

**This study investigates firm's environmental external cost (EEC).** EECs are environmental costs related to the firm that is not captured in the firm's mandatory or voluntary disclosures. The Trucost database provides firm level data of environmental external costs related to GHG, Water Abstraction, Waste, Land and Water pollutant, and Natural Resource that the firm "creates" but does not actually "pay". This paper tests whether market participants are aware of these costs and whether these costs deteriorate firm value.

## Research Motivation

### Environmental External Cost is Main Driver of Climate Change

Recently, we saw the consequence of tragedy of commons. Many environmental problems caused by human activity. For example, climate change, the main driver of climate change is anthropogenic. (2014, IPCC 5<sup>th</sup> Report) However, People did not pay a proper cost what they used the environmental service. It makes negative externality occurred.

Global externalities were estimated at US\$6.6 Trillion in 2008, equating to 11% of the value of the global economy at time (US\$ 60 trillion in GDP). To put US\$ 6.6 trillion into context, annual global environmental externalities are 20% larger than the US\$ 5.4 trillion decline in the value of pension funds in developed countries caused by the global financial risks in 2007/08. This represents the present day value of future climate change impacts. (Stern, 2008)

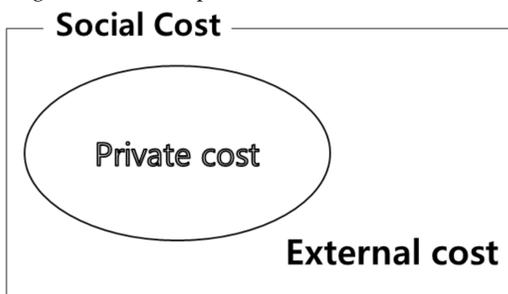
### Environmental External Cost pose financial risk to Firms.

Rising environmental costs contribute to economic and market risks, which could affect asset values and fund returns. Universal owners are likely to suffer larger losses due to environmental externalities. The impact of externalities on individual portfolios would vary large investors could be exposed to a decline in their overall value of investments due to the pervasive nature and scale of externalities. (Hawley, J.J., Williams, A.T., 2000)

## Environmental External Cost

Environmental external cost concept is based on the neoclassical economic theory. An external effect is phenomenon which occurred in the market system remotely from its source or outside the market system. By definition, **an externality has some influence on economic agents in terms of benefit or cost, without proper market transaction.** (Pigou, 1920)

Figure 1. Relationship between social cost and External cost

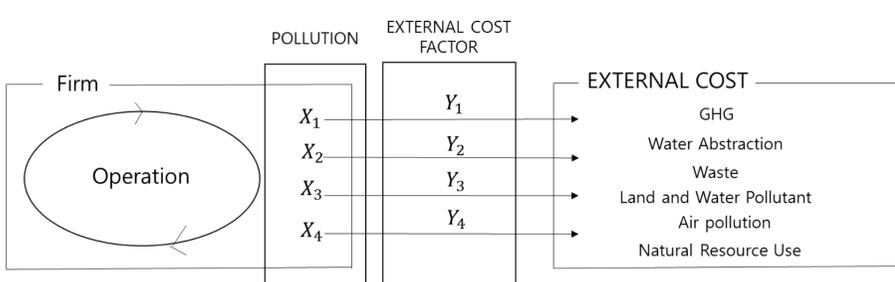


Typical negative externalities is the tragedy of the commons. According to this theory, **the result of each individuals maximize their profit is leads to catastrophe, when each individual's benefit is conflict with the social benefit.** (Garrett Hardin, 1968)

There are two broad approach about remedying external effects. **First, Pigou approach(1920), support intervention in market system** that could make up inability to reflect spontaneously the prices of environmental service. **The second, Coase approach(1960), support the development of market** which can trade environmental goods and services. (Nicolas Antheaume, 2004)

