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Applying the Coase theorem to optimize levels of environmental investment screening

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Abstract: The current paper applies the Coase theorem (Coase, 1960) to environmental investment screening. The Coase theorem is a legal and economic theory focused on explaining how parties when facing a situation involving externalities can reach economic efficiency without government intervention. Through secondary research, the paper examines practices in environmental investment screening, trends in the costs of screening, and trends in the costs of pollution. My findings are in four folds: (1) environmental screening incurs cost, (2) exclusion of environmental screening incurs costs, (3) environmental screening costs are declining, and (4) the cost per unit of pollution is increasing. Applying these findings to the Coase theorem, we conceptually identify an equilibrium point for the optimal level of environmental screening. I further show that the equilibrium point is shifting towards a higher level of environmental screening. The paper thus provides an efficiency-based argument for higher levels of environmental investment screening.

Keywords: Coase theorem; Environmental screening; Green investment; pollution; Environmental impact; Environmental impact assessment

1. Introduction

"The social responsibility of business is to increase its profits" (Friedman, 1970). The application of the famous quote of the modern economist Milton Friedman has changed in the wake of global climate change and recognition of environmental values. The need for attention towards environmental sustainability has grown bigger than ever as global climate change has been changing rapidly. As a result, asset owners are increasingly leaning into green investments (Morgan Stanley, 2020).

Although environmental preservation has grown more important today, the approach to it has been quite controversial as it clashes with the gains of polluting business acts. The Coase theorem provides a strong and widely recognized framework on the issue by helping locate an efficient point for environmental practices.

The current paper explores the following research question: how does the Coase theorem apply to green investments and environmental screening? To explore this question, I look at applications of the Coase theorem, investment practices in green investments, and costs of environmental assessment. My analysis provides conceptual grounds for suggesting that the optimal level of environmental screening may be changing as there are fluctuations in both the cost of environmental screening and the cost of pollution.

Coase theorem

The Coase theorem (Coase, 1960) is a legal and economic theory focused on explaining how parties when facing a situation involving externalities can reach economic efficiency without government intervention. The theorem argues that under an atomistic market, individuals will bargain or negotiate terms to reflect the costs and benefits from their property's rights that have been clearly assigned to reach optimal outcomes. Externalities can be incorporated into the equation and be understood as a bargainable element. In turn, being a component of free market trade, externalities do not inherently require government intervention for control. An example of the theorem's application can be found in the case of the water company Vittel now known as Nestle (Perrot-Maître, 2014). In this case, Vittel bought nearby farms to prevent pollution to their water spring. Additionally, Vittel paid cash to farmers whose farms they were not able to buy in exchange for these farmers to reduce the use of nitrogenous fertilizers. This arrangement was necessary because the farmers' pollution was legally allowed and the farmers had no incentive to reduce pollution if not compensated by Vittel. The payments made to the farmers did not exceed the damages Vittel would incur if the farmers had polluted. Vittel, the pollutee (the victim of pollution), considered the externality which is the pollution and offered a payoff to the polluters to gain the efficient result. If the payoff demanded from the farmers exceeded the damage costs Vittel would have to undertake, Vittel would have chosen to leave the farmers to pollute the spring with fertilizer.

Prior to the introduction of the Coase theorem, a leading economic view on environmental issues was Pigouvian taxation (Deryugina, Tatyana, 2021). The Pigouvian tax (Pigou, 1920), introduced by British economist Arthur Pigou, is a concept used to internalize the costs of externalities that arise from a product into a form of taxation. Requiring polluters to pay taxes would internalize the costs of pollution and reduce the amount of pollution. The Coase theorem introduced a different narrative of externalities being an element of bargain, not taxation. This led to the modern-day view in environmental economics approach to pollution issues (Shirley, 2014). Under the Coase theorem, the amount of environmental screening should not be an element to be regulated, but to be left to the free market for the polluter and pollutee to negotiate its efficient quantity. The level of environmental screening would be determined through market forces including the costs and benefits of screening. The externalities associated with pollution will be considered by market participants in assessing the costs and benefits of environmental screening.

