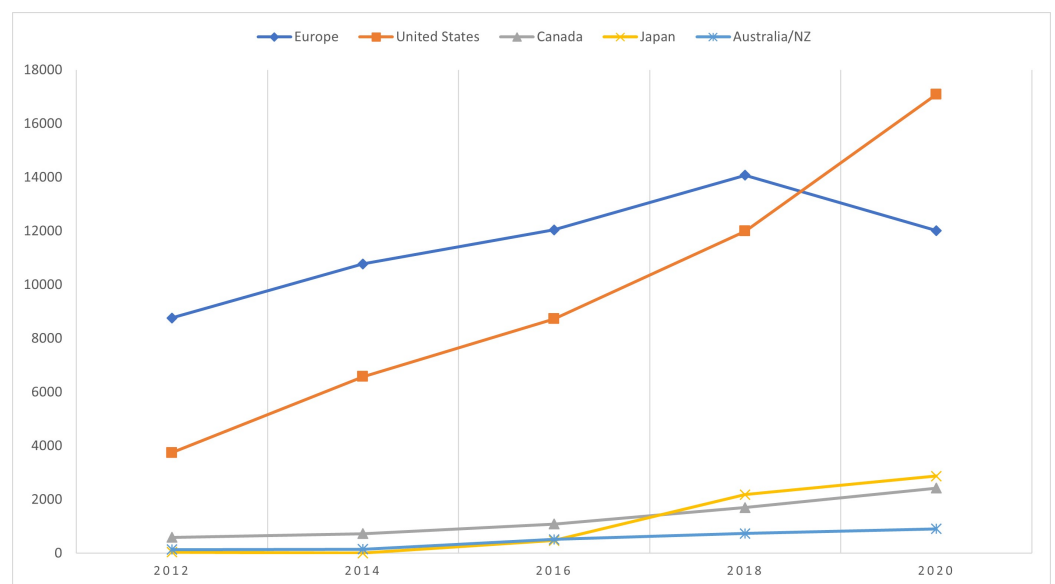


Figure A2. SRI assets by region 2012–2020. Source: GSRI.

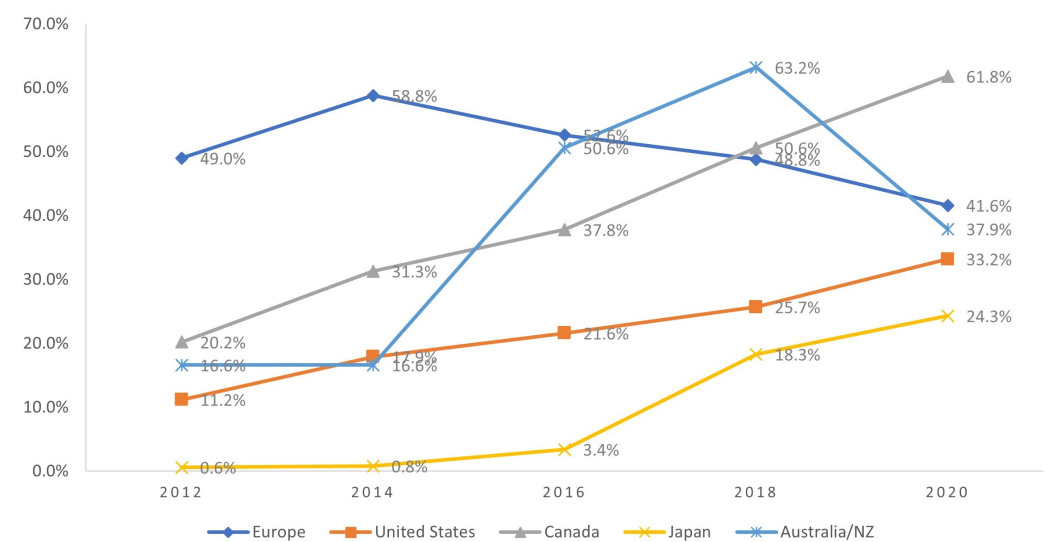


Figure A3. Proportion of sustainable investing assets relative to total manager assets 2014–2020.

