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THE EFFECT OF STRANDED ASSETS IMPAIRMENT ON FIRM VALUE: THE MODERATING ROLE OF CLIMATE CHANGE RISK DISCLOSURE TRANSPARENCY WITH APPLIED EVIDENCE FROM EGYPTIAN CEMENT INDUSTRY

Abstract: *The purpose of this study is to analyze the moderating effect of climate change risk disclosure as well as the effect of stranded assets impairment on business value in cement listed firms in the Egyptian environment which consist of 16 firms , the final sample for the study becomes 81 observations for the period between 2017 and 2023. Firm value measured by the Tobin's Q and economic value added. The climate disclosure index was used to determine the disclosure level of climate change risk according to the Egyptian Financial Supervision Authority's decisions. The results of this study indicate that Stranded assets impairments negatively affect the firm value, while, climate change risk disclosure positively affects the firm Value, and moderated relationship for the interaction between the stranded assets impairments and total climate change risk disclosure positively affects the firm value measured by the Tobin's Q and economic value added (EVA).*

Key Words*: Stranded Assets, Firm Value, Assets Impairment, Climate Change Risk Disclosure.*

1. Introduction

A significant issue that has broad effects on the economic and financial systems is climate change. Climate concerns rank first among the top 10 worldwide dangers in the immediate, extended, and medium terms, based on the World Economic Forum's Global Concerns Report in 2022 (Sun et al., 2023). The industries face many hazards, such as interference with manufacturing procedures, harm to tangible assets, disruptions in infrastructural services, and depletion of ecological capital (Khan et al., 2023).

Companies, shareholders, and governments in numerous nations have suggested frameworks for regulation, governance models, and standards for disclosing climate-related risk since it has been apparent that climate-related threats are among the long-lasting global problems. The disclosure of climate risk by businesses is severely hampered by the fact that no one set of standards has been widely accepted globally across national boundaries (Griffin & Jaffe, 2022).

Businesses are coming under increasing pressure from authorities and investors to demonstrate that they are adding value for

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users by taking actions that demonstrate their commitment to reducing the risks related to climate change (Khan et al., 2023). Given the complicated businesses, making informed business choices and handling risks efficiently have become essential for the expansion and success of businesses (He et al., 2023).

Information about corporation's climate risk is seen as an essential corporate strategy that can guarantee the achievement of sustainable growth (Li 2023). Entities must comply with the requirements of climate change reporting in order to guarantee that they reveal and report sufficient, pertinent information on risks associated with climate change that could affect the business and how they are responding to these risks. This is due to the fact that the effects of climate change have been acknowledged as a serious concern. There is no denying the reality of climate change, its effects, and its severity. Governments, business organizations, NGOs, environmental activists, and regulators are all working harder to address these issues. This demonstrates the critical need for and significance of climate change reporting requirements and initiatives (Ngo et al., 2023).

The complex dynamics of climate hazard disclosures propose that preferences for them are different from those for common company disclosures. Climate risk disclosure Targeting a broader audience, being challenging to compare and standardize, and being suggested to have significant externality advantages outside of a corporation. When it comes to making well-informed investment decisions and appropriately assessing climate risks and opportunities, high-quality information on the company's vulnerability to climate change is essential (Ilhan et al., 2023).

Climate concerns certainly have the potential to cause losses for businesses and their managers. Severe weather can harm a company's equipment or physical assets and interfere with regular operations and production (Xu et al., 2022). the claim that unfavorable climate-related events are cost-intensive for businesses and have a detrimental effect on their value and performance. Since corporations are widely recognized to be exposed to considerable costs linked to climate threats, it is predicted that they will endeavor to manage the costs and risks of climate-related occurrences (Ozkan et al., 2023).

Although disclosure is a first step in the elimination of carbon emissions, questions about the accuracy and reliability of such disclosures still need to be answered. When businesses tend to disclose positive information deliberately while withholding full disclosure of unfavorable information, this is known as "greenwashing." Businesses that embrace high-quality carbon assurance and wide carbon disclosure also produce high-quality financial information (Bui et al., 2021).

Company financial performances, such as operating revenues, existing liquidity, and financial restrictions, are impacted by climate risk. Climate risk also affects the structure of corporate capital. When dealing with climate risk and stock prices, shareholders could modify their projections for the business's upcoming earnings, which could result in a shift in investor ownership. Furthermore, climate risk exposure reduces agency conflicts and enhances transparency. It also has an impact on the firm's internal information stream and the quality of the information disclosed. Additionally, the positive connection is concentrated for businesses in economies that have less bank funding support, greater policy quality, and stronger climate governance (Zhou & Wu, 2023).

The main obstacles to taking action on climate change are as follows: (1) informational: there aren't enough dependable, trustworthy sources of information about climate change; (2) financial: there are conflicting economic demands and the perception that taking

action on climate change will negatively impact the ability to compete; and (3) regulatory: governments' inaction prevents them from creating the necessary regulatory framework to address climate change (Myers et al., 2020).

The majority of carbon-intensive businesses do not include risks associated with climate change in their financial reports (Davidson & Schuwerk, 2021).

The majority of the current literature on risk management related to climate change originates from developed economies, generally neglecting the social, political, and the impact and indications of climate change are more pronounced in the financial circumstances of developing nations (Rana et al., 2023). Even though climate change is a major global issue, developing economies are particularly vulnerable to its effects due to a number of aspects, such as their limited physical and financial assets and the government's lack of assistance for social protection mechanisms (Alam et al., 2022).

Very little research has been done on how climate change affects accounting disclosure. Examples of such topics are how climate change affects corporate reporting risks or how it affects a company's financial and sustainable performance. Simultaneously, more companies are putting more of an emphasis on reducing their emissions and openly disclosing the risks and consequences of climate change in their sustainability and accounting records. In order to boost their market value, gain approval from a larger range of all parties involved, and expedite the transition to a low-carbon, sustainable economy, raise public knowledge of climate risk prevention measures, including energy conservation and lowering emission levels (Guo et al., 2022).

Few studies have been conducted on how techniques for measuring and disclosing climate change risk influence later measures for adaptation or mitigation initiatives (Unter et al., 2023).

The rest of the research is structured as follows: Section 2 presents the background and literature review on climate change risks, assets impairment, firm value, and the role of climate change risk disclosure transparency. Section 3 outlines the research design, sample selection, and empirical model. Section 4 contains correlation matrix, and regression analysis results. Section 5 indicates conclusions, and 6 recommendations.

2. Background and literature review

2.1. Climate change risks, assets impairment, and firm value

2.1.1 Types of climate change risks

The term "firm climate risk exposure" describes an organization's possible susceptibility to the negative effects of climate shift and associated ecological conditions. It entails determining the extent to which certain climate-related elements pose a risk to the business's activities, assets, and supply chains. Depending on the industry, the region, and the company's readiness and adaptation plans, the exposure may differ. Due to the consequences of climate change, including extreme weather occurrences, there is increasing interest in determining how much risk companies are exposed to from climate change and how best to mitigate it (Shahrour et al., 2023; Ni et al., 2022).

Early warning signs of climate change-related risks are hard to identify, and as they worsen, they become more serious. As a result, most firms hardly ever implement rapid, efficient responses to the grave risks they pose. Consequently, companies must take into account both new opportunities and challenges (Alam et al., 2024). Every climatic risk has a major financial effect on the company's overall valuation, processes, and assets (Basyith et al., 2024).

Huang et al., (2022) identified the climate risk related to each organization for 2,763 US companies between 2007 and 2014. They discovered that bank loan terms that are adverse to corporations due to climate risk include higher interest rates, a larger chance of having to provide collateral, and more restrictive covenants. Businesses' performance is negatively impacted by the physical consequences of climate change, which also heightens concern about their potential.

Sun et al., (2020) Used an integrated climate risk to quantify climate change risk and a return on assets to measure financial performance, this study explored in what way climate change risk influences the financial performance of China's listed mining businesses. They discovered an insignificant but positive correlation between China's mining businesses' financial performance and climate risk.

Climate change presents businesses with a range of opportunities as well as challenges. Keep in mind that businesses should be able to adapt to limitations or take advantage of opportunities (risk associated with advancements in technology, creativity, and financial restraints). The possible influence of climate risk on asset returns is a topic of significant discussion. The return on an asset can be impacted by residual risk, previously identified threat elements, and the addition of a new threat element (Khalfaoui et al., 2022).

Physical risk can take the form of diminished value or higher expenses as a result of the disruptive effects of severe threats like heat waves or floods or long-term hazards like droughts and rising sea levels. On the other hand, transitional risk is the kind of risk that refers to expenses and threats combined with the process of shifting to a climate-neutral economy. These factors are usually brought about by legislation aimed at mitigating climate change, progress in technology, and changes in public opinion. It's interesting to note that evaluating climate threats is a component that all of these criteria have in common. A thorough evaluation of climate risk can, in fact, enhance the effectiveness of initiatives to mitigate, expand our understanding of the range of potential asset reactions to climate hazards, and maintain the current state of climate risk control and its integration into investment decisions. Policymakers and regulators need to be more conscious of the risks and returns of various asset classes while also taking market return and instability conditions into consideration in order to enact efficient policies to reduce climate change and assist investors in making climate-notified investment decisions (Bouri et al., 2023).

Xu et al., (2022) Used a substantial global sample of 167,923 firm-year observations from 43 countries between 2001 and 2016 and revealed that business risk-taking, which is thought to enhance value, is significantly positively impacted by both annual and long-term climate threats. Annual climate risk is more significant than long-term climate risk. Furthermore, when it comes to climate concerns, smaller businesses are more willing to take on greater risks than larger ones. Corporations are protected by insurance to take on greater risk. Furthermore, the benefits of climatic hazards on business risk exposure have been shown to be amplified on a national basis by corporate governance, since managers are incentivized to take on more risk due to loss aversion.

It is anticipated that climate risk will affect company performance both directly and indirectly. First, the risk of climate change might physically destroy corporate assets, lowering their value as well as the potential economic advantages those assets would have brought forward. Second, a disruption in corporate operations due to climate risk could lead to a decrease in productivity (Huang et al., 2018).

Based on 36 of the world's greatest polluting businesses, spread across 15 nations. Research indicated that, regardless of

location, businesses perceive regulatory climate concerns as a greater danger than physical and market hazards (Kouloukoui et al., 2021).

Businesses may incur additional expenses in responding to climate change, such as those associated with implementing new policies and technology to alleviate the uncertainties and expectations of the public. One more risk linked to climate change is the possibility of legal consequences for businesses breaking environmental laws. Businesses that are held responsible for the detrimental effects of climate risk may have to pay large legal fees in addition to other substantial business expenses (Ozkan et al., 2023).

While it is arguable that risks connected to climate change have an influence on corporate performance, measuring how companies react to these risks is a challenging task. This is primarily because of two factors. First, measuring climate risk particular to a firm is challenging. Secondly, there is a lack of readily available information regarding the initiatives that companies can take to reduce the risk associated with climate change (Ozkan et al., 2023).

In addition to the variety of climate-related risks (tangible, liability, and transition), the ambiguity pertaining to climate change and its attendant implications and the potential for short- and long-term and significant effects on the value of assets all contribute to the grave challenge of how climate change may affect values both now and in the future. Risks must be verified, assessed, and reported using a thorough, standard-compliant procedure (Warren-Myers & Cradduck L., 2023).

Risks associated with transition can arise from asset values shifting in the direction of a low-carbon economy, particularly when new regulations impose duties to shift to a lower-carbon environment and require more transparency of carbon footprints. Specifically, by putting a price on greenhouse gas emissions, more and more economies are cutting emissions and incentivizing private investment in environmentally friendly options (Capasso et al., 2020). Transitioning slowly to an economy with fewer emissions may result in limited transition risks now but significant physical concerns later (Vollmer 2022).

Naseer et al., (2024) examined the relationship between a company's value and its exposure to climate change risk and financial flexibility using a sample of 1529 publicly traded US businesses from 2012 to 2021. The primary conclusions showed that the risk of climate change has an adverse influence on business worth and a favorable impact on ESG efficiency. Financial adaptability, on the other hand, mitigates both effects by lowering risk and raising value.

A survey by (Stroebel & Wurgler 2021) found that asset values do not overestimate climate hazards but noticeably underestimate them. The physical dangers associated with climate change are evident, real, and low-priced.

Bertolotti et al. (2019) which revealed that, based on the actual locations of their facilities, properties, and equipment, 269 publicly traded U.S. utilities' physical climate risks are underpriced in equity markets. Physical dangers brought on by climate change pose new and increasing threats to businesses, disrupting operations, lowering profitability, and devaluing assets (Chen et al., 2023).

Climate risk can have an adverse effect on tangible assets in two distinct manners. First, it can expedite the depreciation of fixed assets right away because of its correlation with extreme weather phenomena such as floods and wildfires. Secondly, it can change the outcome that can be generated at a certain input level, usually in a negative direction. This may lead to variations in return on capital assets, intellectual efficiency, and worker output. Moreover, it is difficult to fully hedge climate risk given

the global prevalence of climate impacts and the likely duration of holding periods. Therefore, climate risk could result in unfavorable shocks to the financial results of organizations (Ding et al., 2021).

2.1.2 Stranded assets impairment and firm value

The global policy community has placed a high priority on slowing down climate change as a result of growing awareness of its significant effects. The United States, for example, announced plans to invest $1.7 trillion over ten years to fight climate change and, by 2030, cut US greenhouse gas emissions in half from 2005 levels. The European Green Deal was introduced by the European Commission in 2019 with the aim of achieving net-zero greenhouse gas emissions in every member country of the EU by 2050 (Ozkan et al., 2023).

A sudden transition would result in a substantial escalation in energy costs, a break in the supply of energy, an abrupt devaluation of fossil fuels, the economic retirement of investments and other capital stocks, and a decrease in the market value of companies based on their reliance on carbon-intensive resources and technologies (Nieto 2019). According to Tuesta et al., (2021), since market value and greenhouse gas emissions are negatively correlated, businesses with greater emission levels are inclined to have lower market valuations.

Reduced carbon emissions are positively correlated with higher profits and a firm's market value when they are appropriately disclosed in the accounting records. The production of tangible assets may increase or decrease in value because of the shifting climate; traditionally, tangible assets have made up the majority of a firm's value. Companies' quick adoption of climate-related policies has encouraged innovation and directed funds toward carbon-intensive assets. On the other hand, certain business models' outdated assets have resulted in large financial losses and bankruptcies. The impairment of fixed assets is associated with major business risks that need large capital investments and changes in asset use as a consequence of new rules. Businesses in sensitive productions typically have to redesign and install fixed assets with lengthy repayment periods in order to offset these financial losses (Secinaro et al., 2020).

The only industry with corporations reporting greater expenses for managing risks and realizing opportunities is the power sector. Due to the long lifespan and high capital expenditure requirements of the assets in this industry, these organizations have to modify their business models to conform to the general energy system's structural switch from fossil fuels to non-carbon power sources. Companies that put off incorporating the dangers posed by the shift to low-carbon production into their future strategies may be exposed to more hazards than they had anticipated (Grove et al., 2021).

Scholten et al., (2020) examined four energy businesses and carried out an examination of the valuation of production assets, more precisely the platforms for drilling and windmills, the heavy machinery and transportation needed for supporting the manufacture, and the tubes and wires used to move the energy components generated. Potential future adjustments to the production asset valuation resulting from climate change were not incorporated into the balance sheet annex in any of the four settings. The ownership of "stranded assets" by energy, oil, and gas corporations that are not sustainable may result in reduced upcoming financial inflows; however, not one of the four Case Studies corporations assessed any impairment to these assets due to climate change-related factors. The analysis included the financial reports.