In spite of their divided, the two approaches agreed on the concept that monetary evaluation of the environmental service and the damage caused to the natural environment by human activity is needed. **Monetary evaluation will give an insight about full cost of environmental cost.**

Figure 2. Framework of Trucost environmental external cost calculation methodology

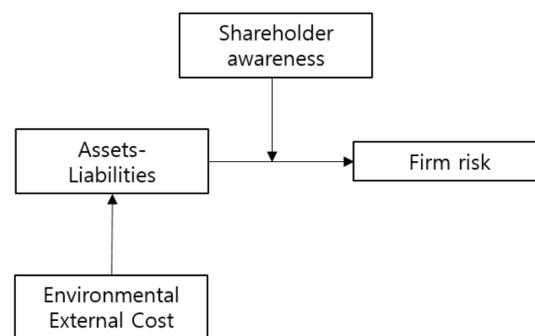


## Theory and Hypothesis

**The proper government regulation raise the competitiveness of enterprises and make innovation.** (Michael E. Poter, 1995). Many studies have been conducted on the relationship between competitiveness and pollutant emissions. Based on the Poter hypothesis. Typically compares the financial performance in accordance with the market value of the company at the time. Although, the research show that the positive relationship between environmental performance and financial performance still direction of the relationship uncertain. (Andrew A. King and Michael J. Lenox 2001).

**Financial performance studies are based on the efficient stock market theory that market work efficiently in terms of reflecting current information and expectations** (Eugene F. Fama, 1970). One of the most recent accident is British Petroleum's oil spill in gulf area. On the accident day, the BP's Stock priced was dropped from \$59.5 to \$28.9 (Flammer, 2013). Many researchers used event study methodology to conduct the research. Regarding the stock market's reaction to environmental information, The major result shows that significant negative abnormal returns when firms had bad environmental news. (Hamilton 1995, Klassen, McLaughlin 1996).

Figure 3. Model of the linkage between Environmental external cost and firm risk



**H1: Environmental external cost negatively affects firm risk in time period 2002- 2012.**

**H2: Environmental external cost negatively affects firm risk as shareholder awareness to environmental increased.**

**H3: Environmental external cost negatively affects firm risk depending on the industry sector.**

## Data and Methodology

### Trucost (Environmental external cost database)

Trucost database provide the company's environmental external cost from 2002 to 2012. In this database, Trucost has analysed the environmental performance of more than 4,500 companies include 70 countries and 19 industries sector. The data are based on the sustainability report, CSR report, estimated data.

### Compustat (Financial database)

Compustat database provide financial, statistical and market information on active and inactive global companies throughout the world. The database covers 99,000 global securities, covering 99% of the world's total market capitalization with annual company data history available back to 1950 and quarterly available back to 1962

### Regression model

$$COC_{ijs} = \beta_{ij} + \beta_{js} + \beta_1(ENVIRONMENTAL\ EXTERNAL\ COST)_{ijs} + \beta_2(Control)_{ijs} + \varepsilon_{ijs}$$

(i indexes firm, j indexes year, s indexes industries)

## Preliminary Results

Table 1. Environmental External Cost by Industrial sector

Industry	Total External Costs(TEC)	TEC/Sales (%)	Industry	Total External Costs(TEC)	TEC/Sales (%)
Utilities	1,689	1.43	Technology	2,630	0.08
Basic Resources	2,256	0.94	Healthcare	1,775	0.08
Food & Beverage	1,592	0.80	Real Estate	1,821	0.06
Industrial Goods & Services	6,201	0.51	Automobiles & Parts	924	0.06
Construction & Materials	1,664	0.42	Financial Services	1,580	0.04
Chemicals	1,311	0.22	Media	1,179	0.02
Oil & Gas	2,100	0.21	Banks	2,378	0.02
Personal & Household Goods	1,927	0.16	Telecommunications	1,006	0.02
Retail	2,247	0.09	Insurance	1,311	0.01
Travel & Leisure	1,429	0.09			