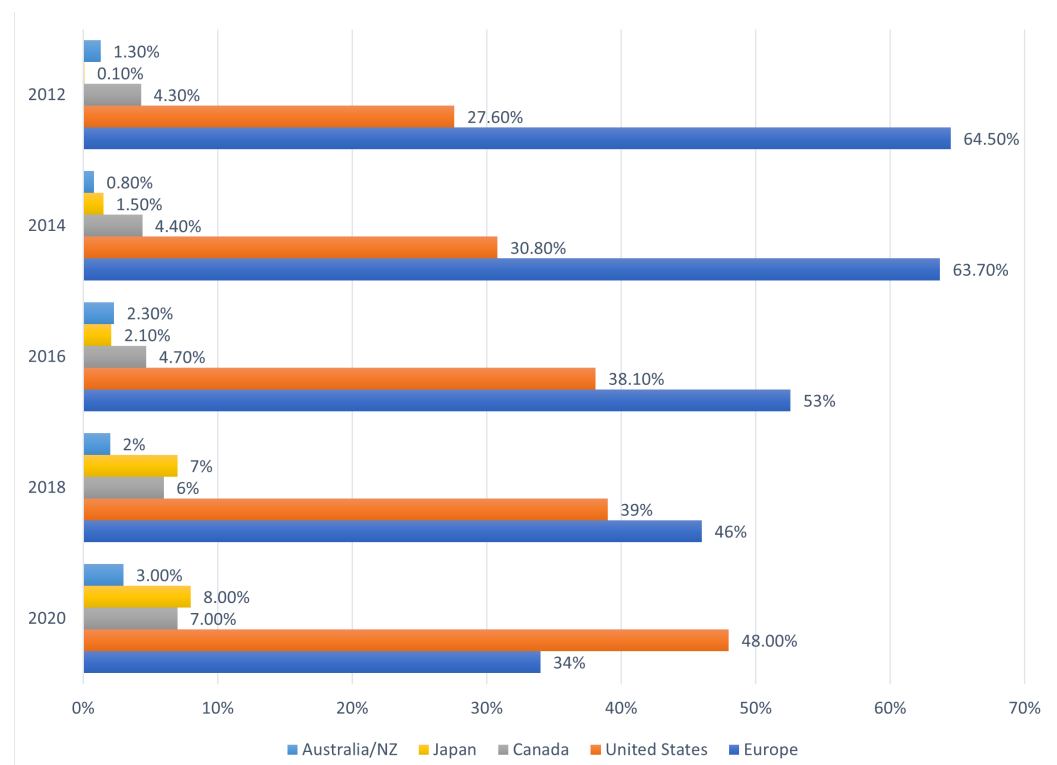


Figure A4. Proportion of global SRI assets by region 2012–2020.

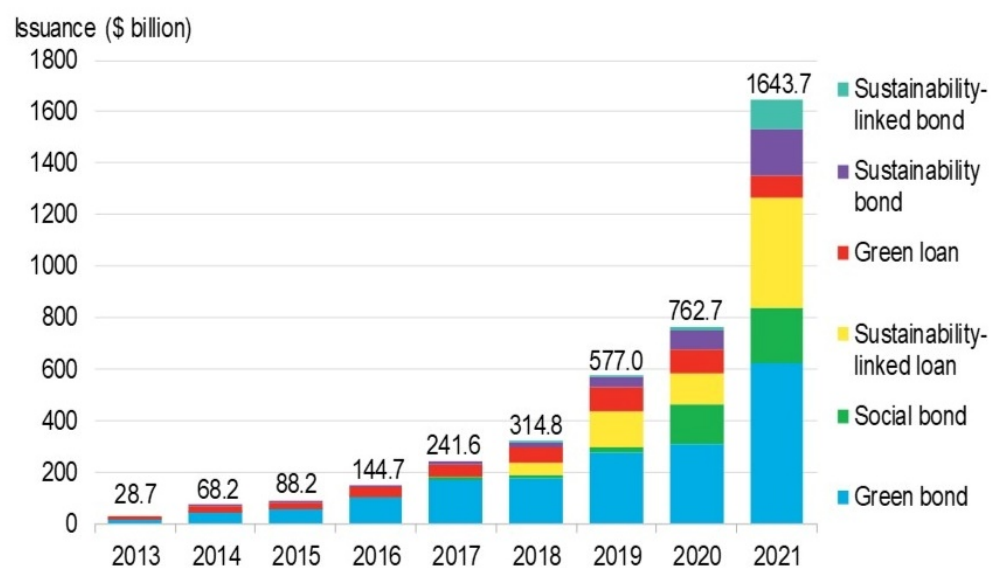


Figure A5. Sustainable Debt Bloomberg : Source: BloombergNEF.

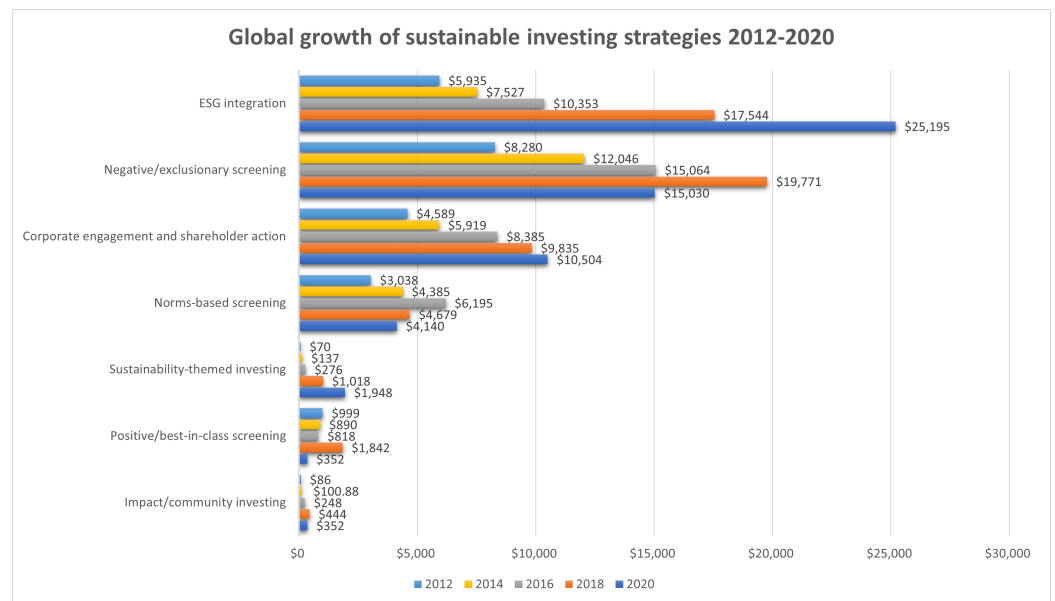


Figure A6. Global growth of sustainable investing strategies 2012–2020.