Events related to climate change may have an impact on whether or not an asset is showing signs of impairment, and particular climatic risks may point to this kind of behavior. Thus, climate-related occurrences

could have an impact on projecting cash flows in the future from the asset, which would have an impact on how much the asset is worth when used in the estimation of the amount that can be recovered. Businesses should reevaluate the potential cash flows of high-carbon assets in light of the carbon-based fuel market's supply and demand disparities and price declines, which are regarded as important signals of asset impairment. At the end of every accounting period, businesses should determine whether an asset exhibits signs of impairment, determine its recoverable value, and make provisions for the impairment of assets when the recoverable amount falls short of the carrying amount. The carrying value of numerous assets may be inflated if high-carbon businesses perform asset impairment tests without taking the impact of major climate concerns into account (Zhao et al., 2023).

The impairment test is governed by International Accounting Standards 36 (IAS 36), which makes sure that assets aren't recorded at a book value that exceeds what may be recovered. It is crucial that this test be carried out by contrasting the current market value of the asset. with the value that can be recovered, which is determined by its potential to produce future financial gains. This brings us to the initial explanation of an accounting stranded asset, which is an asset that depreciates more than anticipated or even deteriorates to the point that it becomes a liability. As a result, an asset's accounting pattern is the decline in value up until the asset reaches the point of stranding, which occurs when the asset ceases to generate cash flow for the business or to provide any economic advantage. It turns into a liability after this. the financial asset, which consists of contracts for revenue rights originating from economic operations related to manufacturing processes, such as shares, bonds, and participations. When circumstances boost the accounting asset's depreciation and worsen the asset's expected return, financial assets begin to strand (Crespo et al., 2023).

According to financial reporting standards, in cases where asset values—and consequently, firm value—have decreased, readers of financial statements must be informed about projected future earnings through the recording of asset impairments. This enables the value of the company to be reassessed (Vanza et al., 2018). Since the useful life of physical assets is limited, short-run indications such as changes in operational cash flow and selling will have a greater impact on impairment (Vichitsarawong & Eng, 2023).

The factors influencing business fossil fuel asset impairment are examined using a dual-way fixed-effects model using data from China's A-share traded companies in the high-carbon business from 1998 to 2021. Additionally, a two-phase estimating methodology is employed to assess the risk associated with stranding business fossil fuel assets. The findings indicate that stranded business fossil power assets are largely caused by climate transition threats, that the stranded risk associated with fossil energy assets owned by Chinese companies has been rising over the previous 20 years, and that the stranded threat has risen significantly following the implementation of the double carbon goal (Zhao et al., 2023).

The study of Vanza et al., (2018) aimed to shed light on the impairments of asset implementation practices of Australian-traded firms, namely on the 5,884 firm-year observations sampled by the Australian Stock Market. The identification of asset impairments has variable and time-dependent effects on measurement ambiguity and information asymmetry. There is no proof that the identification of asset impairments is linked to a decrease in measurement ambiguity before the financial crisis, although it is linked to a decrease in information asymmetry. Nevertheless, there is proof that throughout the financial crisis, measurement ambiguity and information

asymmetry were actually raised as a result of the identification of asset impairments.

Due to their inability to anticipate the consequences of climate change, the present accounting standards for valuation and the regular writing off of assets throughout their economic lifetime are fundamentally not enough, and they have the ability to disproportionately influence the value of income or assets (Olatubosun & Köseoğlu, 2020).

Naseer et al., (2023) utilized financial data from 422 listed energy businesses in the US, Europe, and Asia within 2010 and 2020 to investigate the effects of various variables on the industry's company value. This is because the energy sector is more susceptible to the risk of climate change, which causes investors to undervalue these companies. The primary conclusions demonstrated that the risk of business climate change and fixed assets had a statistically significant adverse effect on the value of the business.

According to the Paris Climate Agreement, the bulk of fossil fuel supplies would eventually run out if global warming was kept to 1.5–2 degrees above pre-industrial levels. To fulfill the 2C target, 33% of oil, 49% of gas, and 82% of coal reserves need to continue unused globally by 2050, while 89% of coal stocks and roughly 60% of oil and gas reserves must continue to be unextracted (Heras & Gupta, 2024).

There are multiple levels of complexity when it involves the interruption associated with the low-carbon transition. First, a sizable amount of the current global coal, gas, and oil supplies will have to stay underground and become stranded; second, the reality that a considerable portion of the global market is closely interrelated to the usage of natural fuels adds another level of complexity. The stranding of physical assets, including natural resources and productive capital, is a third component of the ramifications of a reduction in carbon emissions. This might result in significant declines in the valuation of the enterprises that have ownership of these assets as well as the financial assets they have released (Papandreou A., 2019).

The lost value of fossil fuel assets is one type of cost that many economies face; it is projected to be $4 trillion between 2016 and 2035 and $12 trillion between 2011 and 2100. The costs associated with stranded assets have drawn greater concern (Yang et al., 2023). International financial organizations have recognized the incorrect assessment of stranded asset risk as a potential systematic hazard and danger to the stability of the financial markets. Most fossil energy resources are long-lasting, usually require a large upfront investment, and have relatively low annual costs (Sen & Schickfus, 2020).

Stranded assets refer to a variety of circumstances, such as assets lost due to climate impacts, capital that is underutilized or early retired due to climate change policies, and petroleum and coal storage that cannot be used in order to fulfill a specific climate target (Kalkuhl et al., 2020). Climate policy could succeed or fail based on asset stranding, given the significant risks involved (Dulong et al., 2023). These assets might deteriorate and become impaired; in this case, their value would be deducted or written off at fair value in a situation in which the energy market experienced a significant abandonment of the use of fossil fuels (Shimbar, 2021). The primary source of concern is the enormous fossil fuel reserves that are currently listed on the books of fossil fuel firms but that would need to stay in the ground in order to prevent catastrophic disruptions to the climate system (Carattini & Sen, 2019).

Examples of stranded assets and investments that lose value or are less profitable than anticipated, that need expensive retrofitting, that are early retired, or that turn into liabilities. This may occur due to unanticipated, sudden, or unexpected changes in (i) the regulatory framework or

policy changes. (ii) market circumstances, such as changes in prices, unprofitable returns, or competition; (iii) social norms or circumstances, such as shifting customer preferences; (iv) technology, such as advancements in sustainable energy; (v) financial conditions, such as unexpected write-offs or currency devaluation; and/or due to (vi) risks related to the environment, such as natural disasters or climate change (Bos & Gupta, 2019).

Power companies will need to persuade creditors and investors how they are capable of controlling asset impairments from stranded assets and shifting to a low-carbon business strategy within climate policy focus deadlines. Underutilized and stranded assets diminish stock prices, creditworthiness, financial performance, and the value of financial reports. A company that possesses stranded assets may have restricted or higher expenses to preserve its financial viability in the future. The study establishes and implements an approach to evaluate electricity appliances' capacity to maintain the imposed impairment of carbon-producing power plants on the European market. The study's sample comprises all 29 ungoverned utilities operating power plants that use fossil fuels in the European Economic Area. The majority of European utilities possess the financial resources to fulfill the demands for net zero carbon emissions under the various scenarios with prompt action. But a five-year delay might result in significant financial difficulties for the entire industry (Hickey et al., 2021).

Sen & Schickfus, (2020) focused on when and the manner in which financial stakeholders account for the possibility of an asset stranding and take advantage of a German climate policy plan that is gradually being developed with the goal of reducing the amount of power produced from coal and examined how it affects energy utility valuation. The findings indicated that compensation mechanisms are priced prior to the valuation of companies since they are expected. While investors are concerned about the risk associated with stranded assets, they do not think that the overall unburnable carbon risk or particular policy suggestions implying the stranding of assets will have a financial impact on them since they anticipate being compensated.

The majority of stranded assets result from falling prices for fossil fuels that were continuing to be extracted and traded throughout climate steadiness, not from keeping underground fossil fuels. industry will sustain large losses; even little drops in demand have the potential to undermine the fossil fuel sector's wealth and influence, affecting both high- and low-cost producers (Hansen 2022).

Stocks for climate change risks are underpriced by investors, raising the risk of a portfolio as climate change becomes more pronounced. The potential for stranded assets to occur is still a major risk management concern for investors' portfolios. Investors must determine if share prices represent stranded asset risk in order to make appropriate choices (Byrd & Cooperman, 2016).

Atanasova & Schwartz, (2019) analyzed the relationship between the proven reserves and the valuation of oil companies. Utilizing a sample of 600 oil companies in North America from 1999 to 2018, results showed that although stocks play a significant role in oil firm value, the increase in reserves has an adverse effect on firm value. The adverse impact is greater for oil producers whose extraction costs are higher. The reason for the negative impact of reserves increasing in value may be traced back to corporations increasing their undeveloped oil reserves, as seen by the breakdown of total reserves into developed and undeveloped reserves. Undeveloped reserves, in contrast to developed reserves, must be extracted over a longer period of time and with significant capital expenditures.

Because physical and financial assets are interconnected, stranded assets eventually result in a decline in a firm's valuation. This

possible decline in the value of physical assets will be passed along to financial assets (Breitenstein et al., 2021). Due to incorrect assumptions about the estimation of the associated fossil fuel corporations and the associated mining structures, financial institutions are vulnerable to a shift-prompted reevaluation and the potential worsening of their economic status (Baer 2020).

Long-lived assets have received comparatively less attention in the literature on stranded assets than fossil fuel reserves or financial assets. Long-term capital assets could be vulnerable to changes in the physical foundations of the economy. Private firms and governments hold all the natural resources and man-made capital stocks that are at risk of stranding. If these entities write down their assets earlier than expected, it might have a noteworthy effect on their financial statements and could lead to financial instability. Businesses with significant investments in fossil fuel reserves or capital stocks may experience a sharp decline in value in the future if investors are incorrectly valuing those firms (Campiglio et al., 2017). Due to increased concerns about these companies' potential to produce prospective earnings or, worse even, their inability to provide funding for new initiatives that would result in a lack of extra working capital and the inability to carry on as a going concern, these uncertainties may cause the underlying valuation of these companies' equity to decline (Olatubosun & Köseoğlu, 2020).

Examining if corporate valuations adequately account for stranding concerns. Coal, oil, and gas corporations may have overvalued their valuations in the future with carbon constraints, particularly if they have substantial capital exposure to expensive projects or carbon-intensive commodities. Generally speaking, highly diversified businesses are proven to be less vulnerable to carbon threats. However, in other instances, it's possible that investors included stranding risk in their assessments of the companies. Managing these risks becomes more difficult when there is a shortage of credible, disclosed data and established procedures for assessing being exposed to the carbon-free shift (Mcinerney et al., 2019).

Bogmans et al., (2023) revealed that a typical oil and gas company will reduce investment by approximately 3% for every variance rise in being exposed to climate change strategy. The sample consisted of 117 publicly listed oil and gas businesses, which account for approximately 40% of global oil production. The control group consisted of non-energy companies. Exposure to climate policy is less important than climate policy risk; an average disruption to ambiguity lowers investment by roughly 4%. For non-fossil fuel companies, the energy transition presents more opportunities than risks. Additionally, these consequences have significant economic implications.

According to assessments, markets do not adequately account for physical and transitional climate risks. Transition risk assessments are comprehensive, but they also draw attention to the substantial amount of ambiguity around possible declines in the market and book values of business assets recorded on the financial statements of institutions, as well as the broad variation in assessment disparities over stranded assets (OECD., 2021).

After presenting detailed information about stranded assets and their implications, we can state the following hypothesis:

H1, there is no significant effect of stranded assets impairments on firm value.

2.2. The role of climate change risk disclosure transparency

A company's strategy should incorporate climate change disclosure since it is regarded as a useful managerial approach for investors and interested parties to keep an eye on

business management and reduce the extent of data irregularities. Better eco-friendly performers also favor real climate change disclosure because it sends a credible signal (Giannarakis et al., 2018). Understanding the efforts that businesses are assisting with to mitigate climatic alteration and the effects that arise as a result of these initiatives entails the revelation of pertinent information that stakeholders may utilize in their decision-making procedures (García-Sánchez et al., 2023).

Consequently, given the negative effects that climatic alteration has on businesses' operations and, ultimately, their performance, more disclosure standards are required. When assessing the risks connected with climate change, data shortfalls arise since climate-related exposures are not financial and primarily unrestricted, making them non-standardized and lacking in trust and reliability (Maji & Kalita, 2022).

One of the biggest threats facing reporting firms now is reporting on climate change, and these difficulties will only continue to grow more complicated. The reporting mechanisms in place are insufficient to produce reliable, consistent, and comparable consequences for the contributions of corporations to climate change (El-Jourbagy & Gura, 2022). Threats linked to climate change are not as widely reported by businesses as they are by financial reporting (Blanco 2021).

Based on the IFRS S1 framework, Putri & Pratama (2023) examined sustainability disclosure data from 162 firms that were listed in 2021 on the stock indices in the countries of Malaysia, Singapore, Indonesia, and Thailand that have a focus on sustainable development. The extent of sustainable development reporting increases the value of the business. This study demonstrates how investors may view a company's value as improving when sustainability disclosure is included in financial reports. Sreepriya, et al. (2023) examined 223 manufacturing companies in India that operate in 11 different industries between 2010 and 2019. The results showed a strong and positive correlation between sustainability disclosure and company value. According to this study, GRI compliance acts as a moderator in the relationship between transparency about sustainability and corporate value; thus, the value of a business rises when it incorporates GRI into its sustainability disclosures.

The business environmental transparency, and firm value of the Gulf Cooperation Council members are analyzed. A robust and affirmative correlation was found between company environmental disclosure and firm value, based on a sample of 500 business-year data with a 55-item environmental reporting indicator (Gerged et al., 2021).

Ibrahim & Aboud (2023) obtained 1577 firm-year observations from the sample, which consisted of 328 non-financial UK enterprises from 2005 to 2016. Results indicated that companies that disclose more information about their risks are more likely to be valued highly by the market, regardless of whether the disclosure is positive or negative. Restrepo et al., (2022) identified the impact of information disclosure on Latin American firms' value between 2011 and 2017. A total of 1,412 observations from 198 firms make up the overall sample. According to the study, disclosure transparency has a statistically significant and favorable impact on business value.

Temiz (2021) aimed to explore how disclosure techniques for companies affect the company's value and performance in Turkey, 67 firms each year with an overall of 134 firm-year observations were used in the 2017–2018 period. A business's transparency rating is determined to have a favorable and statistically important effect on business value. Thus, standardization and enhancing the information's credibility are essential for users as well as businesses.

Hardiyansah et al., (2021) Utilized 82 companies that were listed between 2014 and 2018 on the stock exchange of

Indonesia, the study tried to find out how reporting of carbon emissions affected company value. The results showed that disclosure of carbon emissions had a favorable and considerable influence on company value.

The study of (Blanco 2021) Used the greater than 10,925 climate change revelations from 2,003 corporations worldwide that the CDP made available throughout 2007 and 2016 and found that evaluating the supply chain's carbon emissions reflects a large shift in the disclosures' nature and substance. This may be due in part to the fact that most climate change hazards originate in the supply chain as opposed to within the borders of large, multinational enterprises.

