Environmental Awareness, Oligopolistic Competition, and Foreign Direct Investment

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ABSTRACT

In most developing countries, local companies have more expensive polluting production technology than those in developed countries. On the other hand, there is a growing concern to produce and consume ecological goods in the world. Based on this reality, and using environmental awareness as public policy, this article uses a theoretical model that determines the level of environmental awareness that a government receiving foreign investment is willing to promote, taking into account oligopolistic competition between foreign and local companies in the country. The optimal environmental awareness policy considers the impact of this policy on local investment, the benefit of the consumer, foreign investment flows, and the disutility of the contamination of polluting goods in the population. The optimal level of environmental awareness is found to depend on the degree of disutility of pollution and the introjection of politics induced by the host government.

KEYWORDS
Cognitive Introjection, Education, Environmental Awareness, Foreign Direct Investment, Oligopolistic Competition, Pollution, Public Policy, Strategic Firm Behavior

INTRODUCTION

There are differences in the way awareness is defined according to discipline (Akerlof, 2017). Introjection of environmental awareness is not spontaneous, is conducted by socio-economic, political, and cultural processes. The environmentally responsible person is formed from the earliest youth through education obtained at home and school and configuring values and behaviors in an environmental direction (Maravić et al., 2014). Here, the authors focus on the awareness of environmental like public policy, and the subsequent introjection of environmental awareness on trade issues and product demand. Increasing environmental awareness can impact the pleasure of consuming a good for which an environmentally friendly substitute is available, and companies can affect prices, product characteristics, and market shares (Conrad, 2005).

Since the Stockholm Declaration in 1972, it has been written about the need to protect the environment, and that education lays the foundations for an enlightened opinion and responsible
conduct of people and companies in the world, in the sense of conveying intellectual and moral conviction. Therefore, there is a need for States to legislate internally and seek international cooperation to protect the environment (Sohn, 1973, pp. 427-481). The agents involved in the legislation policies are local governments, international agencies, corporate companies, and international organizations.

These agents interact in three areas to define environmental policies according to the environmental requirements using a set of instruments for regulating and/or eradicating damage caused by pollution and the exploitation of natural resources. First, in the national and international legal area; second, in the economic and market area; and third, in the area of motivations and social awareness, and can be framed in the combination of them (Eccleston & March, 2011).

From the first and second areas, the most common environmental policy instruments are those designed and used by governments to obtain some environmental impact. They may use economic incentives instruments such as subsidies, tax exemptions, and/or market-based instruments such as permits, fees, taxes, pollution quotas among many others (Barnes-Dabban et al., 2018). Awareness of environmental problems has increased environmentally friendly business practices, thanks to legislation that affects general environmental awareness (Gadenne et al., 2009). For instance, when the degree of product differentiation is large enough, companies benefit from technological side effects through cooperative environmental R&D, attracting environmentally conscious individuals (Yakita & Yamauchi, 2011). Emissions tax is collected when consumer awareness of pollution is low, and consumer externality is large or a production subsidy is usually granted (Hsu et al., 2017).

With the growing awareness of environmental responsibility in the industry, the improvement of technology only achieves environmental sustainability under sufficiently strict recovery standards; otherwise, it can be counterproductive and damage the environment (Cai et al., 2019). Considering the increased consumer environmental awareness and the strict government rating standard, Zu and Zeng (2020) show that the government rating standard has a major driving impact on the level of efficiency energy of the products. When the energy efficiency level of the product is lower than the government standard, the manufacturer will go to great lengths to improve energy efficiency, since “in industrialized countries; environmental problems are generally related to industrialization and technological development” (Sohn, 1973, p.443).