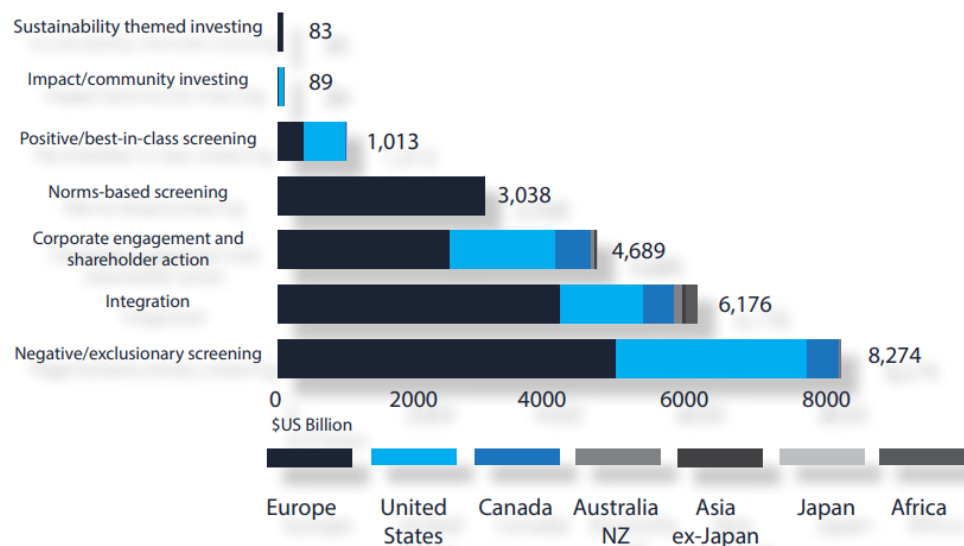


Figure A7. SRI assets by strategy and region 2012.

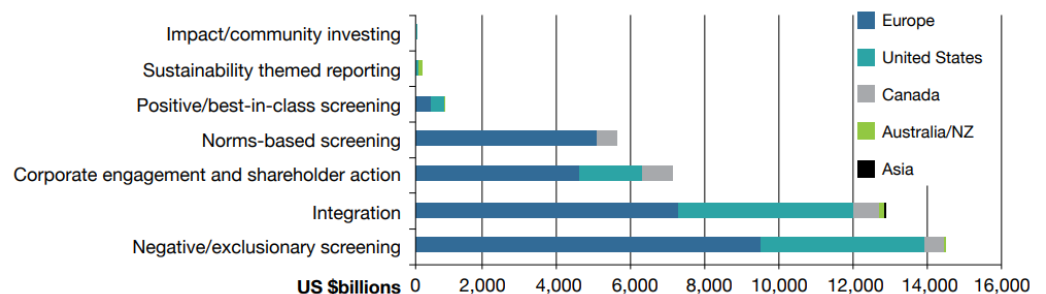


Figure A8. SRI assets by strategy and region 2014.

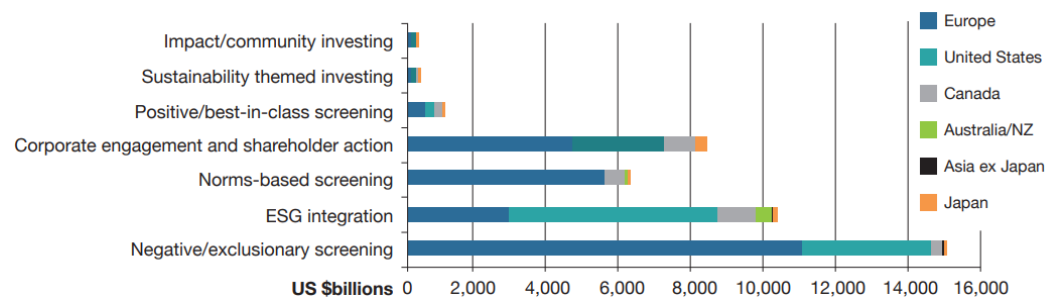


Figure A9. SRI assets by strategy and region 2016.

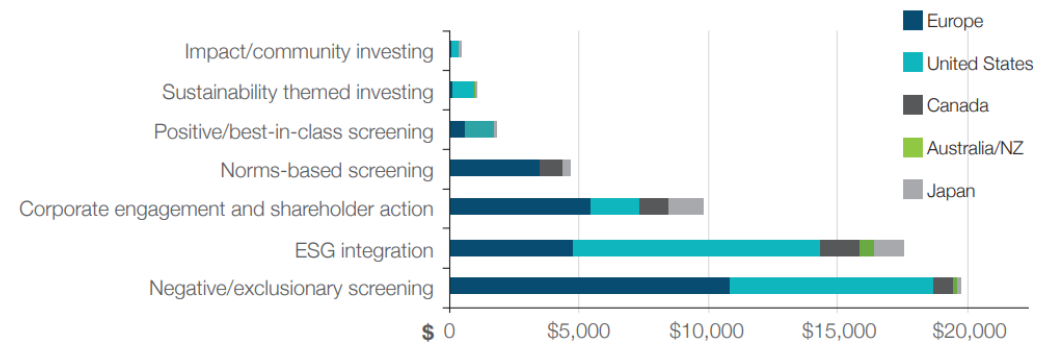


Figure A10. SRI assets by strategy and region 2018.