By presenting empirical data regarding whether business disclosure meets the increasing need from stakeholders for climate change risks to be disclosed, the study of Arian & Sands, (2023) assessed the sufficiency of climate risk disclosure through a panel regression study from 2007 to 2021 on a sample of global companies. The results showed that corporations, even the biggest polluters, have not yet come to cope with the inadequate degree of business climate risk disclosure, which demonstrates the truth of climate-related concerns. ongoing dangers are not sufficiently appraised as a result of short-run business attitudes toward climate risk exposure analyses.

Although investors and other stakeholders are increasingly demanding crucial climate-related information, the quality of this data is still inadequate, making it problematic to integrate it into the process of making capital allocation decisions (Ben-Amar et al., 2023). Investors may price and value assets incorrectly due to a lack of reliable information about risks related to the climate, improperly allocating resources, and causing financial instability (Ngo et al., 2023).

After accounting for typical risk variables, a dataset containing the average daily earnings of 104 businesses with tradable securities from 2010 to 2020 revealed adverse excess returns in the investing portfolios of businesses that did not disclose their climate change and carbon results. This shows that businesses that function sustainably are rewarded by the Norwegian stock exchange. According to research, the average yearly return of stocks held by businesses that effectively minimize risk and report climate concerns is 1.3% higher than the market average return. The high-score equity portfolio yields 9% annual returns. Divestment is recommended for the complete sampling portfolios that exhibit greater climate-related risks because poor and no-score portfolios have adverse returns on average. Additionally, they show unusually adverse returns, which suggests that the marketplace punishes enterprises (Antoniuk 2023).

To ascertain whether or not any relationships existed among the degree of climate risk disclosure and particular business attributes, the study of Kouloukoui et al., (2019) investigated the extent and nature of the data provided in the sustainability assessments of businesses registered on the Brazilian securities exchange regarding climate concerns. The total sample for the study consisted of 67 enterprises with 402 observations between 2009 and 2014. The preliminary results of the underlying analysis show that while Brazilian firms have a tendency to disclose information on climate threats, the extent of this kind of disclosure remains somewhat modest. The results showed that businesses are unconcerned about the occurrences that are already taking place as a result of climate change, which is because there hasn't been much disclosure about storms, floods, and other natural disasters. Moreover, the oil and gas sector, the materials sector, and the wood, pulp, and paper sector had the greatest mean disclosure.

The study of Maji & Kalita (2022) demonstrated how listed Indian corporations disclose information about climate change and how that information affects the

financial performance of the company. The study offered content analysis of 22 selected energy sector businesses' 2018–2019 and 2019–2020 financial statements as well as their reports on sustainability. The findings indicated a reasonable level of disclosure by Indian energy businesses and a favorable association between corporate performance and financial detail regarding climate change, suggesting that enterprises can experience increased financial performance through more disclosure on climate change.

Demaria & Rigot, (2021) used the French CAC 40 companies from 2015 to 2018. The results of the content analysis of reference documents from businesses showed that the climate change index increased between 2015 and 2018. This trend was particularly evident for businesses in the polluting industries, where there is a scarcity of information about the financial effects of climatic hazards. This is also the case for information pertaining to low-carbon sector investments.

The related costs and benefits should determine the supply and request for climate hazard revelation. One potential consequence of the climate risk disclosure could be that it gives competitors access to sensitive information about a company's business plan, since businesses engaged in highly competitive marketplaces are likely to incur significantly higher expenses associated with proprietary disclosure. Therefore, when pressures from rivals are higher, climate-conscious firms' motivation for this kind of information is lower (Ilhan et al., 2023).

Warren-Myers & Cradduck, (2021) stated that insufficient data fundamentals to assess the dangers and a lack of professional body guidance regarding what is necessary might be responsible for the insufficient identification, assessment, and reporting of climate change threats. Inconsistent modifications in valuations are caused by a lack of standard procedures and rules.

Abhayawansa & Adams (2022) examined risk reporting from the top five hotels, top ten airlines, and top five cruise lines for each of their respective financial years ending on March 31, 2019, or December 31, 2018. Disclosures about climate-related risks primarily highlighted the risks associated with more regulation rather than the risks associated with physical hazards, suggesting a short-term focus—possibly due to the immediate financial effects of breaking such regulations. The disclosures are distributed over various corporate reporting channels, and they don't consider the long-term effects or provide treatment options, which makes it challenging for consumers to evaluate the accuracy, dependability, relevancy, and completeness of the information reported.

The study of Alsheikh & Alsheikh, (2023) sought to find out how effective climate risk revealing is in Saudi non-financial enterprises. The study also investigated the relationship between several corporate attributes and the volume of climate risk disclosure. Based on an examination of a subset of Saudi Arabian non-financial enterprises between 2018 and 2021, the findings demonstrated that although climate risk reporting quality seemed at first insufficient, there was an evident rise throughout the duration of the study. Furthermore, the results confirmed that a company's size, the sector, and its climate risk reporting are positively and statistically significantly correlated, but profitability and leverage have no apparent effect.

Businesses that disclose information regarding climate risk stand to gain various benefits. The first benefit of transparency is that it can increase a company's perceived accountability to society, which enhances its capacity to handle and lower these risks going forward. Second, openness promotes confidence, which helps companies build more solid, powerful connections with interested parties like investors. By doing this, transparent businesses are able to regulate and lower their climate risks through enhanced interactions with

shareholders, partners in business, and other parties. Knowledge of climate risk disclosure can improve the governance of the business, increasing its potential future value. Investors may benefit from increased transparency regarding climate change risks since it removes uncertainty about one potentially significant source of risk. According to this viewpoint, the equity market might benefit from the exchange of knowledge on climate risk. Shareholders favor transparency concerning a company's exposure to climate change threats, as seen by the higher valuations of companies that choose to disclose their climate change concerns in response to ecological shareholder demands (Flammer et al., 2021).

Improving investors' comprehension of climate change's impact on firm value is crucial, as it's a big problem that negatively affects businesses' operational and financial performance. Investors can assess companies' responses to climate change with the aid of climate change disclosures, enabling them to make well-informed investment choices. Investors, stakeholders, and regulators are becoming more aware of climate change, which has raised their demand for information about how businesses are responding to it and how they intend to manage and minimize the risks associated with it. Climate change is a major concern, and businesses are under more pressure than ever to promote transparency by disclosing information about it (Chen et al., 2023).

Alsaifi et al. (2020) find compelling evidence that the unforced publication of carbon emissions by a corporation affects its financial viability, which is a crucial factor in decision-making. Alshahrani et al., (2023) Using a selection from the top 300 non-banking firms that were traded on the Australian Stock Market between 2008 and 2019, it was discovered that a lower rate of financial difficulty was correlated with greater levels of climate change disclosure performance. For a sample of 832 multinational corporations over the years 2011 to 2020, enhanced efficiency in the climate confirms the relationship between improved financial results for companies and effective climate governance (Aibar-Guzmán et al., 2023).

From the fifty biggest chemical companies in each of the United States and Japan, as determined by sales revenue in 2017, the study of Park et al., (2023) showed that, in comparison with superior disclosure, corporations with higher GHG emissions are more likely to decide on more extensive but inadequate climate change disclosure. This finding supports the legitimacy argument, which contends that businesses frequently conceal and defend the production of greenhouse gases by not providing enough information on climate change.

Chen et al., (2022) examined the implications of firms in the manufacturing sector having disclosed climatic change-related hazards and potential benefits on sustainability and financial achievement indicators, and it has been discovered that these disclosures greatly enhance financial performance. The study makes use of financial information and sustainability performance indicators from 100 manufacturing companies globally between 2005 and 2020.

A positive correlation was found between carbon disclosures and company value, indicating that businesses should include a variety of climate-related details in their carbon disclosures to increase their transparency. This data should include energy usage, carbon dangers and potential advantages, emissions of carbon, trading in carbon, and any actions aimed at reducing emissions (Basyith et al., 2024; Jiang et al., 2021).

The amount of climate change disclosure by energy businesses that operate in Asia and Africa was investigated by Asare et al., (2022). From 2015 to 2020, an unstable panel of 31 companies in 18 nations in Africa and Asia was evaluated using a quantitative technique. 62.5 percent of

respondents disclosed information regarding climate change, which is quite a significant amount. Energy companies in Asia disclose more than those in Africa. The study by Zhang & Zhang, (2023) examined the representation and framing of climate change in the social responsibility reports of the major energy businesses in China and the US, exposing the corresponding underlying beliefs and motivations. The findings demonstrated that while all eight energy companies acknowledged climate change, they only slightly identified its causes and inadequately explained its effects, emphasizing instead their own solutions.

The effective implementation of climate-related disclosure legislation is contingent upon efficient markets integrating this information into risk management processes. It's possible that an optional strategy for risk disclosure won't be sufficient to significantly alter investors' decisions. When taking into account the behavior of fossil fuel firms, additional problems appear. These companies' reports and strategies do not adequately address climate-related risks since there are no mandatory regulations in place (Baer 2020).

The scope and substance of climate danger disclosures made in US firms' filings are examined in the study of Vestrelli et al., (2024). The results showed that corporate value and climate risk disclosures are positively correlated. However, if climate change becomes more of an emphasis, the connection may become inverse. The final dataset is made up of 13652 quarterly observations across a three-year period from 2020 to 2022.

Drawing on the 2010–2020 annual reports of a number of Chinese A-share traded companies, the final sample consists of 17418 points. The study by Wang et al., (2024) investigated the connection and influencing factors between carbon emissions levels and corporate climate risk disclosure. Findings demonstrated that revealing information about climate risk lowers carbon emissions; additionally, regarding short-run carbon emissions, physical climate threat disclosure is preferred. On the other hand, long-term carbon mitigation objectives are chosen for transformative climate risk disclosure. Companies must therefore be increasingly active in providing climate-associated information, highlighting their emphasis on climate hazards, and showing their capacity to address them in order to get investors' attention.

Disclosures and reporting regarding climate change are crucial instruments that enable stakeholders to comprehend the risks a firm faces in this regard and support different stakeholders in making well-informed decisions. The landscape of reporting obligations related to climate change is constantly changing, moving from voluntary to mandatory. Numerous worldwide disclosure standards and regulations have an impact on local requirements as well as other relevant standards. In addition to behaving as a means of meeting potential conformity obligations, climate disclosures and the regulations that surround them also serve as a guide for businesses looking to better align their internal and external operations with net zero goals (Dey et al., 2024).

Disclosure of climate risk has an unclear effect since it can set off two opposing dynamics. Disclosure that identifies new risk factors may raise investors' perceptions of risk, which could increase company risk and reduce valuation. However, a business's valuation may increase if its climate risk is disclosed more fully. The notion that greater valuation results from greater transparency and the reality that shareholders often steer clear of ambiguity and are willing to pay an extra cost for more transparent firms serve as the foundation for the reasoning. In this sense, greater transparency on climate change could benefit investors by removing doubt about a likely significant cause of risk (Vestrelli et al., 2024).

A great deal of investors believe that the risks associated with climate change, especially those related to regulatory concerns, have become visible and are factored into their assessment models. The lack of adequate disclosure regulations is the main reason why climate danger is underpriced, since it makes it difficult for the marketplace to understand this risk. Investors contend that climate risk reporting should be standardized and regulated, just like financial information, and that it is just as important (Krueger et al., 2020; Javadi & Al Masum, 2021).

Gevin the potential effects of climate change risk disclosure and transparency. The following hypothesis is proposed:

H2, there is no significant effect of climate change risk disclosure on firm value.

2.2.1. Climate change risk disclosure in accordance with international guidance:

The practice of firms disclosing their vulnerability to hazards associated with climate change and the steps they are taking to mitigate those risks is known as corporate climate disclosure. Since the turn of the twenty-first century, the practice has expanded significantly, with supporters claiming that it aids businesses in responding to climate change through measurement and reporting. The expansion of this notable nongovernmental organization may be attributed mostly to the ambitious actions of CDP, which used to be referred to as the Carbon Disclosure Project. established CDP in 2002 to impose corporate force to lower their emissions of greenhouse gases, around 19,000 corporate disclosures about climate change and other environmental challenges were made possible by CDP in 2022 (CDP, 2023a).

The UK-based Carbon Disclosure Project CDP is an institute that assists businesses in revealing their large firms' ecological impact. In order to encourage action toward a sustainable economy, it seeks to standardize risk management and climate change reporting for businesses. Businesses worldwide use CDP to report information on climate change (Charumathi & Rahman, 2019).

Founded by the Financial Stability Board (FSB) of the G20 in 2016, the Task Force on Climate-Related Financial Disclosures (TCFD,2017) is a worldwide foundation that is anticipated to be integrated into regulations for major multinational enterprises operating in many nations (Elliott et al., 2023).

Among the greatest worldwide strategies, the Taskforce on Climate-Related Financial Disclosures has looked into climate-related disclosures in financial statements. According to the TCFD, information is required to enable organizations to comprehend the possible risks connected with their changing climate activities and for shareholders to build greener portfolios. Consequently, it's imperative to support climate releases that raise stakeholders' awareness of the financial consequences of climate-related issues (Demaria & Rigot, 2021).

The TCFD's suggestions are optional, but they help businesses recognize and share both advantages and hazards related to climate change with their stakeholders. Businesses can't start thinking about the financial impacts on their assets and liabilities until they have thoroughly assessed the implications of climate change and decided on the responses they plan to initiate. The suggestions of the TCFD fall into four different groups: metrics and targets, risk management, strategy, and governance (Ngo et al., 2023; Cosma et al., 2022):

- Governance: disclosure regarding the business's risk and opportunity control in relation to climate change.
- Strategy: disclosure, where applicable, of the actual and future impacts of climate-related risks and

opportunities on the business's goals, financial analysis, and activities.
- Risk management: details on the business's development, assessment, and handling of climate change-related hazards.
- Metrics and targets: when necessary, disclosure of the criteria and goals for assessing and managing opportunities and hazards connected to climate change.

The TCFD suggestions were incorporated into the 2019 Rules on Climate-Related Reporting by the European Commission. The TCFD application guidelines, which were released by SASB and CDSB, explain how to use SASB's standards and CDSB's reporting structure to make disclosures that comply with the TCFD guidelines (CDSB and SASB, 2019).

There are various advantages to the TCFD reference system. In contrast to other international organizations, it takes a unique stance by emphasizing how climate change affects a company rather than how the company affects climate change. As a result, it is well-positioned to establish itself as the global standard for reporting on climate risks. Its objective is to enhance the non-financial reporting that businesses provide on how they incorporate opportunities and risks linked to climate change in 4 areas: strategy, governance, risk management, and environmental metrics. These kinds of company disclosures are seen as one way to improve financial transparency through the process of market discipline (Demaria & Rigot, 2021).

The Foundation for Establishing the International Sustainability Standards Board (ISSB) in November 2021 was part of the International Financial Reporting Standards (IFRS). Through cooperation with the Sustainability Accounting Standards Board (SASB), it aimed at standardizing reporting on environmental issues by June 2022 and GRI. GRI and IFRS committed to harmonizing sustainable reporting and disclosure frameworks, with IFRS putting a strong emphasis on financial data for shareholders and GRI focusing on the effects for a variety of stakeholders. Shortly thereafter, the ISSB published a plan for sustainable development globally, and the International Integrated Reporting Council (IIRC) and the SASB merged to become the Values Reporting Foundation in 2021. The purpose of SASB standards, which are applicable to 77 industries, is to determine which material disclosures on sustainability are most important to shareholders (El-Jourbagy & Gura, 2022).