Green (environmental) investing

Green investing, also known as environmental investing, is the practice of investing in financial assets that have a positive impact on the environment. Green investments can be made through various ways such as green bonds, green index funds, or holding stock shares of firms that practice eco-friendly business. Green bonds are "a fixed income debt instrument in which an issuer (typically a corporation, government, or financial institution) borrows a large sum of money from investors for use in sustainability-focused projects" (US Department of Energy, n.d.).

The process of green investing mainly identifies the environmental outcomes of investments. This process would be known as screening or Environmental Impact Assessment (EIA). "A narrow definition of EIA describes it as a systematic process of identifying, predicting, analyzing, evaluating, and mitigating the direct and indirect environmental effects of a proposed activity before permission is given for it to commence. A broader definition stresses the need to identify and assess the potential impacts, not only of projects, but also of legislative proposals, policies, programs and operational procedures, on the environment, human health and well-being, and to communicate information about those impacts to the general public" (United Nations, 2001)

The process of environmental screening starts by setting a criteria for assessing green assets. The screening process aims to reduce the negative environmental impact of investments. The criteria primarily

relys on anticipating the outcomes of the invested assets. Screening criteria also includes the objectives of the assets, the firm receiving the investments, the process of utilizing the investments, and the expected effects to the environment and society. The International Bank for Reconstruction and Development (IBRD), commonly known as the World Bank, sets its criteria of green bonds to those that "support the transition to low-carbon and climate resilient development" and include "mitigation of and adaptation to climate change" (World Bank, 2017). Its criteria on green bond eligibility are defined by World Bank environmental specialists and reviewed independently by the Center for International Climate and Environmental Research at the University of Oslo (CICERO). CICERO "provides second opinions on institutions' framework and guidance for assessing and selecting eligible projects for green bond investments, and assesses the framework's robustness in meeting the institutions' environmental objective" (CICERO, 2015).

The Green Climate Fund (GCF) serves as another prime example of a green investing organization. It establishes investment criteria of impact potential, paradigm shift potential, sustainable development potential, needs of the recipient, country ownership, efficiency and effectiveness (Green Climate Fund, 2019) to support project proposals in clarification. The GCF's investment criteria are not used as a sole screening criteria but offers us insight of the criteria that are put in weight in environmental assessment.

Once the criteria for screening are set, a primary assessment of the investments is conducted. The dataset inputted to the primary screening is based on data provided by the issuer of the investing asset. The initial screening process results in three outcomes: confirmation of the investment, rejection of the investment, or needing more research. Cases that result in needing further research will be subjected to a secondary assessment, moving to the process of scoping and analysis. (UN, 2001)

If an investment requires further research for screening purposes, scoping will initially establish boundaries for the analysis process, directing what to analyze. Scientific analyses differ by the nature of the investing assets, potentially involving research on the investment's financial profitability, impact factors, and subsequent effects on the environment and society. Research into these factors can be composed of scientific experimentation, empirical data collection, and theoretical studies. Secondary opinions or outsourcing are also potential options in collecting further insight on the analysis of the assets (UN, 2001).

Once the process of analysis is completed, it needs to be drafted and presented to the decision makers of the investment. Then the evaluation based off of the newly presented data is conducted, leading to the final decision of the investment, whether to invest or not (UN, 2001).

If a green investment is made, follow-up is needed to ensure that the environmental outcomes are achieved. Credibility can be assessed by how much the companies or projects comply with the investment criteria. One example is the World Bank's ongoing monitoring of green investment projects. The World Bank conducts research and surveys every year in the form of The World Bank Impact Report "to enhance reporting as the sustainable finance landscape evolves, to encompass a greater share of international capital markets" (World Bank, 2022).

2. Methodology

The current paper relies on secondary sources including literature from the domains of economic theory and green investing. In addressing the issue of environmental screening costs, my paper initially focuses on the Coasian application to identify the optimal point of screening without external interventions, such as incentive policies. I review the original Coase theorem (Coase, 1960) and Deryugina's paper (Deryugina, Tatyana, 2021) of environmental applications of the theorem to solidify the ground of my research in the Coasian perspective.