On the other hand, corporate companies’ environmental instruments are commitments with efficient environmental management, eco-labeling, corporate social responsibility, and transparency about their environmental data (Eccleston & March, 2011). Marketing practices have had a greater presence with the emphasis on raising environmental awareness and improving share in the market. With Stackelberg’s models, Du et al. (2019) demonstrate the value of green marketing, since promotion can get more profit. The eco-label has been seen as an effective tool to promote consumer choice, like the mediation role of environmental awareness (Song et al., 2019; Shabbir et al. 2020). Additionally, product quality, according to consumer perception, has a negative influence on green purchasing decisions (Nekmahmud & Fekete-Farkas, 2020).

It is possible to have a combination of policy instruments to address a particular environmental problem since the environmental problem can be so complex that it is impossible to solve it only with an isolated policy instrument. For example, bilateral agreements between government and private companies, and commitments created by independent companies within a legal context ruled by the government are examples of environmental measures with mixed instruments. It seems natural to have a functional relationship between governments and private firms in the first and second areas in which environmental policies can be framed.

However, the challenge arises in the relationship of governments and corporate companies with the civil society in the third area to define environmental policies, where social motivation and awareness imply the design of policy instruments with uncertain results (OECD, 2017). While legal and economic policy instruments are mainly directed at the regulation of production and trade, policy instruments aimed at social motivation and environmental awareness seek consumer-friendly behavior in favour of environmental well-being (Wang et al., 2020). Although some conventional
environmental policies can be combined with policies related to environmental awareness as in Weng et al. (2019) and Lian et al. (2018), the authors focus specifically on policies aimed at promoting environmental awareness as in Gupta (2014), where environmental awareness means being aware of the natural environment and promotes the making of choices to benefit the earth, rather than hurt it.

These policies have two considerations to be taken into account: First, policies aimed at affecting the environmental awareness of society have an uncertain nature. There is no guarantee of the success of such policies. Policies aimed at consumer behavior are indirect policies because the goal of these policies is the human being with all its cognitive implications. The establishment of such a policy must be expressed in a real behavior change. In this sense, there is a gap between the policy setting and the real behavior change. From an environmental public policy addressed to environmental awareness, three possible objectives can be identified by the agents, the first is to promote behavior change among people; second, to facilitate the processes of democratic participation; and third, promoting long-term changes in education, values, and customs to motivate people to greater cooperation in environmental decisions (Akerlof, 2017). For instance, democracy may reduce some types of environmental degradation like deforestation, and deterioration of the land (Li & Reuveny, 2006).

Numerous theoretical frameworks have been developed to explain the gap between the possession of environmental knowledge and environmental awareness, and displaying pro-environmental behavior as shown in Chartrand (2005), Lu et al. (2020), and Okada et al. (2019). Although many studies have been done, no definitive answers have been found as found in the seminal work by Kollmuss and Agyeman (2002), and recently Siegel et al. (2018).

Empirically tests antecedents and consequences of the environmental orientation for 414 exporting SMEs in China, show that, among the companies surveyed, the environmental beliefs of their CEOs contribute directly to the performance of corporate exports and the development of their environmental orientations. Additionally, exporting SMEs that operate in areas with strong (versus weak) ecological infrastructure are more effective in translating their external environmental orientation into the practice of proactive environmental strategies and, ultimately, higher corporate performance (Chan, 2016). Therefore, the introjection of the person at the end is what fosters the impact of the guidelines that companies have and how they incorporate environmental policies received from an early age in an educational framework.

In terms of education, Ito and Kawazoe (2018) suggest that education and family income are significantly associated with environmental awareness. Emiru and Waktola (2018) analyse empirical evidence from 200 highly educated youth from Ethiopia and the US and find that American students scored marginally higher on environmental awareness and willingness to pay additional taxes to offset the environmental impact. Unfortunately, the results in terms of environmental literacy between countries and, specifically, students, are far from satisfactory, mainly because the government of each country has different priorities. For instance, Israel’s educational goals remain focused on security, the economy, and industrial needs, without internalizing environmental issues (Sagy & Tal, 2015), and Australian education policies do not provide opportunities to generate empowerment through education be integrated into the work of the sustainable development goals (Morley, 2020).