The SEC published proposed rule changes on March 21, 2022, in a publication that was more than five hundred pages. These changes would require businesses to include data about climate change in their registration and periodic filings. The SEC is primarily looking for GHG emissions, targets and goals linked to climate change, governance around climate change, and climate-related financial statement measures, as well as, if required, a transition plan (El-Jourbagy & Gura, 2022). Investors would gain from such a rule by having more information available to them about the global climate emissions that their investments generate and by being able to make informed decisions about a company's exposure to hazards related to climate change. The disclosure regulations set forth by the SEC impose significant litigation expenses on issuers that may be accused of misrepresenting material risks associated with their vulnerability to climate change or of greenwashing their disclosure (Hossain et al., 2023).

Climate risk analyses are being made obligatory under several sustainability reporting rules, in addition to mandates on GHG emission reporting. The EU Green Deal's Corporate Sustainability Reporting Directive, for instance, increased the requirement of corporations to develop modification initiatives or approaches and to include information about observed and

potential climate risks to their activities in their sustainability reports, went into effect in January 2023. The objective is to increase the transparency of businesses' sustainability initiatives and provide stakeholders and investors with a means of assessing and contrasting the sustainability records of various businesses (EC, 2022; Juhola et al., 2023).

2.2.2. International accounting standards implications for climate change disclosure

Although IFRS does not have a single clear standard on climate-related issues, several accounting disciplines may be impacted by climate risks, as well as connected subjects. The expectation among stakeholders is that organizations will provide an explanation of how climate-related issues are considered in their accounting records up to the point where they are substantive from a subjective standpoint, despite the fact that the rapid effect on the financial statements could not always be considered quantitatively necessary. In-depth disclosures of the most important estimates, assumptions, and decisions taken in relation to climate change are also expected by stakeholders. Additionally, the reality that users and investors are calling for greater disclosure on issues related to climate change may indicate that these disclosures are important. A key element of relevant reporting that is receiving more attention is coherence between the information disclosed in the financial statements and the information provided by an organization in documents other than the financial statements, such as reports from management and sustainability reports (EY, 2023).

Through the following processes, accounting can assist in climate change adaptation: (i) exposure and capacity for adaptation evaluation; (ii) cost and benefit assessment; and (iii) disclosure of the dangers related to climate change's effects. However, an unusually small amount of climate change disclosure resulted from a shortage of rules and a business environment that placed minimal attention on social accountability, with some corporations providing data using their own procedures and at their discretion (Setiawan et al., 2023).

Table 1. Applicable IFRS for climate change related information disclosure

IAS 16 Property, Plant and Equipment	When evaluating how the climate is affecting their PP&E, businesses should take the following factors into account: - Useful life – Climate change and related regulations may have an impact on the length of time and how PP&E items are used. According to IAS 16, organizations must assess an asset's useful life at least once a year. In each year, while calculating the estimated useful life of their assets and, consequently, the depreciation time for such resources, entities will have to take climate-related considerations into account. - An entity should determine whether to adjust the technique and/or period of depreciation for its current facilities as the level of certainty underlying their future use evolves. That is, a clean energy project could increase the infrastructure's useful life. - Residual value – Every year, the residual value of each PP&E needs to be looked at. The residual values of property, plant, and equipment (PP&E) assets can be somewhat predictable, although this may not always be the case if a small percentage of buyers of used PP&E assets utilize technology that is being phased out prior to a specified date.

IAS 36 Impairment of Assets	Government initiatives to combat climate change, including agreeing to fulfill local emissions targets or attain net-zero emissions in compliance with the Paris Agreement by 2050, could imply: - The asset value of an entity is decreasing. - The entity's operating market, economic, and legal environment have experienced a major negative change. - Significantly negative changes have been made to the entity's technology. - An asset's economic performance is anticipated to be worse off. - The rate of discount applied to ascertain the value of an asset in use is impacted by increases in general expenses and market interest rates. - The entity's net asset carrying value is higher than its market capitalization. Businesses that have pledged to achieve the net-zero emissions objective established by the Paris Agreement by 2050 may be hesitant to reveal how their commitment to this goal is reflected in estimates about commodity prices, taxes, mandatory asset retirement, company divestitures, etc. Businesses should provide users with sufficient information to understand how an asset is assessed for impairment.
IAS 37 Provisions, Contingent Liabilities and Contingent Assets	As organizations respond to the effects of climate change, new liabilities may be recognized as a result of those responses, or new contingent liabilities may need to be declared if the requirements for recognition are not fulfilled. When evaluating the effect of climate on provisions and contingent liabilities, entities should take the following factors into specific consideration, Constructive obligations, decommissioning and asset retirement obligations, new legislation or regulations, Onerous agreements and legal assertions. As a result, companies must reveal how climate change has been considered when calculating a provision or disclosing a potential obligation.
IFRS 13 Fair Value Measurement	Organizations must make sure that the pertinent risk factors associated with climate change are adequately taken into account in fair value measurements. Climate change may have a direct consequence on the assets and liabilities of a company, as well as have an impact on the underlying assumptions that determine fair value. This could involve, for instance, how participants in the market perceive the risks associated with climate change that would impact the asset or liability's price. For instance, an entity may feel that the value of stranded assets is relatively low from their perspective because, given their chosen climate change transition business plans, it is not part of their future plans. However, IFRS 13 would take into account the most efficient and beneficial use from the viewpoint of a market participant, which could lead to a measurement of fair value that is greater than if the entity's existing use is assumed.
IFRS S2 Climate-related Disclosures	In accordance with this standard, a business must provide information about dangers and possibilities connected to climate change that might reasonably affect the organization's revenue streams, cost of capital, or ability to get financing over the short, medium, or long terms. This guideline is applicable to: (a) risks associated with climate change as climate-related physical threats and climate-related transitional threats, to which the entity is susceptible; and (b) opportunities the entity has in relation to climate change.

(Source: EY., 2023; IFRS S2, 2023)

After reviewing climate change risk disclosure in accordance with the guidance of international professional organizations and the implications of international accounting standards for climate change disclosure, the following hypothesis can be stated:

H3, there is no significant effect of climate change risk disclosure on the relationship between stranded assets impairments and firm value.

3. Research Design

3.1 Sample Selection

Attempts to disclose climate change in the Egyptian environment began since the launch of the Sustainability Index in 2008, but these practices were carried out voluntarily in heavy industrial sectors with clear environmental impacts, such as the cement sector.

Then these voluntarily practices became mandatory within the framework of the Financial Supervision Authority's decisions No. 107 and No. 108 issued in July of 2021, the companies obligated to apply the climate disclosure index are companies registered in the stock market and operating in the non-banking field. According to the aforementioned decisions, companies become obligated to apply this disclosure indicator in a mandatory manner after the end of the reconciliation period, starting with the financial statements ending in 2022.

In this regard, it turns out that the climate disclosure topics identified by the disclosure index issued by the Financial Regulatory Authority relate to two aspects: the first relates to disclosures related to the negative impacts of environmental, social and governance aspects related to sustainability; The second relates to measuring performance related to disclosures about the financial impacts of climate change, which includes aspects of governance, strategy, risk management, metrics and goals.

Consequently, Sample firms are selected from firms listed on the Egyptian Stock Exchange between 2017 and 2023 to include both practices of voluntary and mandatory. The start date was chosen to avoid periods of economic fluctuations of floating decisions. Moreover, the study sample determined from the listed firms in the cement sector because of the increasing interest in the climate impacts of the cement industry on the Egyptian environment which amount to 16 firms.

Based on the above considerations, all cement listed firms in the Egyptian environment which consist of 16 firms are the final sample of this research that registered 112 firm year observations. By excluding 13 observations with missing values and 18 observations with outliers, the final sample for the study becomes 81 observations. In this context, the researcher can clarify the procedures for selecting the final sample for the study through the following table:

Table 2. Sampling Procedures

Procedure	Number of firms	Observations
Firms Initial Sample	16	112
(-) Missing Values Observations	---	13
(-) Outliers Observations	---	18
Final Sample	16	81

3.2 Variables Measurement:

This study aims to examine the impact of stranded assets impairment on firm value by moderating role of climate change risk disclosure transparency with applied evidence from Egyptian cement industry, So the measurement tools can be defined as follow.

3.2.1. Independent Variable: stranded assets impairment

Accountants use impairment tests to determine whether an asset has become "stranded." An impairment test is a standard accounting process for determining prospective asset devaluations. Impairment tests differ significantly between Generally Accepted Accounting Principles (GAAP)

and International Financial Reporting Standards (IFRS).

GAAP compares the asset's carrying value (original cost minus accrued depreciation) to its undiscounted future cash flows (UFCF). If the carrying amount exceeds the UFCF, the asset is deemed impaired.

Under IFRS, the asset's carrying value is compared to (1) the fair value less costs to sell the asset and (2) the fair value in use (the present value of future cash flows generated by the asset). If the carrying amount exceeds either the greater of either fair value less costs to sell or fair value in use, the asset is considered impaired.

The Egyptian accounting environment follows the IFRS, so the stranded assets impairment can be measured by manually content analysis for the stranded assets impairment which calculated by the difference between the net fair value of assets and its expected net present value according to the published financial reporting scaled by its book value (Vanza et al., 2018).

3.2.2. Moderator Variable: climate change risk disclosure

According to the framework of the Financial Supervision Authority's decisions No. 107 and No. 108 issued in July of 2021, the climate disclosure index relate to two aspects: the first relates to disclosures related to the negative impacts of environmental, social and governance aspects related to sustainability; The second relates to measuring performance related to disclosures about the financial impacts of climate change, which includes aspects of governance, strategy, risk management, metrics and goals.

Consequently, the current study uses only the manually content analysis for the published financial reporting to determine the disclosure level of climate change risk according to the Egyptian Financial Supervision Authority's decisions as follow.

Table 3. Climate Change Risk Disclosure

Section	Type	Items	No. of Sub Items
Section 1	Environmental Disclosure	Environmental control and processes	6
		Carbon emissions	1
		Usage and diversity of energy sources	3
		Water usage	2
		Waste management	1
		Total	**13**
Section 1	Social Disclosure	Gender diversity and salaries ratio	5
		Employee turnover	3
		Non-discrimination	1
		International health and safety standards	3
		Children and forced labour	1
		labour rights	2
		Total	**15**
Section (1)	Sustainability Disclosure	Board diversity	2
		Bribery/anti-corruption	1
		Ethical code /code of honour	1
		Data privacy	1
		Reporting and disclosing sustainability practices	6
		External guarantees	1
		Total	**12**
Total of Section (1)			**40**

Section (2)	Governance	Governance related to climate change	2
	Strategy	Environmental Processes and control Risks	3
	Risk Management	Climate Change Risks	3
	Objectives & Measures	Carbon emissions / Greenhouse gases	2
Total of Section (2)			**10**
Total index level			**50**

3.2.3. Dependent Variable: Firm Value

There are two ways for measuring firm value; the first one is related to using Tobin's Q index which is can be calculated by sum of the market capitalization, long and short-term debt scaled by total assets. Secondly, it can be measured by the economic value added which is can be calculated by the cost of capital subtracted from net profit after tax.

3.2.4. Control variables

Control variables related to the factors that may affect the dependent variable. In this context, according to the previous studies, these variables can be represented in: size, leverage, return on assets, sales growth and accruals.

3.3 Empirical Model

3.3.1. Regression specification for testing H1

To investigate the effect of stranded assets impairment on firm value for the listed firms in the cement sector for the Egyptian stock market, current study can estimate the following regression models as follow:

$$\text{Tobin's Q} = \alpha + \beta1\ \text{SAI} + \beta2\ \text{Size} + \beta3\ \text{Lev} + \beta4\ \text{ROA} + \beta5\ \text{Growth} + \beta6\ \text{ACC.} + \varepsilon. \quad (1\text{-}1)$$

$$\text{EVA} = \alpha + \beta1\ \text{SAI} + \beta2\ \text{Size} + \beta3\ \text{Lev} + \beta4\ \text{ROA} + \beta5\ \text{Growth} + \beta6\ \text{ACC.} + \varepsilon. \quad (1\text{-}2)$$

3.3.2. Regression specification for testing H2

To investigate the effect of climate change risk disclosure on firm value for the listed firms in the cement sector for the Egyptian stock market, current study can estimate the following regression models as follow:

$$\text{Tobin's Q} = \alpha + \beta1\ \text{CD (Env.)} + \beta2\ \text{CD (Soc.)} + \beta3\ \text{CD (Sus.)} + \beta4\ \text{CD (Sec.1)} + \beta5\ \text{CD (Sec.2)} + \beta6\ \text{CD} + \beta7\ \text{Size} + \beta8\ \text{Lev} + \beta9\ \text{ROA} + \beta10\ \text{Growth} + \beta11\ \text{ACC.} + \varepsilon. \quad (2\text{-}1)$$

$$\text{EVA} = \alpha + \beta1\ \text{CD (Env.)} + \beta2\ \text{CD (Soc.)} + \beta3\ \text{CD (Sus.)} + \beta4\ \text{CD (Sec.1)} + \beta5\ \text{CD (Sec.2)} + \beta6\ \text{CD} + \beta7\ \text{Size} + \beta8\ \text{Lev} + \beta9\ \text{ROA} + \beta10\ \text{Growth} + \beta11\ \text{ACC.} + \varepsilon. \quad (2\text{-}2)$$

3.3.3. Regression specification for testing H3

To investigate the effect of moderating role of climate change risk disclosure on the relationship between stranded assets impairment and firm value for the listed firms in the cement sector for the Egyptian stock market, current study can estimate the following regression models as follow:

$$\text{Tobin's Q} = \alpha + \beta1\ \text{CD (Env.)} \times \text{SAI} + \beta2\ \text{CD (Soc.)} \times \text{SAI} + \beta3\ \text{CD (Sus.)} \times \text{SAI} + \beta4\ \text{CD (Sec. 1)} \times \text{SAI} + \beta5\ \text{CD (Sec.2)} \times \text{SAI} + \beta6\ \text{CD} \times \text{SAI} + \beta7\ \text{Size} + \beta8\ \text{Lev} + \beta9\ \text{ROA} + \beta10\ \text{Growth} + \beta11\ \text{ACC.} + \varepsilon. \quad (3\text{-}1)$$

$$\text{EVA} = \alpha + \beta1\ \text{CD (Env.)} \times \text{SAI} + \beta2\ \text{CD (Soc.)} \times \text{SAI} + \beta3\ \text{CD (Sus.)} \times \text{SAI} + \beta4\ \text{CD (Sec. 1)} \times \text{SAI} + \beta5\ \text{CD (Sec.2)} \times \text{SAI} + \beta6\ \text{CD} \times \text{SAI} + \beta7\ \text{Size} + \beta8\ \text{Lev} + \beta9\ \text{ROA} + \beta10\ \text{Growth} + \beta11\ \text{ACC.} + \varepsilon. \quad (3\text{-}2)$$

Table 4. List of Variables

Type	Variables	Code	Definition	Data Source	Citation
Independent variable	Stranded Assets Impairment	SAI	the difference between the net fair value of assets and its expected net present value according to the published financial reporting scaled by its book value	Financial reporting	(Vanza, et al., 2018)
Moderator Variable	climate change risk disclosure	CD (Env.)	Disclosure level for the environmental issue	Financial reporting, governance and sustainability reports	Egyptian Index
		CD (Soc.)	Disclosure level for the social issue		
		CD (Sus.)	Disclosure level for the sustainability issue		
		CD (Sec. 1)	Disclosure level for the total of section1 from the climate change risk disclosure index		
		CD (Sec.2)	Disclosure level for the total of section2 from the climate change risk disclosure index		
Dependent Variable	Firm Value	Tobin's Q	market capitalization plus long-term debt plus short-term debt divided by the total assets	Stock Market & Financial Statements	
		EVA	Natural log of the cost of capital subtracted from net profit after tax		
Control Variables	Firm Size	Size	Natural log of total assets	Financial Statements	
	Return on Assets	ROA	Net income divided by total assets		
	Leverage	Lev	Total debt divided by total equity		
	Sales Growth	Growth	Change in revenue scaled by Revenue for the previous year		
	Accruals	ACC.	Accounting accruals which is the difference between the net income before tax and operating cash flow scaled by total assets		

4. Results

4.1 Normality Tests

The Shapiro–Wilk test is more appropriate method for small sample sizes (<50 samples) although it can also be handling on larger sample size while Kolmogorov–Smirnov test is used for $n \geq 50$. For both of the above tests, null hypothesis states that data are taken from normal distributed population. When $P > 0.05$, null hypothesis accepted and data are called as normally distributed.