To understanding environmental screening, I review various green investing assets including green bonds issued by the World Bank and the European Union, and corporate stocks that conduct positive environmental practices.

I gain overview of the standard process of green investments by reviewing the World Bank's green bond funding program, the European Commission's environmental impact assessment, and the Green Investment Group's green investment handbook. To identify costs implied in environmental screening, I review various green investment parties including the World Bank's green bond funding program in its practices to gain an overview of the green investing process and the criteria weighed for it. I also explore the supporting practices and regulations such as the GCF's investment criteria indicator and CICERO's work over secondary review to further understand criteria used in evaluating green assets.

I identify costs associated with the environmental screening process by analyzing the steps in environmental screening. Through secondary sources, I identify the benefits of environmental screening and compare them against the costs incurred during the screening process.

3. Findings

My research resulted in four findings. First, I find that there were costs incurred by applying the environmental screening process. Second, I find that costs were also incurred in reducing environmental screening to investing processes. Third, I identify that the costs incurred from applying individual environmental screenings are decreasing. Fourth, I identify those environmental costs per pollution has been increasing over time.

Finding 1: Environmental screening incurs costs.

Though green investment strategies differ across investors, the main process of screening follows a similar pattern. Investors initially review the information provided by the asset issuer and assess the assets with the information. If further research is required, investors will commence the research needed through various methods. Finally, they will make decisions of investing or not and monitor the assets further on. The process involves costs in the form of money, time, and effort.

New green asset issuers encounter entry costs attributed to various challenges; they must provide new types of monitoring, external reviews, and disclosures to acquire credibility for their assets. Additional institutional efforts to identify the new issuances may also arise if needed (Sustainable Banking Network, 2018). Issuers of pre-existing green assets face similar costs as they require consistent updating upon their data by research, monitoring, and analysis (The Green Bond Principles, 2021).

Information required for environmental screening can be collected in different ways. It can be collected by issuers, by investors themselves, or by outsourced consultants. Each generates costs as assessments by issuers or investors will need manpower and time whereas outsourced consultants charge consulting fees to the requestors, adding to the total cost of the environmental screening process. An example of environmental consulting is Deloitte, which offers ESG advisory services with "climate risk and resilience, including stress testing", "ESG technology, data and analytics advisory", "ESG reporting advisory and assurance", "decarbonization strategy and execution", and more (Deloitte UK, n.d.).

Environmental impact evaluations and monitoring sometimes require specific tools for assessment such as sensor networks and geographic information system (GIS) models for air monitoring or chemical techniques including chromatography and spectrometry (Heavy.AI, n.d.). These processes call upon the need for experimental tools, incurring fees. For example, GIS model software annual fees vary between $600 to $17,000 (SiteMap, n.d.).

Besides technical costs, screening entails staff time, which is considered as an additional expense in environmental screening. According to the European Commission, "Project EIAs are usually completed in under 2 years in the Netherlands and United Kingdom" (EU, 1996). Studies for EIA are generally conducted through a 6-to-12-month period and "preparations of the Environmental Impact Statements (EIS) typically takes 2 to 3 months" (EU, 1996).

Finding 2: Exclusion of environmental screening incurs costs.

"When we ignore the environment, it gets worse; when we apply attention, ingenuity, and new technology to its care, it gets better." (Cohen, 2022). If investors do not require environmental screening, issuers lose an incentive to consider environmental impact.

When investment impacts on sustainability and environmental protection decrease by issuers less considering environmental areas, issuance of green assets decrease. In turn, the decrease of green assets lead to an increase in pollution (Xu, 2023).

Th costs resulting from decreased environmental screening are directly associated with the costs of increased pollution. Public health costs incur expenses due to pollution in the form of increased premature deaths and illnesses. "Air pollution from fine particulate matter caused 6.4 million premature deaths and 93 billion days lived with illness in 2019" (World Bank, 2022).

Finding 3: Environmental screening costs are declining.