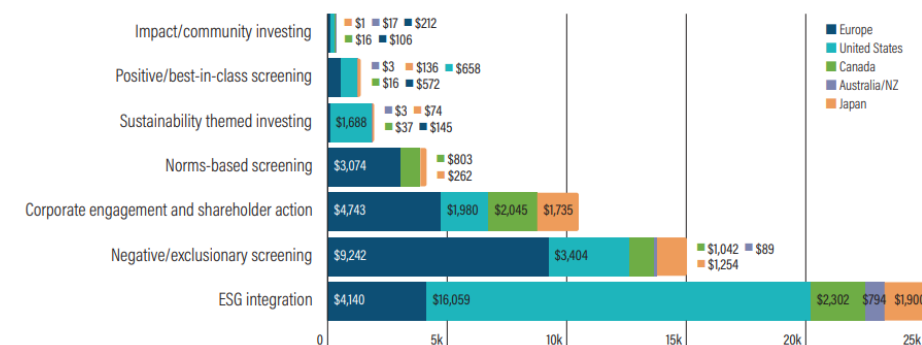


Figure A11. SRI assets by strategy and region 2020.

Notes

- 1 Economical and financial crisis.
- 2 This theory was developed in 1954 by psychologist Leon Festinger.
- 3 In this paper, we use CSR and ESG to refer to sustainability. Thus, they have the same meaning.
- 4 For more details, refer to the authors.
- 5 The author cited: Evans and Sridhar (1996), Skinner (1994), Verrecchia (1983).
- 6 Corporate Social Performance (CSP) reflects an assessment of how well companies perform on environmental, social, and governance (ESG) [<https://businessandsociety.org/csr-pay/>] (accessed on 15 April 2022).
- 7 CFP: Corporate Financial Performance.
- 8 It would be interesting to re-examine the ESG rating of certain sectors/firms in an upcoming research paper. Contrary to greenwashing, some sectors (or companies) are often considered as having a poor ESG performance, while they have an essential ESG contribution, often social, which is not taken into account (for example, the pharmaceutical sector).
- 9 The authors uses firms' environmental and social (E&S) performance to proxy for social capital.
- 10 see Figure 1 and refer to KI (2022) for more details.

References

- Acheampong, Alex O. 2018. Economic growth, CO₂ emissions and energy consumption: What causes what and where? *Energy Economics* 74: 677–92. [CrossRef]
- Akerlof, George A. 1978. The market for “lemons”: Quality uncertainty and the market mechanism. In *Uncertainty in Economics*. Amsterdam: Elsevier, pp. 235–51. [CrossRef]
- Alam, Md Rafayet, Erick Kitenge, and Bizuayehu Bedane. 2017. Government Effectiveness and Economic Growth. *Economics Bulletin* 37: 222–27.
- AlBassam, Bassam A. 2013. The relationship between governance and economic growth during times of crisis. *European Journal of Sustainable Development* 2: 1–18. [CrossRef]
- Alexander, Gordon J., and Rogene A. Buchholz. 1978. Corporate social responsibility and stock market performance. *The Academy of Management Journal* 21: 479–86.
- Alfieri, Élise. 2014. L’information: Un enjeu pour la stabilité financière. Master’s thesis, Centre d’études et de recherches appliquées à la gestion (CERAG), Saint Martin Hères, France.
- Amiraslani, Hami, Karl V. Lins, Henri Servaes, and Ane Tamayo. 2022. Trust, social capital, and the bond market benefits of ESG performance. *Review of Accounting Studies*. [CrossRef]
- Ashwin Kumar, N. C., Camille Smith, Leila Badis, Nan Wang, Paz Ambrosy, and Rodrigo Tavares. 2016. Esg factors and risk-adjusted performance: A new quantitative model. *Journal of Sustainable Finance & Investment* 6: 292–300.
- Asiedu, Benjamin Ampomah, Abisola Amudat Hassan, and Murad A. Bein. 2021. Renewable energy, non-renewable energy, and economic growth: Evidence from 26 European countries. *Environmental Science and Pollution Research* 28: 11119–28. [CrossRef]
- Aver, Bostjan, Bostjan Aaver, and Simon Cadez. 2009. Management accountants’ participation in strategic management processes: A cross-industry comparison. *Journal of East European Management Studies* 14: 310–22. [CrossRef]
- BDF. 2019a. *Bulletin de la Banque de France, Économie et Financements Internationaux*. Technical Report 226/6. Paris: Banque de France.
- BDF. 2019b. *Les Produits Dérivés de gré à gré: Nouvelles Règles, Nouveaux Acteurs, Nouveaux Risques*. Revue de la Stabilité Financière (rfs). Paris: Banque de France.