Summarizing the reasons given by these articles, and abusing the simplicity of this assumption, it is considered that this gap is given by the level of cognitive introjection of the policy on the consciousness of people. In other words, the cognitive introjection of the policy determines the success of said policy to promote environmental awareness. This gap is the origin of the uncertainty of the policy mentioned above.

The establishment of environmental awareness policies directly or indirectly affect markets other than those to which environmental awareness policy is directed. The search for certain environmental objectives can generate adverse effects in other areas of the economy, for instance, on the chain value as in Koźluk and Timiliotis (2016). There are negative externalities of some environmental policies that should be considered despite their apparent success (Dechezleprêtre & Sato, 2017). Additionally, some developing economies are reluctant to establish strong environmental policies because they undermine
competitiveness and employment conditions (Stevens, 1993). For those developing economies the urgent needs of the economy are crucial, and some environmental concerns are no longer relevant.

In some developing countries, the commitment to environmentally friendly policies is rather limited because there are some technological restrictions. Biodegradable technology may be expensive and gives to domestic firms some competitive disadvantage. Local firms want to produce as much as possible with the cheapest technology; it is a surviving strategy for many firms and a strict environmental policy may convert them into polluting export industries as shown in Cole and Elliott (2003). Even when, for example, Sánchez-Medina et al. (2015) reveal that the environmental compliance of small pottery craft companies in Mexico significantly influences better economic performance, the perception on the use of environmentally friendly technology is that this clean technology is expensive and no profitable.

On the contrary, in developed economies, many firms have developed environmentally friendly technology in the production process because there is a social and cultural tradition of environmental social conscience (Wallace, 2017). This environmental-friendly behavior of some firms affects the intention of them to locate in other countries in the form of Foreign Direct Investment (FDI).

Today, environmental commitment adopted by governments in developing economies is an incentive for receiving FDI from abroad, especially from countries with high commitments with the environment (Chudnovsky & Lopez 2003). Similarly, there is a complex correlation between FDI, SO2 emissions. A shred of empirical evidence, between FDI and emissions in China, shows that the total impact of FDI on industrial emission is very small; also support the “pollution haven” hypothesis. Furthermore, the impact of the transformation of the composition of FDI in China appears to be dominated by the inflow of foreign capital that pursues a “production platform” that provides a lower cost of compliance with pollution regulation (Jie, 2006).

The FDI firms consider that environmental concerns of these economies are politically correct and attractive to host foreign investors. However, developing economies should consider the benefit of receiving FDI, and the cost on local producers and consumers at the moment of setting environmental general policies and solely environmental awareness policy in particular.

This paper gives an insight into the importance and awareness among the agents; it is presented a theoretical model where foreign firms, in the form of FDI, and domestic firms compete in an oligopolistic market, as in Kayalica and Lahiri (2005), with homogenous good but different technologies: foreign firms have a non-polluting technology and the domestic firms a polluting technology. The cost of producing a non-polluting good is larger than the cost of producing a polluting good. Different from Kayalica and Lahiri (2005), the host government set a pollution policy aimed to encourage a level of environmental awareness to fight against pollution. Constant and Davin (2016) developed a theoretical model of environmental awareness but in combination with formal environmental policies. In this paper, as in Akerlof (2017), environmental awareness is considered as a policy goal.

To maximize the welfare, the host government seeks to encourage an optimal level of environmental awareness taking into account the consumer surplus of polluting and non-polluting goods, the producer surplus of FDI and domestic firms, and the pollution disutility of polluting goods over the population. It is found that the optimum level of environmental awareness depends on the degree of the disutility of pollution. However, the success of such a level of environmental awareness depends on the efficiency of how the environmental stimulus is introduced to translate into positive environmental behavior. When an environmental stimulus policy is directed at consumers rather than producers, the human dimension is something to consider.