Many asset owners have favorable perspectives to green investments due to reputational benefits, enhanced environmental outcomes, and enhanced financial performances (Morgan Stanley, 2020). Increased attention to environmental sustainability has driven the screening process to evolve into a more efficient and cost-effective form.

One reason for the decrease in environmental screening costs is the development of research methods and data accumulation over time, which decreased the resources required for conducting screening. According to the European Union, "in the Netherlands, the operation of strict timetables for each stage of the process and formalized inputs from the various participants achieves a shorter timescale" (EU, 1996). The research also includes "seven measures which are most likely to be helpful in reducing time and money costs" listed in Table 1. Table 1 is adapted from "EIA - a study on costs and benefits, summary" by the European Commission (EU, 1996).

Table 1. Seven measures in reducing time and money costs.

Introduction of strategic level assessments	Identifying major decisions with environmental impacts prior to individual projects are defined, creating standards, in turn reducing costs and risks.
Improvements to screening	Through clear regulations, requirements, and methods of screening, standards reduce costs.
Joint scoping	Through cooperation in EIA content and references between respective parties reduces research costs.
New guidance on standards	Newfound technical assessments for specific developments such as waste disposal and mineral extraction reduce technical costs
Greater public involvement	Public involvement in and after the scoping stage eases assessment stages, reducing time and costs in gathering insight of environmental impact.
Clearer definition of mitigation standards	Increased standardization will require less customization and effort.
A formal requirement to introduce monitoring	In the long term, more monitoring will result in standardization and lower costs for EIA.

Technological advancements also contribute to reducing the costs of environmental screening. Applications of artificial intelligence technology reduce analysis by employing machine learning to automate repetitive tasks. It replaces manpower and reduces errors and time (Thota, 2023). The Internet of Things (IOT) method based environmental monitoring "facilitates the development of wireless, remote environmental monitoring systems, which enable operations to remove much of the human interaction in system function, which reduces human labor" (Heavy.AI, n.d.).

Finding 4: The cost per unit of pollution is increasing.

"Industrialization, use of pesticides and nitrogen-based fertilizers, crop residues in agriculture, urbanization, forest fires, desert dust, and inadequate waste management have intensified environmental health risks and pollution, especially in low- and middle-income countries." (World Bank, 2023). The effects of pollution have sped up climate change, leading to catastrophic global outcomes incurring social costs (Plumer, 2023). "The global cost of climate change damage is estimated to be between $1.7 trillion and $3.1 trillion per year by 2050" and "is expected to increase over time as the impacts of climate change become more severe" (Bennett, 2023). In contrast to the damages increasing, the actual number of pollutants has been decreasing. Since 2013, global pollution has decreased by 40% (EPIC, 2022). This shows that damages are increasing even though pollution masses are decreasing, indicating that the cost per unit of pollution is increasing.

Another indication of the increase in the costs per unit of pollution is that when air pollution increases by fixed amounts, there is a percentage reduction in real GDP. According to the OECD, through an analysis of the European Union's economy through 2000~2015, a 1μg/m3 increase in PM2.5 concentration caused a 0.8% drop in real GDP (Dechezleprêtre, 2020). The European Union's GDP has grown from 7.28 trillion USD in 2000 up to 13.55 trillion USD in 2015 (World Bank, n.d.). This shows that the 0.8% GDP drop has increased in size to almost double its amount in 2015 compared to its amount in 2000.

4. Discussion

My findings indicate that the Coase theorem is applicable to environmental screening. This is because we found costs to both the implementation and the absence of environmental screening. The costs of not applying it includes externalities of environmental pollution, therefore making the Coase theorem applicable to our analysis.

Applying the Coase theorem, we can conceptually identify an equilibrium of environmental screening. The curve in the figure 1 illustrates the equilibrium. Curve D represents the costs of environmental screening. Curve S in the figure 3 represents the costs associated with the absence of environmental screening. The equilibrium point is identified as point A as the two curves intersect in the figure 2.

In my discovery of finding 3, we find that environmental screening costs are reducing. This change results in curve D shifting downwards. This can be seen in the figure 1 in the original curve D shifting to curve D'.