- Bencivenga, Valerie R., and Bruce D. Smith. 1991. Financial intermediation and endogenous growth. *The Review of Economic Studies* 58: 195–209. [CrossRef]
- Benoit, Guillaume, and Sophie Rolland. 2022. La France émet la première obligation verte qui protège contre l’inflation. *Daily newspaper: LesEchos (France)*. Available online: <https://www.lesechos.fr/finance-marches/marches-financiers/la-france-emet-la-premiere-obligation-verte-qui-protège-contre-linflation-1409670#:~:text=C\T1\textquoterightest%20une%20premi/%C3%A8re%20mondiale,\T1\textquoteright%C3%A9mission%20de%20%2D0%2C415%20%25> (accessed on 27 May 2022).
- Callery, Patrick J., and Jessica Perkins. 2021. Detecting False Accounts in Intermediated Voluntary Disclosure. *Academy of Management Discoveries* 7: 40–56. [CrossRef]
- Capasso, Salvatore. 2004. Financial markets, development and economic growth: Tales of informational asymmetries. *Journal of Economic Surveys* 18: 267–92. [CrossRef]
- Cepoi, Cosmin-Octavian. 2020. Asymmetric dependence between stock market returns and news during COVID-19 financial turmoil. *Finance Research Letters* 36: 101658. [CrossRef]
- Chang, Juin-Jen, Jhy-Hwa Chen, and Ming-Fang Tsai. 2022. Corporate social responsibility, social optimum, and the environment-growth trade-off. *Resource and Energy Economics* 69: 101311. [CrossRef]
- Christensen, Hans B., Luzi Hail, and Christian Leuz. 2021, September. Mandatory CSR and sustainability reporting: economic analysis and literature review. *Review of Accounting Studies* 26: 1176–248. [CrossRef]
- Cooray, Arusha. 2009. Government expenditure, governance and economic growth. *Comparative Economic Studies* 51: 401–18. [CrossRef]
- Core, John E. 2001. A review of the empirical disclosure literature: Discussion. *Journal of Accounting and Economics* 31: 441–56. [CrossRef]
- Cornett, Marcia Millon, Otgontsetseg Erhemjamts, and Hassan Tehranian. 2016. Greed or good deeds: An examination of the relation between corporate social responsibility and the financial performance of US commercial banks around the financial crisis. *Journal of Banking & Finance* 70: 137–59. [CrossRef]
- Cracolici, Maria, Miranda Cuffaro, and Peter Nijkamp. 2010. The Measurement of Economic, Social and Environmental Performance of Countries: A Novel Approach. *Social Indicators Research: An International and Interdisciplinary Journal for Quality-of-Life Measurement* 95: 339–56. [CrossRef]
- Darrough, Masako N., and Neal M. Stoughton. 1990. Financial disclosure policy in an entry game. *Journal of Accounting and Economics* 12: 219–43. [CrossRef]
- Dhaliwal, Dan S., Oliver Zhen Li, Albert Tsang, and Yong George Yang. 2011. Voluntary Nonfinancial Disclosure and the Cost of Equity Capital: The Initiation of Corporate Social Responsibility Reporting. *The Accounting Review* 86: 59–100. [CrossRef]
- Diamond, Douglas, and Robert E. Verrecchia. 1991. Disclosure, Liquidity, and the Cost of Capital. *Journal of Finance* 46: 1325–59. [CrossRef]
- Diamond, Douglas W. 1984. Financial intermediation and delegated monitoring. *The Review of Economic Studies* 51: 393–414. [CrossRef]
- Diaye, Marc-Arthur, Sy-Hoa Ho, and Rim Oueghlissi. 2022. ESG Performance and Economic Growth: A panel co-integration analysis. *Empirica* 49: 99–122. [CrossRef]