The model also suggests that domestic and foreign companies should be concerned about the way public policy permeates both countries since the introjection of environmental awareness can be highly influenced by environmental literacy and marketing in countries depending on the international environmental regulations.
In the next section is set the model. Some statistics comparative is made in section 3. Section 4 determines the optimal policies. In section 5 it is concluded.

THE MODEL

This document considers two goods that are homogeneous in their use, but different in terms of production technology: one kind of good is produced using environmentally friendly technology, and the other uses non-environmentally friendly technology. For example, biodegradable and non-biodegradable goods that are consumed for the same purpose, but produced with different technology. From now and until the end of the paper, it is defined as environmentally friendly goods as non-polluting goods and non-environmental friendly good as polluting goods.

In this sense, there are \( n \) identical foreign firms (FDI) producing a non-polluting good \(( x_1 )\), and \( m \) identical domestic firms producing a polluting good \(( x_2 )\). Both kinds of firms compete in an oligopolistic industry. The marginal cost of each firm is \( c_i \) \(( i = 1, 2 \)\) where 1 is for non-polluting good and 2 is for polluting good. Both marginal costs are taken to be constant, and therefore equal the average variable cost. However, these costs differ between firms. Profits of each non-polluting and polluting firm are:

\[
\pi_1 = (p_1 - c_1)x_1
\]

(1)

\[
\pi_2 = (p_2 - c_2)x_2
\]

(2)

such that:

\[ c_1 > c_2 \]

where \( \pi_1 \) is the profit of each non-polluting firm, and \( \pi_2 \) is the profit of each polluting firms. On the other hand, it is considered that the cost of producing non-polluting output is larger than the cost of producing polluting output. It means, environmentally friendly technology is more expensive than non-environmentally friendly technology according to the vast majority of the empirical literature. The firms producing polluting output have a competitive advantage over the firms producing non-polluting output.

On the other hand, consumers may perceive that the goods to be consumed are homogeneous in use but different in terms of polluting characteristics. They made a consumption decision according to their environmental concerns. In other words, according to Conrad (2005), even when the goods produced are identical in their use, consumers may differ in their willingness to consume those goods for environmental reasons.

Under these assumptions, the authors can consider different demands. The demands are differentiated in terms of willingness to pay for goods according to environmental concerns. The demands of goods are differentiated by the perception of the consumer according to his “Environmental Awareness”. A large level of environmental awareness implies to consume non-polluting goods rather than polluting goods.

In this model, the consumer may decide to consume polluting or non-polluting goods depending on his environmental awareness rather than the characteristics of the use of the goods. Here, the
goods have the same use for consumers. A helpful example is plastic bags versus biodegradable bags used in commercial supermarkets. They have the same use, but they are different in terms of their making technology. People may decide to consume plastic or biodegradable bags according to environmental awareness. Environmental awareness changes the preferences of consumers from polluting to non-polluting goods.

The authors assume, without loss of generality, that a larger environmental awareness affects negatively the preference for polluting goods. The same result holds if a larger environmental awareness affects positively the preferences for non-polluting goods or both cases at the same time.

One way to model the willingness to consume a specific good is by having differentiated demands from the intercept. It is considered that the intercept of the demand shows the willingness to consume a specific good because it is the source for preferences on consumers; a larger intercept means a larger willingness to pay for a good. The authors assume two quasilinear utility functions where both utilities can be approximated from $U = u(x) + z$ where $x$ is the goods vector under consideration and $z$ is the expenditure on the numeraire good. The use of this approximation removes some theoretical difficulties, including income effects. There is a numeraire good in the background which is produced under competitive conditions and a factor of production whose price is determined in the competitive sector. The inverse demand function is derived from a quadratic utility function such that:

$$p_i = a_i - bQ$$  \hspace{1cm} (3)

$$p_2 = a_2(\gamma) - bQ$$  \hspace{1cm} (4)

where $p_i$ ($i = 1, 2$) and $Q$ are respectively the price and the total demand of the commodity. Since the commodity is non-tradeable, the total domestic demand must be equal to the total production, such that:

$$Q = nx_1 + mx_2$$  \hspace{1cm} (5)