In finding 4, I identified that the cost of pollution per unit of pollution has been rising. This leads to curve S in the figure 2 shifting upwards. This can be seen in the figure 3 in the original curve S shifted to curve S'.

As both curves S and D shift, the equilibrium point shifts as well. This can be seen in the figure 4, as the former equilibrium point A has shifted to A', the equilibrium of D' and S'. This shows that the optimal level of environmental screening should increase as the costs of screening are decreasing and the costs of its exclusion are increasing.

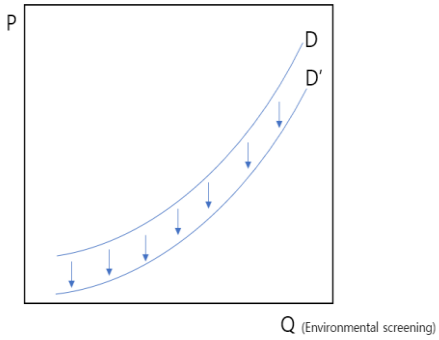

Figure 1. Curve D and D' represent the costs of environmental screening.

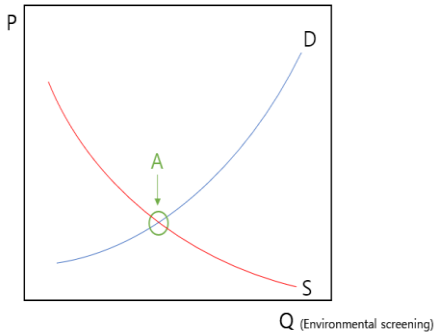

Figure 2. The equilibrium point (Point A).

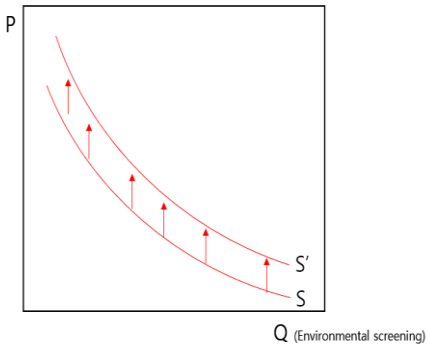

Figure 3. Curve S and S′ represent the costs associated with the absence of environmental screening.

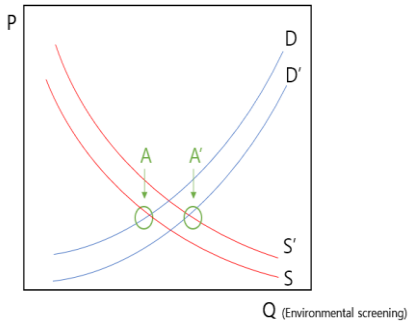

Figure 4. the former equilibrium point A has shifted to A′.

The preceding analysis is based on economic efficiency. I note that there are also moral and ethical objectives that may encourage green investing. Ethical objectives have been shown to be motives to green investments and environmental screening (Santhakumar, 2023). The findings of my paper suggest that screening should increase based upon economics efficiency; one need not to rely only on moral and ethical arguments.

5. Conclusion

My paper begins by applying the Coase theorem as a background to view environmental screening activities. I commenced by reviewing the Coase theorem and the processes of environmental screening via the lens of green investments. Through my review, I identified costs associated with environmental screening and costs associated by not applying environmental screening. These costs are changing over time: environmental screening costs are reducing due to factors such as technological advancements, accumulated data, and methodology establishments. On the other hand, environmental screening exclusion costs have increased over time and are estimated to increase further as consequences of negative environmental impact from reduced screening have grown more severe. Using the Coase theorem and applying our findings, we concluded that the equilibrium is changing, and the optimal level of environmental screening is increasing.

My paper has been based on literature reviews and secondary sources. Further research can advance our conceptual findings with empirical data. Such studies may include (1) empirical studies on the costs of environmental screening, (2) empirical studies on the associated costs of when environmental screening is excluded, and (3) analysis of specific green investments and the relative costs of screening compared to the costs of pollution avoided. Such studies would test my conceptual findings with empirical data.

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