- El Khoury, Rim, Nohade Nasrallah, and Bahaaeddin Alareeni. 2021. Esg and financial performance of banks in the menat region: concavity–convexity patterns. *Journal of Sustainable Finance & Investment* 1–25. [\[CrossRef\]](#)
- El Khoury, Rim, Nohade Nasrallah, Etienne Harb, and Khaled Hussainey. 2022. Exploring the performance of responsible companies in G20 during the COVID-19 outbreak. *Journal of Cleaner Production* 354: 131693. [\[CrossRef\]](#)
- Engelhardt, Nils, Jens Ekkenga, and Peter Posch. 2021. ESG Ratings and Stock Performance during the Covid-19 Crisis. *Sustainability* 13: 7133. [\[CrossRef\]](#)
- Evans, Jh and S Sridhar. 1996. Multiple control systems, accrual accounting, and earnings management. *Journal of Accounting Research* 34: 45–65.
- Feng, Zifeng, and Zhonghua Wu. 2021. ESG Disclosure, REIT Debt Financing and Firm Value. *The Journal of Real Estate Finance and Economics*. [\[CrossRef\]](#)
- Fodha, Mouez, and Oussama Zaghdoud. 2010. Economic growth and pollutant emissions in Tunisia: An empirical analysis of the environmental Kuznets curve. *Energy Policy* 38: 1150–56. [\[CrossRef\]](#)
- Freeman, R. Edward. 1984. *Strategic Management: A Stakeholder Approach*. Boston: Pitman.
- Freeman, R. Edward, and Sergiy Dmytriiev. 2017. Corporate social responsibility and stakeholder theory: Learning from each other. *Symphonya. Emerging Issues in Management* 7–15. [\[CrossRef\]](#)
- Friedman, Milton. 2007. *The Social Responsibility of Business Is to Increase Its Profits*. Berlin/Heidelberg: Springer, pp. 173–78. [\[CrossRef\]](#)
- Fu, Jiarong. 1996. The effects of asymmetric information on economic growth. *Southern Economic Journal* 63: 312–26. [\[CrossRef\]](#)
- Galant, Adriana, and Simon Cadez. 2017. Corporate social responsibility and financial performance relationship: A review of measurement approaches. *Economic Research-Ekonomska istraživanja* 30: 676–93. [\[CrossRef\]](#)
- George, Sarah. 2022. *Greenwashing Is over’: EU to Tighten ESG Disclosure Requirements for Large Businesses*. East Grinstead: Edie.
- Goldman, Arie, and J. K. Johansson. 1978. Determinants of Search for Lower Prices: An Empirical Assessment of the Economics of Information Theory. *Journal of Consumer Research* 5: 176–86. [\[CrossRef\]](#)
- Greenwood, Jeremy, and Boyan Jovanovic. 1990. Financial development, growth, and the distribution of income. *Journal of Political Economy* 98: 1076–107. [\[CrossRef\]](#)
- Grossman, Gene M., and Alan B. Krueger. 1995. Economic Growth and the Environment. *The Quarterly Journal of Economics* 110: 353–77. [\[CrossRef\]](#)
- Grossman, Sanford J., and Joseph E. Stiglitz. 1980. On the Impossibility of Informationally Efficient Markets. *The American Economic Review* 70: 393–408.
- GSIA. n.d. *Global Sustainable Investment Review*. Technical Report. 2012–14–16–18–20. Brussels: Global Sustainable Investment Alliance.
- Hadj Fraj, Salma, Mekki Hamdaoui, and Samir Maktouf. 2018. Governance and economic growth: The role of the exchange rate regime. *International Economics* 156: 326–64. [\[CrossRef\]](#)
- Haji, Abdifatah Ahmed, Paul Coram, and Indrit Troshani. 2022. Consequences of CSR reporting regulations worldwide: a review and research agenda. *Accounting, Auditing & Accountability Journal*. [\[CrossRef\]](#)
- Hassan, Oaima, and Claire Marston. 2010. Disclosure measurement in the empirical accounting literature—A review article. *International Journal of Accounting* 54. [\[CrossRef\]](#)
- Healy, Paul M., and Krishna G. Palepu. 2001. Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. *Journal of Accounting and Economics* 31: 405–40. [\[CrossRef\]](#)
- Henisz, Witold, Tim Koller, and Robin Nuttall. 2019. Five ways that esg creates value. *The McKinsey Quarterly*, November 14.
- Ho, Sy-Hoa, Rim Oueghli, and Riadh El Ferktaji. 2019. *The Dynamic Causality between ESG and Economic Growth: Evidence from Panel Causality Analysis*. MPRA Paper 95390. Munich: University Library of Munich.
- Hopkins, Michael S., Andrew Townend, Zayna Khayat, Balu Balagopal, Martin Reeves, and Maurice Berns. 2009. The business of sustainability: what it means to managers now. *MIT Sloan Management Review* 51: 20.
- Houtbeckers, Eeva. 2021. Transcending social enterprise understandings—Wellbeing, livelihoods, and interspecies solidarity in transformation to postgrowth societies. In *Social Enterprise, Health, and Wellbeing*. London: Routledge, pp. 49–66.
- Howarth, Richard B. 2012. Sustainability, well-being, and economic growth. *Minding Nat* 5: 32–39.
- Huang, Chiung-Ju, and Yuan-Hong Ho. 2017. Governance and economic growth in asia. *The North American Journal of Economics and Finance* 39: 260–72. [\[CrossRef\]](#)
- Hwang, Juhee, Hyuna Kim, and Dongjin Jung. 2021. The Effect of ESG Activities on Financial Performance during the COVID-19 Pandemic—Evidence from Korea. *Sustainability* 13: 11362. [\[CrossRef\]](#)
- Ilhan, Emirhan, Philipp Krueger, Zacharias Sautner, and Laura T. Starks. 2019. *Institutional Investors’ Views and Preferences on Climate Risk Disclosure*. Swiss Finance Institute Research Paper Series 19-66. Zürich: Swiss Finance Institute.
- Inekwe, Murumba, Fathyah Hashim, and Sofri B. Yahya. 2020. CSR in developing countries – the importance of good governance and economic growth: Evidence from Africa. *Social Responsibility Journal* 17: 226–42. [\[CrossRef\]](#)
- Ioannou, Ioannis, George Kassinis, and Giorgos Papagiannakis. 2022. The Impact of Perceived Greenwashing on Customer Satisfaction and the Contingent Role of Capability Reputation. *Journal of Business Ethics* 1–15. [\[CrossRef\]](#)
- Jacobs, Michael. 2013. *Green Growth, The Handbook of Global Climate and Environment Policy*. Hoboken: John Wiley & Sons, Ltd., chp. 12, pp. 197–214. [\[CrossRef\]](#)
- Jaffee, Dwight and Joseph Stiglitz. 1990. Chapter 16, Credit rationing. In *Handbook of Monetary Economics*. Amsterdam: Elsevier, vol. 2, pp. 837–88.