The first demand (3) is for non-polluting good and the second (4) is for polluting good. $nx_1$ and $mx_2$ are the amount of non-polluting and polluting goods consumed respectively. The intercept of demand in (3) is $a_1$, and it is fixed; the intercept of demand in (4) is a function of the level of environmental awareness ($\gamma$), such that $a_2 = a_2(\gamma)$, and it is decreasing ($a_2' < 0$). In other words, the larger level of environmental awareness, the smaller is the willingness to consume the polluting good.

The level of environmental awareness runs from zero to some maximum level of environmental awareness such that $0 < \gamma < \bar{\gamma}$. When the level of environmental awareness is zero ($\gamma = 0$) the consumer does not care about the polluting damage caused by the consumption of the polluting goods. In such a case, the size of the demand for pollution goods is larger than the size of the non-polluting goods. On the other hand, with the largest possible level of environmental awareness ($\gamma = \bar{\gamma}$), the demand for polluting goods is zero, and the only existing demand is for non-polluting goods. In brief, $a_2(0) > a_1 > a_2(\bar{\gamma})$.

An interesting feature in (3) and (4) is that, given that the use of both goods is the same, the prices depend on the number of goods available in the market independently of their polluting characteristics. The price of each type of goods depends on the sum of polluting and non-polluting
goods. Once again, the goods are homogeneous in use, but the demands differ according to the will to consume non-polluting goods.

Each firm has a Cournot perception: it takes the output of other firms as given while maximizing its profits. Under Cournot-Nash assumptions from (1) to (5) profit maximization yields the following result:

\[
x_1 = \frac{(m + 1)s_1 - ms_2}{\Delta}
\]  

(6)

\[
x_2 = \frac{(n + 1)s_2 - ns_1}{\Delta}
\]  

(7)

such that:

\[
s_1 = (a_1 - c_1) > 0
\]

\[
s_2 = (a_2 - c_2) > 0
\]

\[
\pi = (m + n + 1)b
\]

\[
x_1, x_2 > 0
\]

where the benefit of each oligopolistic firm is given by (6) and (7) in (1) and (2) as:

\[
\pi_1 = bx_1^2
\]  

(8)

\[
\pi_2 = bx_2^2
\]  

(9)

Until now, it is considered environmental awareness as an exogenous variable. However, environmental awareness may be a policy-induced variable. The government in the country may affect the environmental awareness of consumers and consequently may impact the benefit of firms and consumer surplus. Although environmental awareness is not an environmental policy, it can function as an induced environmental policy different from conventional environmental policies. Promoting environmental awareness by the government can be an efficient strategic policy aimed at controlling pollution emissions through consumer decisions.

For simplicity, it is assumed the government set a costless policy incentive to affect environmental awareness. In this sense, the government can affect the level of environmental awareness with a costless policy not specified in this model. It may be by affecting the education system, or some marketing social campaigns. However, this paper is not going deep into this discussion.

On the other hand, the number of foreign firms or FDI is endogenously determined by the level of environmental awareness. It is assumed that the host country is small in the market for FDI. Foreign firm moves into (out of) the host country if the profit it makes in the host country, \( \pi_1 \), is larger.
(smaller) than the reservation profit, $\overline{\pi}$, it can make in the rest of the world. Therefore, the FDI equilibrium provides:

$$\pi_1 = \overline{\pi} \quad (10)$$

Once it has set the defined solutions forms, it is going to set the welfare function of the country taking into account the use of the pollution policy. The welfare can be written as:

$$W = n\pi_1 + m\pi_2 + CS - \psi mx_2 \quad (11)$$

where the first and second terms are the producer surplus, the third term is the consumer surplus and, the fourth term is the total disutility for consuming the polluting good where $\psi$ is the marginal pollution disutility, assumed as do Lahiri and Ono (2000) and Markusen et al. (1993, 1995), as constant. Other authors, like Asako (1979), consider that marginal disutility is an increasing function of the output. However, this alternative assumption will not contradict our results and a constant marginal disutility is a more convenient assumption.