Table 5. Normality tests results

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Tobin's Q	.116	81	.009	.917	81	.000
EVA	.107	81	.022	.924	81	.000
SAI	.146	81	.000	.896	81	.000
CD (Env.)	.096	81	.061	.955	81	.006
CD (Soc.)	.114	81	.011	.920	81	.000
CD (Sus.)	.124	81	.004	.922	81	.000
CD (Sec.1)	.091	81	.096	.950	81	.003
CD (Sec.2)	.130	81	.002	.928	81	.000
CD	.091	81	.093	.945	81	.002
Size	.089	81	.178	.943	81	.001
Lev	.094	81	.071	.947	81	.002
ROA	.064	81	.200*	.976	81	.139
Growth	.094	81	.076	.963	81	.020
ACC.	.122	81	.005	.938	81	.001

Therefore, based on the results presented previously in table No.5, it is obvious that majority of variables are significant in the two tests, because the value of Sig. For majority variables less than 5% and this indicates that the distribution of the data does not follow a normal distribution. However, these results cannot be considered a problem in the validity of the data, as it can be assumed that the condition of normal distribution of data is met for large samples (N > 30), regardless of the distribution of the original population, in accordance with what the central limit theorem stipulates, and since the size of the sample in the current study is (N = 81). The problem of the data not being normally distributed will not have an impact on the validity of the models used in the study.

4.2 Descriptive Statistics:

There are three major types of descriptive statistics: Measures of frequency (frequency, percent), measures of central tendency (mean, median and mode), and measures of dispersion or variation (variance, SD, standard error, quartile, interquartile range, percentile, range, and coefficient of variation) provide simple summaries about the sample and the measures. In this study, both measures of central tendency and measures of dispersion or variation used and can be summarized in the following table.

Table 6. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Tobin's Q	81	0.467	2.148	1.363	0.551
EVA	81	0.456	3.203	1.732	0.905
SAI	81	0.059	0.146	0.110	0.029
CD (Env.)	81	0.000	13.000	6.025	3.788
CD (Soc.)	81	0.000	15.000	6.840	4.946
CD (Sus.)	81	0.000	12.000	6.012	3.926
CD (Sec.1)	81	0.333	13.000	6.292	3.775
CD (Sec.2)	81	0.000	10.000	4.395	3.208
CD	81	0.333	11.500	5.344	3.360
Size	81	0.516	6.382	3.510	1.783
Lev	81	0.057	0.563	0.305	0.151
ROA	81	-0.050	0.357	0.154	0.102
Growth	81	-0.047	0.260	0.109	0.082
ACC.	81	0.055	0.278	0.176	0.067
Valid N (listwise)	81				

According to the above results, Tobin's Q value for the mean is greater than 1, which means that majority of observations inserted in this sample is capable of achieving value for all stakeholders. Moreover, from the side of economic value added the value also greater than 1 which ensures the capability of inserted firms in this sample in creating the value for all stakeholders.

From the standpoint of the stranded assets impairments, it is so clear that the mean is so low which equal 11%, so the firms inserted in this sample is so efficient in managing their assets so this sample is not biased. And it's worth noting that this result is complement for the above results from the side of firms' efficiency in managing their assets .

Finally, the scores of climate change risk disclosure are 6.025, 6.840, 6.012, 6.292, 4.395 and 5.344 for the environmental, social, sustainability, total section (1), total section (2) and the total index respectively. This result indicates that listed firms in this sample moderate adherence by the climate change risk disclosure .

In a border sense, results of current study can be compared with the other previous studies based on matching degree on the descriptive statistics with the other; especially the standard deviation is low for all variables so there are no outliers in this sample.

4.3 Correlation matrix

Correlation coefficients indicate the nature of the correlation between the independent variables of the study and the dependent variable. They also show the direction of the relationship, whether it is positive or negative, which serves as a prelude to the form of the relationship between the variables until the final result is reached through the results of regression analysis. In this context, current study can show the correlation matrix results into two stages, the first one related by the relationship between the independent variable and the dependent variable of this study which is can be called the origin model of this study and interested in testing H1, and the other stage related to the role of moderating variable in the relationship which can be shown by analysing the relationship between the moderator variable and the dependent variable, the analysing the role of this moderator in the origin model and this stage interested in testing H2 & H3. These results of two stages can be shown as follow:

The correlation results of the origin model (H1).

Table 7. Correlation Matrix for the origin model (H1)

Variables		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	VIF
(1)	Tobin's Q	1								--
(2)	EVA	.605**	1							--
(3)	SAI	-.624**	-.616**	1						1.033
(4)	Size	-0.177	-0.018	0.101	1					1.023
(5)	Lev	-0.195	0.023	0.036	-0.002	1				1.021
(6)	ROA	0.045	-0.033	0.104	0.096	-0.134	1			1.171
(7)	Growth	-0.059	-0.018	0.079	0.054	0.004	-0.125	1		1.031
(8)	ACC.	0.010	0.080	0.073	-0.009	-0.048	.323**	-0.080	1	1.123
Note: *, ** and * indicate statistical significance at the 10, 5 and 1% levels, respectively**										

The above results show a significant negative relationship between the independent variable which is the stranded assets impairments and the dependent variable which is the firm value measured by Tobin's Q and economic value added. These results indicate that increased stranded assets impairments lead to deterioration in the financial health of the firm so the firm value is decreased. Moreover, the coefficient correlation among the independent variables and the other control variables are less than 0.8 which indicate that there is no multicollinearity problem, in addition the VIF values is less than 10 which ensure this result.

The correlation results of the moderating role models (H2&3):

Panel A from the table No. 8 show that climate change risk disclosure index and its sub sections are positively correlated with the firm value measured by Tobin's Q and economic value added.

Panel B from the table No. 8 ensure that climate change risk disclosure index and its sub sections after the interactions with the independent variable which is the stranded assets impairments are still positively correlated with the firm value measured by Tobin's Q and economic value added, although the negative relationship between the stranded assets impairments and the firm value measured by Tobin's Q and economic

value added. Consequently, it can be assured that climate change risk disclosure index and its sub sections can moderate the negative relationship between the stranded assets impairments and firm value.

Table 8. Correlation Matrix for the moderating role models (H2&3)

Panel A: Pairwise correlations for Moderator variable Model (H2)															
Variables		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	VIF
(1)	Tobin's Q	1													---
(2)	EVA	.605**	1												---
(3)	CD (Env.)	.521**	.726**	1											2.562
(4)	CD (Soc.)	.657**	.781**	.689**	1										3.058
(5)	CD (Sus.)	.633**	.805**	.681**	.720**	1									2.819
(6)	CD (Sec.1)	.680**	.863**	.872**	.917**	.889**	1								12.526
(7)	CD (Sec.2)	.724**	.801**	.737**	.782**	.760**	.851**	1							3.656
(8)	CD	.728**	.867**	.841**	.888**	.862**	.968**	.956**	1						17.851
(9)	Size	-0.177	-0.018	-0.011	-0.051	-0.076	-0.052	-0.011	-0.035	1					1.027
(10)	Lev	-0.195	0.023	0.091	-0.010	0.045	0.042	0.055	0.050	-0.002	1				1.044
(11)	ROA	0.045	-0.033	-0.001	-0.059	-0.019	-0.033	-0.023	-0.029	0.096	-0.134	1			1.186
(12)	Growth	-0.059	-0.018	-0.023	-0.083	-0.042	-0.059	-0.060	-0.062	0.054	0.004	-0.125	1		1.034
(13)	ACC.	0.010	0.080	-0.044	0.040	0.093	0.035	0.022	0.030	-0.009	-0.048	.323**	-0.080	1	1.164
Panel B: Pairwise correlations for Moderated Model (H3)															
Variables		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	VIF
(1)	Tobin's Q	1													---
(2)	EVA	.605**	1												---
(3)	CD (Env.) × SAI	.220*	.443**	1											1.506
(4)	CD (Soc.) × SAI	.447**	.644**	.496**	1										2.654
(5)	CD (Sus.) × SAI	.445**	.637**	.456**	.722**	1									2.427
(6)	CD (Sec.1) × SAI	.444**	.686**	.765**	.897**	.856**	1								11.476
(7)	CD (Sec.2) × SAI	.562**	.680**	.528**	.697**	.665**	.752**	1							2.372
(8)	CD × SAI	.533**	.730**	.699**	.858**	.819**	.944**	.927**	1						14.583
(9)	Size	-0.177	-0.018	-0.013	-0.042	-0.075	-0.050	0.032	-0.013	1					1.034
(10)	Lev	-0.195	0.023	0.125	0.019	0.082	0.085	0.071	0.084	-0.002	1				1.047
(11)	ROA	0.045	-0.033	0.026	-0.044	-0.035	-0.023	0.002	-0.012	0.096	-0.134	1			1.189
(12)	Growth	-0.059	-0.018	-0.030	-0.079	-0.031	-0.058	-0.086	-0.076	0.054	0.004	-0.125	1		1.035
(13)	ACC.	0.010	0.080	0.003	0.146	0.171	0.128	0.111	0.128	-0.009	-0.048	.323**	-0.080	1	1.182

Finally, the coefficients among the climate change risk disclosure index and its sub sections in both models of Panel A & B is larger than 0.8 in some cases and the VIF value also greater than 10, so it is important to split the models according to the change risk disclosure index and its sub sections for avoiding the multicollinearity problems.

4.4 Regression analysis results

While descriptive statistics and correlation analysis are informative, more conclusive evidence can be obtained through multivariate regression analysis that controls for a number of firm-specific variables affecting the dependent variable.

4.4.1. The effect of stranded assets impairments on the firm Value (H1)

The first hypothesis tests the relationship between the stranded assets impairments and the firm Value based on the model no (1) and its sub models. Consequently, running model no (1) and its sub models lead to the results stated in table no.9, depending on these results it is obvious that R^2 for the models equal 39.70% and 35.40% respectively, which means that the independent variables of stranded assets impairments & the other control variables can explain 39.70% and 35.40% respectively from the change of firm value measured by Tobin's Q and economic value added. Moreover, the F-Value for the models equal 9.779 and 8.296 and both is significant at level 1% which means that models explain the relationship efficiently.

Table 9. The effect of stranded assets impairments on the firm Value (H1)

Variables	Panel A: Dependent Variable Tobin's Q			Panel B: Dependent Variable EVA	
	β Coef.	t-stat.		β Coef.	t-stat.
Cons.	2.852	11.007		3.373	7.663
SAI	-11.689	-7.002		-19.730	-6.958
Size	-0.038	-1.413		0.023	0.500
Lev	-0.579	-1.813		0.312	0.574
ROA	0.516	1.016		-0.020	-0.023
Growth	0.074	0.126		0.440	0.440
ACC.	0.136	0.181		1.787	1.398
Year & Industry Dummies	*Included*			*Included*	
N	81			81	
F-value	9.779***			8.296***	
Adj. R2	39.70%			35.40%	

Note: *, ** and *** indicate statistical significance at the 10, 5 and 1% levels, respectively

From Panel (A), it is obvious that the stranded assets impairments negatively affect the firm value measured by Tobin's Q where SAI as an independent variable is significant and negative (β = -11.689; T Stat. = -7.002 > 2). This result means that increasing the stranded assets impairments lead to decreasing in the firm value measured by the Tobin's Q i.e. that stranded assets impairments lead to deterioration in the financial health of the firm because of excluding these assets so the firm value decreased. Therefore, the first sub hypothesis can be accepted in the alternative form as follow: Stranded assets impairments negatively affect the firm value measured by the Tobin's Q.

Panel (B) results revealed that the stranded assets impairments negatively affect the firm value measured by economic value added where SAI as an independent variable is significant and negative (β = -19.730; T Stat.

= -6.958 > 2). This result means that increasing the stranded assets impairments lead to decreasing in the firm value measured by the economic valued added i.e. that stranded assets impairments lead to deterioration in the financial health of the firm because of excluding these assets so the firm value decreased. Therefore, the second sub hypothesis can be accepted in the alternative form as follow: Stranded assets impairments negatively affect the firm value measured by the Economic Value Added (EVA).

Based on the results of panels (A & B), current study can accept the first hypothesis of on the alternative form as follow: H1, Stranded assets impairments negatively affect the firm Value.

4.4.2. The effect of climate change risk disclosure index and its sub sections on the firm value (H2)

The second hypothesis test the relationship between the climate change risk disclosure index and its sub sections and the firm Value based on the model no (2) and its sub models. Consequently, running model no (2) and its sub models lead to the results stated in table no.10.

Depending on Panel (A) results, from the table rows it is clear that R^2 for the models equal 31%, 45.50%, 43.20%, 50%, 57.90% and 57.90% respectively, which means that the independent variables of climate change risk disclosure index and its sub sections which are environmental, social, sustainability, total section (1), total section (2), the total index and the control variables can explain 31%, 45.50%, 43.20%, 50%, 57.90% and 57.90% respectively from the change of firm value measured by Tobin's Q. Moreover, the F-Value for the models equal 6.991, 12.136, 11.152, 14.334, 19.344 and 19.315 are significant at level 1% which means that models explain the relationship efficiently.

On the other side, Depending on Panel (B) Results from the table rows it is clear that R^2 for the models equal 51.10%, 58.60%, 62.30%, 73%, 62% and 73.8% respectively, which means that the independent variables of climate change risk disclosure index and its sub sections which are environmental, social, sustainability, total section (1), total section (2), the total index and the control variables can explain 51.10%, 58.60%, 62.30%, 73%, 62% and 73.8% respectively from the change of firm value measured by economic value added (EVA). Moreover, the F-Value for the models equal 14.937, 19.861, 23.018, 37.067, 22.778 and 38.641 are significant at level 1% which means that models explain the relationship efficiently.

Additionally, for the columns results panel (A) show that environmental issue of the climate change risk disclosure positively affects the firm value measured by Tobin's Q and economic value added respectively, where CD (Env.) as an independent variable is significant and positive (β = 0.079, 0.176; T Stat. = 5.789, 9.371 > 2). This result means that increasing the environmental issue of the climate change risk disclosure lead to increasing in the firm value measured by the Tobin's Q and economic value added (EVA) i.e. that increasing the disclosure of environmental issue from the climate change risk disclosure index lead to more transparency for the stakeholders so the firm value increased. Moreover, only leverage as one of control variables negatively affect the firm value measured by Tobin's Q where (β = -0.876; T Stat. = -2.555 > 2). Therefore, the first sub hypothesis can be accepted in the alternative form as follow: environmental issue of the climate change risk disclosure index positively affects the firm value measured by the Tobin's Q and economic value added.