- Khan, Muhammad Arif. 2022. ESG disclosure and Firm performance: A bibliometric and meta analysis. *Research in International Business and Finance* 61: 101668. [\[CrossRef\]](#)
- Khan, M. Mansoor. 2016. Csr standards and islamic banknig practice: A case of meezan bank of pakistan. *The Journal of Developing Areas* 50: 295–306. [\[CrossRef\]](#)
- KI. 2022. *Does ESG Investing Generate Higher Returns?* Technical Report. North Carolina: Kenan Institute of Private Entreprises.
- Kim, Dong-Hyeon, Yi-Chen Wu, and Shu-Chin Lin. 2018. Heterogeneity in the effects of government size and governance on economic growth. *Economic Modelling* 68: 205–16. [\[CrossRef\]](#)
- Kishan, Saijel. 2022. ESG by the Numbers: Sustainable Investing Set Records in 2021. *Bloomberg UK*, February 2022.
- Krueger, Philipp, Zacharias Sautner, Dragon Yongjun Tang, and Rui Zhong. 2021, April. *The Effects of Mandatory ESG Disclosure around the World*. Swiss Finance Institute Research Paper Series 21-44. Zürich: Swiss Finance Institute.
- Kumar, Sumit. 2022. Impact of esg integration on equity performance between developed and developing economy: Evidence from s and p 500 and nifty 50. *The Empirical Economics Letters* 20: 1–16.
- La Torre, Mario, Sabrina Leo, and Ida Claudia Panetta. 2021. Banks and environmental, social and governance drivers: Follow the market or the authorities? *Corporate Social Responsibility and Environmental Management* 28: 1620–34. [\[CrossRef\]](#)
- La Torre, Mario, Fabiomassimo Mango, Arturo Cafaro, and Sabrina Leo. 2020. Does the esg index affect stock return? Evidence from the eurostoxx50. *Sustainability* 12: 6387. [\[CrossRef\]](#)
- Lambert, Richard, Christian Leuz, and Robert E. Verrecchia. 2007. Accounting Information, Disclosure, and the Cost of Capital. *Journal of Accounting Research* 45: 385–420. [\[CrossRef\]](#)
- Lambert, Richard A., Christian Leuz, and Robert E. Verrecchia. 2011. Information Asymmetry, Information Precision, and the Cost of Capital. *Review of Finance* 16: 1–29. [\[CrossRef\]](#)
- Lins, Karl V., Henri Servaes, and Ane Tamayo. 2017. Social Capital, Trust, and Firm Performance: The Value of Corporate Social Responsibility during the Financial Crisis. *Journal of Finance* 72: 1785–824. [\[CrossRef\]](#)
- Löfström, Åsa. 2009. *Gender Equality, Economic Growth and Employment*. Stockholm: Swedish Ministry of Integration and Gender Equality.
- Lubin, David A., and Daniel C. Esty. 2010. The Sustainability Imperative. *Harvard Business Review* 88: 42–50.
- Martínez-Alier, Joan, Unai Pascual, Franck-Dominique Vivien, and Edwin Zaccai. 2010. Sustainable de-growth: Mapping the context, criticisms and future prospects of an emergent paradigm. *Ecological Economics* 69: 1741–47. [\[CrossRef\]](#)
- McCulloch, Neil, Edmund Malesky, and Nhat Nguyen Duc. 2013. Does Better Provincial Governance Boost Private Investment in Vietnam? *IDS Working Papers* 2013: 1–27. [\[CrossRef\]](#)
- McWilliams, Abigail. 2001. Corporate social responsibility: A theory of the firm perspective. *The Academy of Management Review* 26: 117–27. [\[CrossRef\]](#)
- Merton, Robert. 1987. A Simple Model of Capital Market Equilibrium with Incomplete Information. *Journal of Finance* 42: 483–510. [\[CrossRef\]](#)
- Milde, Hellmuth and John G. Riley. 1988. Signaling in Credit Markets. *The Quarterly Journal of Economics* 103: 101–29. [\[CrossRef\]](#)
- Mlachila, Montfort, René Tapsoba, and Sampawende J. A. Tapsoba. 2017. A Quality of Growth Index for Developing Countries: A Proposal. *Social Indicators Research: An International and Interdisciplinary Journal for Quality-of-Life Measurement* 134: 675–710. [\[CrossRef\]](#)
- Morgan-Knapp, Christopher. 2014. Economic envy. *Journal of Applied Philosophy* 31: 113–26. [\[CrossRef\]](#)
- Naimy, Viviane, Rim El Khoury, and Sahar Iskandar. 2021. ESG versus corporate financial performance: Evidence from east asian firms in the industrials sector. *Sustainable Economics* 39. [\[CrossRef\]](#)
- Naomi, Prima, and Iqbal Akbar. 2021. Beyond sustainability: Empirical evidence from oecd countries on the connection among natural resources, esg performances, and economic development. *Economics & Sociology* 14: 89–106. [\[CrossRef\]](#)
- Navarro Espigares, José Luis and José Manuel González López. 2006. Corporate Social Responsibility and Economic Growth/ Responsabilidad social corporativa y crecimiento económico. *Estudios de Economía Aplicada* 24: 637–63.
- Nordhaus, William. 2008. *A Question of Balance: Weighing the Options on Global Warming Policies*. New Haven: Yale University Press.
- Nordhaus, William. 2014. Estimates of the social cost of carbon: Concepts and results from the dice-2013r model and alternative approaches. *Journal of the Association of Environmental and Resource Economists* 1: 273–312. [\[CrossRef\]](#)
- North, Douglass C. 1990. *Institutions, Institutional Change and Economic Performance*. Political Economy of Institutions and Decisions. Cambridge: Cambridge University Press. [\[CrossRef\]](#)
- Ozcan, Burcu, Panayiotis G. Tzeremes, and Nickolaos G. Tzeremes. 2020. Energy consumption, economic growth and environmental degradation in oecd countries. *Economic Modelling* 84: 203–13. [\[CrossRef\]](#)
- Parra, Constanza, and Frank Moulaert. 2011. Why sustainability is so fragilely 'social'. In *Strategic Spatial Projects: Catalysts for Change*. London: Routledge, pp. 163–73.
- Rahman, Mohammad Mafizur. 2020. Environmental degradation: The role of electricity consumption, economic growth and globalisation. *Journal of Environmental Management* 253: 109742. [\[CrossRef\]](#)
- Ramasamy, Bala, and Hung Woan Ting. 2004. A comparative analysis of corporate social responsibility awareness: Malaysian and singaporean firms. *Journal of Corporate Citizenship* 13: 109–23. [\[CrossRef\]](#)
- Saygili, Ebru, Serafettin Arslan, and Ayse Ozden Birkan. 2022. ESG practices and corporate financial performance: Evidence from Borsa Istanbul. *Borsa Istanbul Review* 22: 525–33. [\[CrossRef\]](#)