From the linearity of demand, the consumer surplus of both goods can be defined as:

$$CS = bQ^2$$

where:

$$dCS = 2bQdQ \quad (12)$$

The equations (1) - (12) form the backbone for the following analysis. Once the government objective function has been defined, the authors shall make some comparative statics.

**COMPARATIVE STATICS IN THE PRESENCE OF FDI**

In this section, it is determined the comparative statics of the change of environmental awareness on key variables as output, consumer surplus, producer surplus, and pollution disutility. First of all, the effect of an increase in the level of environmental awareness on the number of incoming firms can be deducted by implicit derivative using (6), (8), and (10) as:

$$\frac{dn}{d\gamma} = -\frac{\partial F}{\partial \gamma} = -\frac{ma_2}{bx_1} > 0 \quad (13)$$

where $F = \pi_1 - \overline{\pi}$. As expected, an increase in the level of environmental awareness increases the number of incoming foreign firms because the market becomes greater given by the reduction in the consumption of polluting goods.

From the differentiation of (6), and (13) is defined as the impact of environmental awareness on the optimal output of foreign firms such that:
There are two effects on the optimal production of each foreign company: first, there is an increase in the number of incoming firms and the optimal production of each firm is reduced. Second, the market becomes larger for foreign firms that increase their optimal production. The net effect of an increase in the level of environmental awareness on the optimal performance of each foreign firm is zero. From (14) in (8), it is defined as the effect of an increase in the environmental awareness on the profit of each foreign firm as:

\[
\frac{d\pi_1}{d\gamma} = 0 \tag{15}
\]

The intuition in (15) is the same as before, if there is not a change in the optimal output, there is no change in the profit of each foreign firm. On the other hand, the effect of environmental awareness on the optimal output and profits of domestic firms are given by differentiation of (7) and (9), and using (13) as,

\[
\frac{dx_2}{d\gamma} = \frac{a_2'}{b} < 0 \tag{16}
\]

\[
\frac{d\pi_2}{d\gamma} = 2x_2a_2' < 0 \tag{17}
\]

The number of incoming firms and the reduction in the market for polluting goods reduce the optimal output and the profits of each foreign firm.

The impact of environmental awareness on consumer surplus is given from (5), (12), (14), and (16) such that:

\[
\frac{dQ}{d\gamma} = \frac{dCS}{d\gamma} = 0 \tag{18}
\]

An increase in the number of incoming firms increases the output and demand for non-polluting goods but reduces the output and demand for polluting goods in the same proportion. The effect on consumer surplus is zero.

Finally, the impact of an increase in the level of environmental awareness on the pollution disutility is given by:

\[
\frac{d(\psi mx_2)}{d\gamma} = \psi \frac{2ma_2'}{b} < 0 \tag{19}
\]
The effect of an increase in the level of environmental awareness on pollution disutility is negative. The output of the polluting good is reduced and so the pollution disutility.

**OPTIMAL ENVIRONMENTAL AWARENESS IN THE PRESENCE OF FDI**

As mentioned before, the government in the country may set a policy aimed to encourage environmental awareness in people. In this sense, environmental awareness is not a direct policy like taxing in which the government may affect directly the key variables. In this case, the government may induce a kind of behavior in the consumers to encourage or discourage their environmental awareness level. For practical reasons, it is considered that the government sets the environmental awareness level as if it were government policy.