Table 10. The effect of climate change risk disclosure index and its sub sections on the firm Value (H2)

Variables	Panel A: CD (Env.)		Panel B: CD (Soc.)		Panel C: CD (Sus.)		Panel D: CD (Sec. 1)		Panel E: CD (Sec.2)		Panel F: CD	
	β Coef.	t-stat.	β Coef.	t-stat.	β Coef.	t-stat.	β Coef.	t-stat.	β Coef.	t-stat.	β Coef.	t-stat.
Cons.	1.332	5.575	1.221	5.732	1.295	6.030	1.151	5.598	1.257	6.839	1.149	6.140
CD (Env.)	0.079	5.789	---	---	---	---	---	---	---	---	---	---
CD (Soc.)	---	---	0.073	7.883	---	---	---	---	---	---	---	---
CD (Sus.)	---	---	---	---	0.090	7.528	---	---	---	---	---	---
CD (Sec. 1)	---	---	---	---	---	---	0.100	8.624	---	---	---	---
CD (Sec.2)	---	---	---	---	---	---	---	---	0.127	10.111	---	---
CD	---	---	---	---	---	---	---	---	---	---	0.121	10.104
Size	-0.053	-1.833	-0.048	-1.851	-0.042	-1.581	-0.046	-1.857	-0.054	-2.398	-0.049	-2.168
Lev	-0.876	-2.555	-0.650	-2.141	-0.798	-2.574	-0.790	-2.714	-0.835	-3.125	-0.819	-3.065
ROA	0.116	0.215	0.507	1.050	0.347	0.706	0.361	0.783	0.323	0.764	0.357	0.842
Growth	-0.216	-0.343	0.083	0.147	-0.151	-0.264	-0.034	-0.064	0.003	0.007	0.006	0.011
ACC.	0.090	0.112	-0.453	-0.632	-0.682	-0.931	-0.389	-0.568	-0.313	-0.498	-0.374	-0.595
Year & Industry Dummies	*Included*		*Included*		*Included*		*Included*		*Included*		*Included*	
N	81		81		81		81		81		81	
F-value	6.991***		12.136***		11.152***		14.334***		19.344***		19.315***	
Adj. R2	31.00%		45.50%		43.20%		50.00%		57.90%		57.90%	
Variables	Panel A: CD (Env.)		Panel B: CD (Soc.)		Panel C: CD (Sus.)		Panel D: CD (Sec. 1)		Panel E: CD (Sec.2)		Panel F: CD	
	β Coef.	t-stat.	β Coef.	t-stat.	β Coef.	t-stat.	β Coef.	t-stat.	β Coef.	t-stat.	β Coef.	t-stat.
Cons.	0.554	1.679	0.461	1.515	0.554	1.929	0.257	1.038	0.627	2.189	0.340	1.405
CD (Env.)	0.176	9.371	---	---	---	---	---	---	---	---	---	---
CD (Soc.)	---	---	0.144	10.818	---	---	---	---	---	---	---	---
CD (Sus.)	---	---	---	---	0.186	11.652	---	---	---	---	---	---
CD (Sec. 1)	---	---	---	---	---	---	0.207	14.803	---	---	---	---
CD (Sec.2)	---	---	---	---	---	---	---	---	0.226	11.591	---	---
CD	---	---	---	---	---	---	---	---	---	---	0.234	15.115
Size	-0.001	-0.014	0.009	0.258	0.023	0.647	0.014	0.473	-0.004	-0.101	0.007	0.223
Lev	-0.289	-0.610	0.205	0.472	-0.097	-0.234	-0.079	-0.226	-0.133	-0.319	-0.123	-0.356
ROA	-0.736	-0.984	0.051	0.074	-0.247	-0.376	-0.218	-0.391	-0.333	-0.506	-0.249	-0.455
Growth	-0.002	-0.002	0.560	0.700	0.119	0.156	0.360	0.558	0.351	0.459	0.400	0.630
ACC.	1.829	1.646	0.704	0.687	0.194	0.197	0.801	0.970	1.011	1.032	0.865	1.065
Year & Industry Dummies	*Included*		*Included*		*Included*		*Included*		*Included*		*Included*	
N	81		81		81		81		81		81	
F-value	14.937***		19.861***		23.018***		37.067***		22.778***		38.641***	
Adj. R2	51.10%		58.60%		62.30%		73.00%		62.00%		73.80%	

According to panel (B) from the columns results, it is obvious that social issue of the climate change risk disclosure positively affects the firm value measured by Tobin's Q and economic value added respectively, where CD (Soc.) as an independent variable is significant and positive (β = 0.073, 0.144; T Stat. = 7.883, 10.818 > 2). This result means that increasing the social issue of the climate change risk disclosure lead to increasing in the firm value measured by the Tobin's Q and economic value added (EVA) i.e. that increasing the disclosure of social issue from the climate change risk disclosure index lead to more transparency for the stakeholders so the firm value increased. Moreover, only leverage as one of control variables negatively affects the firm value measured by Tobin's Q where (β = -0.650; T Stat. = -2.141 > 2). Therefore, the second sub hypothesis can be accepted in the alternative form as follow: social issue of the climate change risk disclosure index positively affects the firm value measured by the Tobin's Q and economic value added (EVA).

Additionally, panel (C) from the columns results, it is obvious that sustainability issue of the climate change risk disclosure positively affects the firm value measured by Tobin's Q and economic value added respectively, where CD (Sus.) as an independent variable is significant and positive (β = 0.090, 0.186; T Stat. = 7.528, 11.652 > 2). This result means that increasing the sustainable issue of the climate change risk disclosure lead to increasing in the firm value measured by the Tobin's Q and economic value added (EVA) i.e. that increasing the disclosure of sustainable issue from the climate change risk disclosure index lead to more transparency for the stakeholders so the firm value increased. Moreover, current study found only leverage as one of control variables negatively affects the firm value measured by Tobin's Q where (β = -0.798; T Stat. = -2.574 > 2). Therefore, the third sub hypothesis can be accepted in the alternative form as follow: sustainable issue of the climate change risk disclosure index positively affects the firm value measured by the Tobin's Q and economic value added (EVA).

Moreover, panel (D) from the columns results, it is clear that total section (1) of the climate change risk disclosure positively affect the firm value measured by Tobin's Q and economic value added respectively, where CD (Sec.1) as an independent variable is significant and positive (β = 0.100, 0.207; T Stat. = 8.624, 14.803 > 2). This result means that increasing the total section (1) of the climate change risk disclosure lead to increasing in the firm value measured by the Tobin's Q and economic value added (EVA) i.e. that increasing the disclosure of total section (1) from the climate change risk disclosure index lead to more transparency for the stakeholders so the firm value increased. Moreover, current study found only leverage as one of control variables negatively affects the firm value measured by Tobin's Q where (β = -0.790; T Stat. = -2.714 > 2). Therefore, the fourth sub hypothesis can be accepted in the alternative form as follow: total section (1) of the climate change risk disclosure index positively affects the firm value measured by the Tobin's Q and economic value added (EVA).

Besides, panel (E) from the columns results, it is clear that total section (2) of the climate change risk disclosure positively affect the firm value measured by Tobin's Q and economic value added respectively, where CD (Sec.2) as an independent variable is significant and positive (β = 0.127, 0.226; T Stat. = 10.111, 11.591 > 2). This result means that increasing the total section (2) of the climate change risk disclosure lead to increasing in the firm value measured by the Tobin's Q and economic value added (EVA) i.e. that increasing the disclosure of total section (2) from the climate change risk disclosure index lead to more transparency for the stakeholders so the firm value increased. Moreover, only size and leverage

as control variables negatively affect the firm value measured by Tobin's Q where (β = -0.054, -0.835; T Stat. = -2.398, -3.125 > 2). Therefore, the fifth sub hypothesis can be accepted in the alternative form as follow: total section (2) of the climate change risk disclosure index positively affects the firm value measured by the Tobin's Q and economic value added (EVA).

Finally, panel (F) from the columns results, it is clear that the total climate change risk disclosure index positively affects the firm value measured by Tobin's Q and economic value added respectively, where CD as an independent variable is significant and positive (β = 0.121, 0.234; T Stat. = 10.104, 15.115 > 2). This result means that increasing the total climate change risk disclosure index lead to increasing in the firm value measured by the Tobin's Q and economic value added (EVA) i.e. that increasing the total climate change risk disclosure index lead to more transparency for the stakeholders so the firm value increased. Moreover, only size and leverage as control variables negatively affect the firm value measured by Tobin's Q where (β = -0.049, -0.819; T Stat. = -2.168, -3.065 > 2). Therefore, the sixth sub hypothesis can be accepted in the alternative form as follow: total climate change risk disclosure index positively affects the firm value measured by the Tobin's Q and economic value added (EVA).

Based on the results of panels (A, B, C, D, E & F), the second hypothesis of this study can be accepted on the alternative form as follow: H2, climate change risk disclosure positively affects the firm value.

4.4.3 The effect of interaction between the stranded assets impairments and climate change risk disclosure index and its sub sections on the firm value (H3)

The third hypothesis test the effect of the interaction relationship between the stranded assets impairments and climate change risk disclosure index and its sub sections on the firm value based on the model no (3) and its sub models. Consequently, running model no (3) and its sub models lead to the results stated in table no.11.

Depending on Panel (A) results, from the table rows it is clear that R2 for the models equal 22.10%, 21.90%, 22.70%, 22.5%, 37% and 33% respectively, which means that the moderated relationship for the interaction between the stranded assets impairments and climate change risk disclosure index and its sub sections which are environmental, social, sustainability, total section (1), total section (2), the total index and the control variables can explain 22.10%, 21.90%, 22.70%, 22.5%, 37% and 33% respectively from the change of firm value measured by Tobin's Q. Moreover, the F-Value for the models equal 4.859, 4.728, 4.923, 4.876, 8.823 and 7.577 are significant at level 1% which means that models explain the relationship efficiently.

In another vein, depending on Panel (B) results, from the table rows it is clear that R2 for the models equal 14.50%, 37.00%, 36.00%, 43.00%, 42.50% and 49.9% respectively, which means that the moderated relationship for the interaction between the stranded assets impairments and climate change risk disclosure index and its sub sections which are environmental, social, sustainability, total section (1), total section (2), the total index and the control variables can explain 14.50%, 37.00%, 36.00%, 43.00%, 42.50% and 49.90% respectively from the change of firm value measured by economic value added (EVA). Moreover, the F-Value for the models equal 3.270, 8.814, 8.516, 11.079, 10.853 and 14.279 are significant at level 1% which means that models explain the relationship efficiently.

Additionally, for the columns results panel (A) show that the moderated relationship for the interaction between the stranded assets impairments and environmental issue of the climate change risk disclosure positively affects the firm value measured by Tobin's Q and economic value added respectively,

where CD (Env.) × SAI as a moderator variable is significant and positive (β = 0.370, 1.119; T Stat. = 2.228, 4.311 > 2).

Table 11. The effect of interaction relationship between the stranded assets impairments and climate change risk disclosure index and its sub sections on the firm Value (H3)

Variables	Panel A: CD (Env.) × SAI		Panel B: CD (Soc.) × SAI		Panel C: CD (Sus.) × SAI		Panel D: CD (Sec. 1) × SAI		Panel E: CD (Sec.2) × SAI		Panel F: CD × SAI	
	β Coef.	t-stat.	β Coef.	t-stat.	β Coef.	t-stat.	β Coef.	t-stat.	β Coef.	t-stat.	β Coef.	t-stat.
Cons.	1.602	5.792	1.443	5.732	1.457	5.853	1.375	5.394	1.424	6.403	1.331	5.675
CD (Env.) × SAI	0.370	2.228	---	---	---	---	---	---	---	---	---	---
CD (Soc.) × SAI	---	---	0.586	4.574	---	---	---	---	---	---	---	---
CD (Sus.) × SAI	---	---	---	---	0.754	4.692	---	---	---	---	---	---
CD (Sec. 1) × SAI	---	---	---	---	---	---	0.801	4.663	---	---	---	---
CD (Sec.2) × SAI	---	---	---	---	---	---	---	---	1.158	6.611	---	---
CD × SAI	---	---	---	---	---	---	---	---	---	---	1.099	6.064
Size	-0.054	-1.598	-0.051	-1.671	-0.046	-1.496	-0.049	-1.608	-0.063	-2.270	-0.055	-1.923
Lev	-0.811	-2.019	-0.717	-1.972	-0.833	-2.299	-0.838	-2.308	-0.850	-2.598	-0.867	-2.567
ROA	0.133	0.211	0.457	0.789	0.411	0.715	0.347	0.605	0.327	0.632	0.363	0.679
Growth	-0.262	-0.357	-0.065	-0.097	-0.228	-0.343	-0.139	-0.209	0.034	0.056	-0.031	-0.050
ACC.	-0.114	-0.122	-0.788	-0.908	-0.902	-1.041	-0.693	-0.805	-0.721	-0.931	-0.796	-0.996
Year & Industry Dummies	*Included*		*Included*		*Included*		*Included*		*Included*		*Included*	
N	81		81		81		81		81		81	
F-value	4.859***		4.728***		4.923***		4.876***		8.823***		7.577***	
Adj. R2	22.10%		21.90%		22.70%		22.50%		37.00%		33.00%	
Variables	Panel A: CD (Env.) × SAI		Panel B: CD (Soc.) × SAI		Panel C: CD (Sus.) × SAI		Panel D: CD (Sec. 1) × SAI		Panel E: CD (Sec.2) × SAI		Panel F: CD × SAI	
	β Coef.	t-stat.	β Coef.	t-stat.	β Coef.	t-stat.	β Coef.	t-stat.	β Coef.	t-stat.	β Coef.	t-stat.
Cons.	1.005	2.322	0.774	2.088	0.831	2.236	0.569	1.588	0.888	2.547	0.595	1.787
CD (Env.) × SAI	1.119	4.311	---	---	---	---	---	---	---	---	---	---
CD (Soc.) × SAI	---	---	1.355	7.175	---	---	---	---	---	---	---	---
CD (Sus.) × SAI	---	---	---	---	1.692	7.051	---	---	---	---	---	---
CD (Sec. 1) × SAI	---	---	---	---	---	---	1.948	8.057	---	---	---	---
CD (Sec.2) × SAI	---	---	---	---	---	---	---	---	2.189	7.974	---	---
CD × SAI	---	---	---	---	---	---	---	---	---	---	2.356	9.160
Size	-0.002	-0.032	0.003	0.071	0.015	0.338	0.009	0.205	-0.020	-0.456	-0.005	-0.113
Lev	-0.236	-0.375	0.066	0.124	-0.194	-0.359	-0.231	-0.453	-0.177	-0.345	-0.252	-0.525
ROA	-0.745	-0.754	0.044	0.052	-0.077	-0.089	-0.189	-0.234	-0.312	-0.384	-0.201	-0.265
Growth	-0.073	-0.064	0.353	0.358	-0.029	-0.029	0.201	0.215	0.440	0.466	0.386	0.439
ACC.	1.384	0.942	-0.184	-0.144	-0.395	-0.305	-0.031	-0.026	0.221	0.182	-0.092	-0.081
Year & Industry Dummies	*Included*		*Included*		*Included*		*Included*		*Included*		*Included*	
N	81		81		81		81		81		81	
F-value	3.270***		8.814***		8.516***		11.079***		10.853***		14.279***	
Adj. R2	14.50%		37.00%		36.00%		43.00%		42.50%		49.90%	

This result means that increasing the moderated relationship for the interaction between the stranded assets impairments and environmental issue of the climate change risk disclosure lead to increasing in the firm value measured by the Tobin's Q and economic value added (EVA), although the negative relationship between the stranded assets impairments and firm value measured by the Tobin's Q and economic value added (EVA), which means that environmental issue of the climate change risk disclosure can moderate the origin relationship from the negative to positive i.e. that increasing the moderated relationship for the interaction between the stranded assets impairments and environmental issue from the climate change risk disclosure index lead to more transparency for the stakeholders so the firm value increased. Moreover, only leverage as one of control variables negatively affects the firm value measured by Tobin's Q where (β = -0.811; T Stat. = -2.019 > 2). Therefore, the first sub hypothesis can be accepted in the alternative form as follow: moderated relationship for the interaction between the stranded assets impairments and environmental issue of the climate change risk disclosure index positively affects the firm value measured by the Tobin's Q and economic value added.