- Schneider, François, Giorgos Kallis, and Joan Martinez-Alier. 2010. Crisis or opportunity? economic degrowth for social equity and ecological sustainability. introduction to this special issue. *Journal of Cleaner Production* 18: 511–18. [\[CrossRef\]](#)
- Securities and Exchange Commission. 2022. *Enhanced Disclosures by Certain Investment Advisers and Investment Companies about Environmental, Social, and Governance Investment Practices*. Technical Report. 17 CFR Parts 200, 230, 232, 239, 249, 274, and 279. [Release No. 33-11068; 34-94985; IA-6034; IC-34594; File No. S7-17-22]. RIN 3235-AM96. Washington, DC: Securities and Exchange Commission.
- Semieniuk, Gregor, Emanuele Campiglio, Jean-Francois Mercure, Ulrich Volz, and Neil R. Edwards. 2021. Low-carbon transition risks for finance. *WIREs Climate Change* 12: e678. [\[CrossRef\]](#)
- Sharma, Eliza, and M. Sathish. 2022. “CSR leads to economic growth or not”: An evidence-based study to link corporate social responsibility (CSR) activities of the indian banking sector with economic growth of india. *Asian Journal of Business Ethics* 11: 1–37. [\[CrossRef\]](#)
- Sharpe, Steven. 1990. Asymmetric Information, Bank Lending, and Implicit Contracts: A Stylized Model of Customer Relationships. *Journal of Finance* 45: 1069–87.
- Shkura, Iryna. 2019. The regional peculiarities of SRI development. *Journal of Economics and Management* 37: 107–38. [\[CrossRef\]](#)
- Škare, Marinko, and Tea Golja. 2014. The impact of government csr supporting policies on economic growth. *Journal of Policy Modeling* 36: 562–77. [\[CrossRef\]](#)
- Skinner, Douglas J. 1994. Why firms voluntarily disclose bad news. *Journal of Accounting Research* 32: 38–60. [\[CrossRef\]](#)
- Spence, A. Michael. 1973. Time and Communication in Economic and Social Interaction. *The Quarterly Journal of Economics* 87: 651–60. [\[CrossRef\]](#)
- Stern, David, Michael S. Common, and Edward Barbier. 1996. Economic growth and environmental degradation: The environmental kuznets curve and sustainable development. *World Development* 24: 1151–60. [\[CrossRef\]](#)
- Stern, Nicholas. 2007. *The Economics of Climate Change: The Stern Review*. Cambridge: Cambridge University Press. [\[CrossRef\]](#)
- Stern, Scott, Amy Wares, and Sarah Orzell. 2015. *The Relationship between Social Progress and Economic Development*. Technical Report, Social Progress Index 2015, Methodological Report. Washington, DC: The Social Progress Imperative.
- Stigler, George J. 1961. The Economics of Information. *Journal of Political Economy* 69: 213–25. [\[CrossRef\]](#)
- Stiglitz, Joseph E., and Andrew Weiss. 1981. Credit rationing in markets with imperfect information. *The American Economic Review* 71: 393–410.
- US-SIF-Foundation. 2020. *Report on US Sustainable and Impact Investing Trends*. Technical Report. Washington, DC: US SIF Foundation.
- Verrecchia, Robert E. 1983. Discretionary disclosure. *Journal of Accounting and Economics* 5: 179–94. [\[CrossRef\]](#)
- Williamson, Stephen D. 1987. Costly monitoring, loan contracts, and equilibrium credit rationing. *The Quarterly Journal of Economics* 102: 135–45. [\[CrossRef\]](#)
- Wong, Jin Boon, and Qin Zhang. 2022. Stock market reactions to adverse ESG disclosure via media channels. *The British Accounting Review* 54: 101045. [\[CrossRef\]](#)
- Xie, Jun, Wataru Nozawa, Michiyuki Yagi, Hidemichi Fujii, and Shunsuke Managi. 2019. Do environmental, social, and governance activities improve corporate financial performance? *Business Strategy and the Environment* 28: 286–300. [\[CrossRef\]](#)
- Yang, Zhendong, Qaiser Abbas, Imran Hanif, Majed Alharthi, Farhad Taghizadeh-Hesary, Babar Aziz, and Muhammad Mohsin. 2021. Short- and long-run influence of energy utilization and economic growth on carbon discharge in emerging sreb economies. *Renewable Energy* 165: 43–51. [\[CrossRef\]](#)
- Zhang, Yuanyuan, and Zhe Ouyang. 2021. Doing well by doing good: How corporate environmental responsibility influences corporate financial performance. *Corporate Social Responsibility and Environmental Management* 28: 54–63. [\[CrossRef\]](#)
- Zhang, Yuanyuan, Jiuchang Wei, Yunhao Zhu, and Glory George-Ufot. 2020. Untangling the relationship between corporate environmental performance and corporate financial performance: The double-edged moderating effects of environmental uncertainty. *Journal of Cleaner Production* 263: 121584. [\[CrossRef\]](#)