According to panel (B) from the columns results, it is obvious the moderated relationship for the interaction between the stranded assets impairments and social issue of the climate change risk disclosure positively affects the firm value measured by Tobin's Q and economic value added respectively, where CD (Soc.) × SAI as a moderator variable is significant and positive (β = 0.586, 1.355; T Stat. = 4.574, 7.175 > 2). This result means that increasing the moderated relationship for the interaction between the stranded assets impairments and social issue of the climate change risk disclosure lead to increasing in the firm value measured by the Tobin's Q and economic value added (EVA), although the negative relationship between the stranded assets impairments and firm value measured by the Tobin's Q and economic value added (EVA), which means that social issue of the climate change risk disclosure can moderate the origin relationship from the negative to positive i.e. that increasing the moderated relationship for the interaction between the stranded assets impairments and social issue from the climate change risk disclosure index lead to more transparency for the stakeholders so the firm value increased. Therefore, the second sub hypothesis can be accepted in the alternative form as follow: *moderated relationship for the interaction* between the stranded assets impairments and social issue of the climate change risk disclosure index positively affects the firm value measured by the Tobin's Q and economic value added (EVA).

Additionally, panel (C) from the columns results, it is obvious that the moderated relationship for the interaction between the stranded assets impairments and sustainability issue of the climate change risk disclosure positively affects the firm value measured by Tobin's Q and economic value added respectively, where CD (Sus.) × SAI as a moderator variable is significant and positive (β = 0.754, 1.692; T Stat. = 4.692, 7.051 > 2). This result means that increasing the moderated relationship for the interaction between the stranded assets impairments and sustainability issue of the climate change risk disclosure lead to increasing in the firm value measured by the Tobin's Q and economic value added (EVA), although the negative relationship between the stranded assets impairments and firm value measured by the Tobin's Q and economic value added (EVA), which means that sustainability issue of the climate change risk disclosure can moderate the origin relationship from the negative to positive i.e. that increasing the moderated relationship for the interaction between the stranded assets impairments and sustainability issue from the climate change risk disclosure index lead to more transparency for the stakeholders so the firm

value increased. Moreover, only leverage as one of control variables negatively affects the firm value measured by Tobin's Q where (β = -0.833; T Stat. = -2.299 > 2). Therefore, the third sub hypothesis can be accepted in the alternative form as follow: moderated relationship for the interaction between the stranded assets impairments and sustainability issue of the climate change risk disclosure index positively affects the firm value measured by the Tobin's Q and economic value added (EVA).

Moreover, panel (D) from the columns results, it is clear that the moderated relationship for the interaction between the stranded assets impairments and total section (1) of the climate change risk disclosure positively affects the firm value measured by Tobin's Q and economic value added respectively, where CD (Sec.1) × SAI as a moderator variable is significant and positive (β = 0.801, 1.948; T Stat. = 4.663, 8.057 > 2). This result means that increasing the moderated relationship for the interaction between the stranded assets impairments and total section (1) of the climate change risk disclosure lead to increasing in the firm value measured by the Tobin's Q and economic value added (EVA), although the negative relationship between the stranded assets impairments and firm value measured by the Tobin's Q and economic value added (EVA), which means that total section (1) of the climate change risk disclosure can moderate the origin relationship from the negative to positive i.e. that increasing the moderated relationship for the interaction between the stranded assets impairments and total section (1) from the climate change risk disclosure index lead to more transparency for the stakeholders so the firm value increased. Moreover, only leverage as one of control variables negatively affects the firm value measured by Tobin's Q where (β = -0.838; T Stat. = -2.308 > 2). Therefore, the fourth sub hypothesis can be accepted in the alternative form as follow: *moderated relationship for the interaction between the stranded assets impairments and total section (1) of the climate change risk disclosure index positively affects the firm value measured by the Tobin's Q and economic value added (EVA).*

Besides, panel (E) from the columns results, it is clear that the moderated relationship for the interaction between the stranded assets impairments and total section (2) of the climate change risk disclosure positively affects the firm value measured by Tobin's Q and economic value added respectively, where CD (Sec.2) × SAI as a moderator variable is significant and positive (β = 1.158, 2.189; T Stat. = 6.611, 7.974 > 2). This result means that increasing the moderated relationship for the interaction between the stranded assets impairments and total section (2) of the climate change risk disclosure lead to increasing in the firm value measured by the Tobin's Q and economic value added (EVA), although the negative relationship between the stranded assets impairments and firm value measured by the Tobin's Q and economic value added (EVA), which means that total section (2) of the climate change risk disclosure can moderate the origin relationship from the negative to positive i.e. that increasing the moderated relationship for the interaction between the stranded assets impairments and total section (2) from the climate change risk disclosure index lead to more transparency for the stakeholders so the firm value increased. Moreover, only size and leverage as control variables negatively affect the firm value measured by Tobin's Q where (β = -0.063, -0.850; T Stat. = -2.270, -2.598 > 2). Therefore, the fifth sub hypothesis can be accepted in the alternative form as follow: *moderated relationship for the interaction between the stranded assets impairments and total section (2) of the climate change risk disclosure index positively affects the firm value measured by the Tobin's Q and economic value added (EVA).*

Finally, panel (F) from the columns results, it is clear that the moderated relationship for the interaction between the stranded assets impairments and total climate change risk

disclosure positively affects the firm value measured by Tobin's Q and economic value added respectively, where CD × SAI as a moderator variable is significant and positive (β = 1.099, 2.356; T Stat. = 6.064, 9.160 > 2). This result means that increasing the moderated relationship for the interaction between the stranded assets impairments and total climate change risk disclosure lead to increasing in the firm value measured by the Tobin's Q and economic value added (EVA), although the negative relationship between the stranded assets impairments and firm value measured by the Tobin's Q and economic value added (EVA), which means that total climate change risk disclosure can moderate the origin relationship from the negative to positive i.e. that increasing the moderated relationship for the interaction between the stranded assets impairments and total climate change risk disclosure index lead to more transparency for the stakeholders so the firm value increased. Moreover, only leverage as one of control variables negatively affects the firm value measured by Tobin's Q where (β = -0.867; T Stat. = -2.567 > 2). Therefore, the sixth sub hypothesis can be accepted in the alternative form as follow: moderated relationship for the interaction between the stranded assets impairments and total climate change risk disclosure index positively affects the firm value measured by the Tobin's Q and economic value added (EVA).

Based on the results of panels (A, B, C, D, E & F), current study can accept the third hypothesis on the alternative form as follow: H3, moderated relationship for the interaction between the stranded assets impairments and climate change risk disclosure positively affects the firm Value.

5. Conclusions

The purpose of this study was to investigate the moderating effect of climate change risk disclosure as well as the effect of stranded assets impairment on business value. Because of this, the current study reviewed the literature on the risks associated with climate change, the impairment of stranded assets, and firm value, and analyzed climate change risk disclosure in accordance with international professional organizations guidance and standards. The research methodology focused on Egyptian cement listed companies for the time period between 2017 and 2023, with final sample consisted of 81 observations.

Research results drawn from theoretical work showed that governments and investors are putting more and more pressure on businesses to show that they are generating value for users by demonstrating their commitment to lowering the risks associated with climate change. Each climate risk has a significant financial impact on the assets, operations, and total valuation of the business, So, climate change poses a risk to corporate assets, which could physically destroy them and reduce their value along with any potential economic benefits. Consequently, stranded asset, defined as an asset that deteriorates more than expected or even to the point where it turns into a liability. The current accounting standards for the valuation of assets and the usual writing off of assets during an asset's economic lifetime are insufficient because they cannot predict the effects of climate change, and they can have an excessive impact on the value of assets. So, to make informed decisions, investors need to ascertain whether share prices reflect stranded assets risk.

Research Conclusions drawn from applied work showed that Stranded assets impairments have negative effect on the firm value measured by the Tobin's Q and the economic value added, whilst, climate change risk disclosure index and its sub sections which are environmental, social, sustainability, total section (1), total section (2), the total index climate change risk disclosure have positive effect on the firm value measured by the Tobin's Q and the economic value added. Also, the moderated relationship for the interaction between the

stranded assets impairments and climate change risk disclosure index and its sub sections which are environmental, social, sustainability, total section (1), total section (2), the total index has positive effect on the firm value measured by the Tobin's Q and economic value added.

6. Recommendations

Enacting effective policies to mitigate climate change and support investors in making climate-aware investment decisions will require policymakers and regulators to be more cognizant of the risks and returns of different types of assets, as well as market return and instability conditions.

Businesses should assess whether an asset shows indications of impairment at the ending of each accounting period, ascertain its recoverable value, and make provisions for impairment when the recoverable amount is less than the carrying amount.

Businesses must convince investors and other stakeholders of their ability to manage stranded assets impairments and transition to a low-carbon business model through matching their internal and external activities with net zero targets by the time limits set forth by climate policy.

Similar to financial information, reporting on climate change risks need to be standardized and governed since it is equally significant.

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References

Abhayawansa, S., & Adams, C. (2022). Towards a conceptual framework for non-financial reporting inclusive of pandemic and climate risk reporting. *Meditari Accountancy Research, 30*(3), 710-738.

Aibar-Guzmán, B., Raimo, N., Vitolla, F., & García-Sánchez, I. (2023). Corporate governance and financial performance: Reframing their relationship in the context of climate change. *Corporate Social Responsibility and Environmental Management*, 1-17.

Alam, A., Du, A. M., Rahman, M., Yazdifar, H., & Abbasi, K. (2022). SMEs respond to climate change: Evidence from developing countries. *Technological Forecasting & Social Change, 185*, 1-8.

Alam, Md., Tahir, Y., Saif-Alyousfi, A., & Pahlevi, R. (2024). Climate change-induced firms' initiatives and investors' perceptions: Evidence from Bursa Malaysia. *Sustainability Accounting, Management and Policy Journal, 15*(1), 232-261.

Alsaifi, K., Elnahass, M., & Salama, A. (2020). Carbon disclosure and financial performance: UK environmental policy. *Business Strategy and the Environment, 29*(2), 711–726.

Alshahrani, F., Eulaiwi, B., Duong, L., & Taylor, G. (2023). Climate change performance and financial distress. *Business Strategy and the Environment, 32*, 3249–3271.

Alsheikh, A. H., & Alsheikh, W. H. (2023). The level of climate risk reporting performance and firm characteristics: Evidence from the Saudi Stock Exchange. *Investment Management and Financial Innovations, 20*(4), 360-374.

Antoniuk, Y. (2023). The effect of climate disclosure on stock market performance: Evidence from Norway. *Sustainable Development, 31*, 1008–1026.

Arian, A., & Sands, J. S. (2023). Corporate climate risk disclosure: Assessing materiality and stakeholder expectations for sustainable value creation. *Sustainability Accounting, Management and Policy Journal*, 1-25.

Asare, E., Duho, K., & Amegatcher, E. (2022). Climate change reporting and corporate governance among Asian and African energy firms. *IOP Conference Series: Earth and Environmental Science, 997*, 1-16.

Atanasova, C., & Schwartz, E. (2019). Stranded fossil fuel reserves and firm value. *NBER Working Paper No. 26497*, 1-44.

Baer, M. (2020). The impact of stranded fossil fuel assets on international financial institutions: A financial exposure analysis and implications for European central banks and financial regulators. *C-EENRG Working Papers*, 1-38.

Basyith, A., Fauzi, F., & Agusria, L. (2024). Green finance and governance: The effect of climate change. *Corporate & Business Strategy Review, 5*(1), 16-29.

Ben-Amar, W., Comyns, B., & Martinez, I. (2023). The COVID-19 pandemic: Opportunity or challenge for climate change risk disclosure? *Accounting, Auditing & Accountability Journal, 36(2)*, 649-676.

Bertolotti, A., Basu, D., Akallal, K., & Deese, B. (2019). Climate risk in the US electric utility sector: A case study. *SSRN*. Retrieved from https://ssrn.com/abstract=3347746

Blanco, C. C. (2021). Supply chain carbon footprinting and climate change disclosures of global firms. *Production and Operations Management, 30(9)*, 3143–3160.

Bogmans, C., Pescatori, A., & Prifti, E. (2023). The impact of climate policy on oil and gas investment: Evidence from firm-level data. *IMF Working Paper 23/140*, 1-43.

Bos, K., & Gupta, J. (2019). Stranded assets and stranded resources: Implications for climate change mitigation and global sustainable development. *Energy Research & Social Science, 56*, 1-15.

Bouri, E., Rognone, L., Sokhanvar, A., & Wang, Z. (2023). From climate risk to the returns and volatility of energy assets and green bonds: A predictability analysis under various conditions. *Technological Forecasting & Social Change, 194*, 1-22.

Breitenstein, M., Anke, C., Nguyen, D., & Walther, T. (2021). Stranded asset risk and political uncertainty: The impact of the coal phase-out on the German coal industry. *SSRN*.

Bui, B., Houqe, M., & Zaman, M. (2021). Climate change mitigation: Carbon assurance and reporting integrity. *Business Strategy and the Environment, 30*, 3839–3853.

Byrd, J., & Cooperman, E. (2016). Investors and stranded asset risk: Evidence from shareholder responses to carbon capture and sequestration (CCS) events. *SSRN*.

Campiglio, E., Godin, A., & Kemp-Benedict, E. (2017). Networks of stranded assets: A case for a balance sheet approach. *AFD Research Papers Series, No. 2017-54*, 1-26.

Capasso, G., Gianfrate, G., & Spinelli, M. (2020). Climate change and credit risk. *Journal of Cleaner Production, 266*, 1-10.

Carattini, S., & Sen, S. (2019). Carbon taxes and stranded assets: Evidence from Washington state. *CESifo Working Paper No. 7785*, 1-57.

CDP. (2023a). What we do. Retrieved from https://www.cdp.net/en/info/about-us/what-we-do

Climate Disclosure Standards Board (CDSB) & Sustainability Accounting Standards Board (SASB). (2019). *TCFD implementation guide: Using SASB standards and the CDSB framework to enhance climate-related financial disclosures in mainstream reporting*. London and San Francisco.

Charumathi, B., & Rahman, H. (2019). Do women on boards influence climate change disclosures to CDP? Evidence from large Indian companies. *Australasian Accounting, Business and Finance Journal, 13(2)*, 5-31.

Chen, H., Kuo, T., & Chen, J. (2022). Impacts on the ESG and financial performances of companies in the manufacturing industry based on the climate change-related risks. *Journal of Cleaner Production, 380*, 1-13.

Chen, J. W., Khoo, E. S., & Peng, Z. (2023). Climate change disclosure and the information environment in the initial public offering market. *Accounting & Finance, 63*, 907–952.

Cosma, S., Principale, S., & Venturelli, A. (2022). Sustainable governance and climate-change disclosure in European banking: The role of the corporate social responsibility committee. *Corporate Governance, 22(6)*, 1345–1369.

Crespo, J., Cunha, B., Draeger, R., Schaeffer, R., & Szklo, A. (2023). Stranded assets and compensation in upstream projects: Conceptual and practical issues. *SSRN*.

Davidson, B., & Schuwerk, R. (2021). Flying blind – The glaring absence of climate risks in financial reporting.

Demaria, S., & Rigot, S. (2021). Corporate environmental reporting: Are French firms compliant with the Task Force on Climate Financial Disclosures' recommendations? *Business Strategy and the Environment, 30(1)*, 721–738.

Dey, D., Richards, L., Arora, M., Boyle, E., Bryson, R., Jackman, S., Patel, V., & Shirazi, C. (2024). Overview of climate disclosures. *British Actuarial Journal, 28*, e13, 1-17.

Ding, R., Liu, M., Wang, T., & Wu, Z. (2021). The impact of climate risk on earnings management: International evidence. *Journal of Accounting and Public Policy, 40*, 1-17.

Dulong, A., Gard-Murray, A., Hagen, Z., Jaakkola, N., & Sen, S. (2023). Stranded assets: Research gaps and implications for climate policy. *Review of Environmental Economics and Policy, 17(1)*, 161-169.

European Commission (EC). (2022). Directive (EU) 2022/2464 as regards corporate sustainability reporting. *Official Journal of the European Union*.

El-Jourbagy, J., & Gura, P. (2022). In space, no one can hear you're green: Standardization of environmental reporting, the SEC's proposed climate change disclosure rules, and remote sensing technology. *American Business Law Journal, 59(4)*, 773–820.

Elliott, C., Janzwood, A., Bernstein, S., & Hoffmann, M. (2023). Rethinking complementarity: The co-evolution of public and private governance in corporate climate disclosure. *Regulation & Governance*, 1-18.

EY. (2023). *Applying IFRS – Accounting for climate change* (pp. 1-68).

Flammer, C., Toffel, M. W., & Viswanathan, K. (2021). Shareholder activism and firms' voluntary disclosure of climate change risks. *Strategic Management Journal, 42(10)*, 1850–1879.

García-Sánchez, I., Ali, R., & Rehman, R. (2023). Is there a complementary or a substitutive relationship between climate governance and analyst coverage? Its effect on climate disclosure. *Business Strategy and the Environment, 32*, 3445–3464.

Gerged, A. M., Beddewela, E., & Cowton, C. J. (2021). Is corporate environmental disclosure associated with firm value? A multicountry study of Gulf Cooperation Council firms. *Business Strategy and the Environment, 30*, 185–203.

Giannarakis, G., Zafeiriou, E., Arabatzis, G., & Partalidou, X. (2018). Determinants of corporate climate change disclosure for European firms. *Corporate Social Responsibility and Environmental Management, 25*, 281–294.

Griffin, P., & Jaffe, A. M. (2022). Challenges for a climate risk disclosure mandate. *Nature Energy, 7*, 2–4. https://doi.org/10.1038/s41560-021-00929-z

Grove, H., Clouse, M., & Xu, T. (2021). Climate change risk: Challenge for corporate governance. *Journal of Governance and Regulation, 10(2)*, 258–268.

Guo, Y., Zhao, J., & Yang, D. C. (2022). Theories applicable to corporate climate change disclosure. *Journal of Corporate Accounting and Finance, 33*, 147–157.

Hansen, T. A. (2022). Stranded assets and reduced profits: Analyzing the economic underpinnings of the fossil fuel industry's resistance to climate stabilization. *Renewable and Sustainable Energy Reviews, 158*, 1-14.

Hardiyansah, M., Agustini, A., & Purnamawati, I. (2021). The effect of carbon emission disclosure on firm value: Environmental performance and industrial type. *The Journal of Asian Finance, Economics, and Business, 8(1)*, 123-133.

He, X., Xu, X., & Shen, Y. (2023). How climate change affects enterprise inventory management from the perspective of regional traffic. *Journal of Business Research, 162*, 1-15.

Heras, A., & Gupta, J. (2024). Fossil fuels, stranded assets, and the energy transition in the Global South: A systematic literature review. *WIREs Climate Change, 15*, e866, 1-23.

Hickey, C., O'Brien, J., Caldecott, B., McInerney, C., & O'Gallachoir, B. (2021). Can European electric utilities manage asset impairments arising from net zero carbon targets? *Journal of Corporate Finance, 70*, 1-13.

Hossain, A., Rjiba, H., & Zhang, D. (2023). Ex-ante litigation risk and firm-level climate-change exposure. *Journal of Economic Behavior and Organization, 214*, 731–746.

Huang, H. H., Kerstein, J., Wang, C., & Wu, F. (2022). Firm climate risk, risk management, and bank loan financing. *Strategic Management, 43*, 2849–2880.

Huang, H. H., Kerstein, J., & Wang, C. (2018). The impact of climate risk on firm performance and financing choices: An international comparison. *Journal of International Business Studies, 49(5)*, 633–656.

Ibrahim, A., & Aboud, A. (2023). Corporate risk disclosure and firm value: UK evidence. *International Journal of Finance & Economics*, 1-22.

IFRS S2. (2023). *Climate-related disclosures* (IFRS Sustainability Disclosure Standard, pp. 1-46). International Sustainability Standards Board.

Ilhan, E., Krueger, P., Sautner, Z., & Starks, L. T. (2023). Climate risk disclosure and institutional investors. *The Review of Financial Studies, 36(7)*, 2617–2650.

Javadi, S., & Al Masum, A. (2021). The impact of climate change on the cost of bank loans. *Journal of Corporate Finance, 69*, 1-28.

Jiang, Y., Luo, L., Xu, J., & Shao, X. (2021). The value relevance of corporate voluntary carbon disclosure: Evidence from the United States and BRIC countries. *Journal of Contemporary Accounting and Economics, 17(3)*, 100279. https://doi.org/10.1016/j.jcae.2021.100279

Juhola, S., Laurila, A., Groundstroem, F., & Klein, J. (2023). Climate risks to the renewable energy sector: Assessment and adaptation within energy companies. *Business Strategy and the Environment*, 1-14.

Kalkuhl, M., Steckel, J., & Edenhofer, O. (2020). All or nothing: Climate policy when assets can become stranded. *Journal of Environmental Economics and Management, 100*, 1-21.

Khalfaoui, R., Wali, S., Viviani, J., Ben Jabeur, S., Abedin, M. Z., & Lucey, B. M. (2022). How do climate risk and clean energy spillovers, and uncertainty affect U.S. stock markets? *Technological Forecasting & Social Change, 185*, 1-20.

Khan, H., Gupta, S., Kumar, V., & Kumar, B. (2023). Managing climate change risks and creating stakeholders' value via sustainability-focused B2B brand strategies. *Industrial Marketing Management, 115*, 198-213.

Kouloukoui, D., De Marcellis-Warin, N., Armellini, F., Warin, T., & Torres, E. A. (2021). Factors influencing the perception of exposure to climate risks: Evidence from the world's largest carbon-intensive industries. *Journal of Cleaner Production, 306*, 1-16.

Kouloukoui, D., Sant'Anna, A. M., Gomes, S. M., Marinho, M. M., De Jong, P., Kiperstok, A., & Torres, E. A. (2019). Factors influencing the level of environmental disclosures in sustainability reports: Case of climate risk disclosure by Brazilian companies. *Corporate Social Responsibility and Environmental Management, 26*, 791–804.

Krueger, P., Sautner, Z., & Starks, L. T. (2020). The importance of climate risks for institutional investors. *Review of Financial Studies, 33*(3), 1067–1111.

Li, X. (2023). Entrepreneurs' visibility, media attention, and corporate climate risk disclosure – based on Chinese listed companies. *Journal of Organizational Change Management*, 1-21. https://doi.org/10.1108/JOCM-05-2023-0168

Maji, S. G., & Kalita, N. (2022). Climate change financial disclosure and firm performance: Empirical evidence from the Indian energy sector based on TCFD recommendations. *Society and Business Review, 17*(4), 594-612.

McInerney, C., Hickey, C., Deane, P., Curtin, J., & Gallachóir, B. (2019). Fossil fuel lock-in in Ireland: How much value is at risk? *EPA Research Report No. 302*, 1-68.

Myers, G., Hurlimann, A., & Bush, J. (2020). Barriers to climate change adaption in the Australian property industry. *Journal of Property Investment & Finance, 38*(5), 449-462.

Naseer, M., Khan, M., Bagh, T., Guo, Y., & Zhu, X. (2024). Firm climate change risk and financial flexibility: Drivers of ESG performance and firm value. *Borsa Istanbul Review, 24*, 106-117.

Ngo, T., Le, T., Ullah, S., & Trinh, H. H. (2023). Climate risk disclosures and global sustainability initiatives: A conceptual analysis and agenda for future research. *Business Strategy and the Environment, 32*, 3705–3720.

Ni, Y., Chen, Z., Li, D., & Yang, S. (2022). Climate risk and corporate tax avoidance: International evidence. *Corporate Governance: International Review, 30*, 189–211.

Nieto, M. J. (2019). Banks, climate risk, and financial stability. *Journal of Financial Regulation and Compliance, 27*(2), 243-262.

OECD. (2021). *Financial markets and climate transition: Opportunities, challenges, and policy implications* (pp. 1-128).

Olatubosun, P., & Köseoğlu, S. (2020). Valuation challenges in stranded asset scenarios: A risk discourse of evidence from the UK. In *Handbook of Research on Strategic Business Infrastructure Development and Contemporary Issues in Finance* (pp. 157-174). https://doi.org/10.4018/978-1-7998-1086-5.ch009

Ozkan, A., Temiz, H., & Yildiz, Y. (2023). Climate risk, corporate social responsibility, and firm performance. *British Journal of Management, 34*, 1791–1810.

Papandreou, A. (2019). *Stranded assets and the financial system* (Working Paper No. 272). Bank of Greece, 1-57.

Park, J. D., Nishitani, K., Kokubu, K., Freedman, M., & Weng, Y. (2023). Revisiting sustainability disclosure theories: Evidence from corporate climate change disclosure in the United States and Japan. *Journal of Cleaner Production, 382*, 1-13.

Putri, N., & Pratama, A. (2023). Quality of financial disclosures related to environmental, social, and governance matters, and firm characteristics and firm value: A comparative study across four ASEAN countries. *International Journal of Management and Sustainability, 12*(3), 404-418.

Rana, T., Lowe, A., & Azam, M. S. (2023). Green governmentality and climate change risk management: The case of a regulatory reform in Bangladesh. *Accounting, Auditing & Accountability Journal, 36*(3), 801-829.

Restrepo, L., Tellez-Falla, D., & Godoy-Bejarano, J. (2022). Information disclosure quality and firm value: Empirical evidence for an emerging integrated market. *Academia Revista Latinoamericana de Administracion, 35*(3), 345-365.

Scholten, R., Lambooy, T., Renes, R., & Bartels, W. (2020). The impact of climate change in the valuation of production assets via the IFRS framework. *Accountancy Economics & Law*, 1-33.

Secinaro, S., Brescia, V., Calandra, D., & Saiti, B. (2020). Impact of climate change mitigation policies on corporate financial performance: Evidence-based on European publicly listed firms. *Corporate Social Responsibility and Environmental Management, 27*, 2491–2501.

Sen, S., & Schickfus, M. (2020). Climate policy, stranded assets, and investors' expectations. *Journal of Environmental Economics and Management, 100*, 1-43.

Setiawan, D., Rahmawati, I., & Santoso, A. (2023). A bibliometric analysis of evolving trends in climate change and accounting research. *Cogent Business & Management, 10*, 1-20.

Shahrour, M. H., Arouri, M., & Lemand, R. (2023). On the foundations of firm climate risk exposure. *Review of Accounting and Finance, 22(5)*, 620-635.

Shimbar, A. (2021). Environment-related stranded assets: What does the market think about the impact of collective climate action on the value of fossil fuel stocks? *Energy Economics, 103*, 1-19.

Sreepriya, J., Suprabha, K. R., & Prasad, K. (2023). Does GRI compliance moderate the impact of sustainability disclosure on firm value? *Society and Business Review, 18(1)*, 152-174.

Stroebel, J., & Wurgler, J. (2021). What do you think about climate finance? *Journal of Financial Economics, 142(2)*, 487–498.

Sun, X., Shen, Y., Guo, K., & Ji, Q. (2023). Sovereign ratings change under climate risks. *Research in International Business and Finance, 66*, 1-16.

Sun, Y., Yang, Y., Huang, N., & Zou, X. (2020). The impacts of climate change risks on financial performance of mining industry: Evidence from listed companies in China. *Resources Policy, 69*, 1-9.

Temiz, H. (2021). The effects of corporate disclosure on firm value and firm performance: Evidence from Turkey. *International Journal of Islamic and Middle Eastern Finance and Management, 14*(5), 1061-1080.

Tuesta, N. Y., Soler, C., & Feliu, R. V. (2021). Carbon management accounting and financial performance: Evidence from the European Union emission trading system. *Business Strategy and the Environment, 30*, 1270–1282.

Unter, K., Park, S., & Rivera, J. (2023). Business response strategies to climate change: An integrative and research frontiers outlook. *Organization & Environment*, 1-33.

Vanza, S., Wells, P., & Wright, A. (2018). Do asset impairments and the associated disclosures resolve uncertainty about future returns and reduce information asymmetry? *Journal of Contemporary Accounting & Economics*, *14*, 22-40.

Vestrelli, R., Colladon, A., & Pisello, A. (2024). When attention to climate change matters: The impact of climate risk disclosure on firm market value. *Energy Policy, 185*, 1-12.

Vichitsarawong, T., & Eng, L. (2023). Corporate governance, financial indicators and asset impairments during the COVID-19 pandemic period. *Finance Research Letters, 58*, 1-10.

Vollmer, U. (2022). Central bank policies and climate change: Where do we stand? *Credit and Capital Markets, 55*(3), 381–411.

Wang, Z., Fu, H., Ren, X., & Gozgor, G. (2024). Exploring the carbon emission reduction effects of corporate climate risk disclosure: Empirical evidence based on Chinese A-share listed enterprises. *International Review of Financial Analysis, 92*, 1-11.

Warren-Myers, G., & Cradduck, L. (2021). Physical and climate change-related risk identification in valuation practice: An Australian perspective. *Journal of Property Investment & Finance, 40*, 14-37.

Warren-Myers, G., & Cradduck, L. (2023). Tackling the wicked challenge of climate change risks to property: Are Australian valuers prepared? *Journal of Property Investment & Finance, 41*(4), 429-452.

Xu, W., Gao, X., Xu, H., & Li, D. (2022). Does global climate risk encourage companies to take more risks? *Research in International Business and Finance, 61*, 1-19.

Yang, H., Meng, K., & Suh, S. (2023). Spatial distributions of stranded fossil asset costs and benefits from climate change mitigation. *Environmental Research Communications, 5*, 1-10.

Zhang, Y., & Zhang, J. (2023). Climate change as represented in corporate social responsibility reports of American and Chinese energy giants: A critical frame analysis perspective. *International Journal of Business Communication*, 1-38.

Zhao, H., Wu, C., & Wen, Y. (2023). Determinants of corporate fossil energy assets impairment and measurement of stranded assets risk. *Energies, 16*, 1-14.

Zhou, Z., & Wu, K. (2023). Does climate risk exposure affect corporate leverage adjustment speed? International evidence. *Journal of Cleaner Production, 389*, 1-10.

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