Differentiation of the welfare function (11) with respect to the level of environmental awareness $\gamma$, and using (13) to (19), the first-order condition as:

$$\frac{dW}{d\gamma} = \frac{ma_x^2}{b} \left[ 2bx_2 - bx_1 - \psi \right]$$

In (20) there is an implicit result because there is not a defined specific functional form for $a(\gamma)$. Providing the concavity of welfare function, the optimal environmental awareness level is ambiguous. An increase in $\gamma$ affects negatively the profits of domestic firms but affects positively the incoming number of foreign firms, and the disutility of pollution.

With a sufficiently large marginal pollution disutility (20) is negative, and the government encourages a positive level of environmental awareness. On the contrary, when the marginal pollution disutility is negligible (20) is negative, and the government discourages any policy aimed to promote environmental awareness, it is expected to be zero. Of course, it is omitted the case in which the optimal level of environmental awareness is negative since no government would be willing to encourage the polluting behavior of the consumers.

However, these results depend on the concavity given by a negative second-order condition. From (18):

$$\frac{d^2W}{d\gamma^2} = \frac{ma_x^2}{b} \left[ 2bx_2 - bx_1 - \psi \right] + \frac{2m(a_x')^2}{b}$$

Assuming for simplicity that $|a_x'| > (a_x')^2$, the second-order condition is ambiguous. While $a_x' < 0$ is the reduction in the willingness to consume polluting goods given by an increase in the level of environmental awareness, $a_x''$ can be interpreted as the learning environmental awareness process, or the speed at which the consumer has introjected the incentives given by the government to get a higher level of environmental awareness, and consequently a lower willingness to consume polluting goods.

When $a_x'' > 0$, starting from zero incentives ($\gamma = 0$), the initial government incentive increases the level of environmental awareness and reduces the willingness to consume polluting goods to a greater extent. Later on, with higher incentive levels, the reduction in willingness to consume polluting goods is to a lesser extent. In brief, there is an initial fast learning process in which the consumers introject the incentives given by the government in the form of a reduction in the willingness to consume.
When $a^*_2 < 0$, starting from zero incentives ($\gamma = 0$), the initial government incentive increases the level of environmental awareness and reduces the willingness to consume polluting goods to a lesser extent. Later on, with higher incentive levels, the reduction in willingness to consume polluting goods is to a greater extent. In brief, there is an initial slow learning process in which the consumers introject the incentives given by the government in the form of a reduction in the willingness to consume.

Therefore, from the first and second-order conditions (20) and (21) respectively, with a sufficiently large marginal pollution disutility, the government encourages a positive level of environmental awareness if and only if there is initial rapid learning or introjection by consumers of the incentives given by the government. Otherwise, the government may not promote any incentive.

On the other hand, with a sufficiently small marginal pollution disutility, the government discourages any level of environmental awareness. Of course, when there is no incentive to encourage any environmental awareness level, it does not matter the introjection level. But to obtain concavity, the authors consider that there is initial slow learning or introjection by consumers of the incentives given by the government. This is because it is not considering the negative levels of environmental awareness.

Formally it is said:

**Proposition:** The level of environmental awareness, promoted by the government is positive ($\gamma^* > 0$), if the level of marginal pollution disutility is large enough ($\psi \gg 0$), and there is a rapid introjection of the government incentive into the consumer ($a^*_2 > 0$). On the other hand, the level of environmental awareness, promoted by the government, is zero ($\gamma^* = 0$), if the level of marginal pollution disutility is small enough ($\psi \to 0$), and there is a slow introjection of the government incentive into the consumer ($a^*_2 < 0$).

Intuitively, with a high level of the disutility of marginal pollution, the cost of consuming the polluting good is large, so the government has incentives to encourage a positive level of environmental awareness and, therefore, a reduction in production and the consumption of the polluting good. The government fosters a positive level of environmental awareness because the cost of pollution in people’s health and the increase in FDI is greater than the loss in the producer surplus of domestic firms. However, to have an efficient incentive, consumers must introject this incentive quickly.

On the other hand, with a low level of marginal pollution disutility, the cost of consuming the polluting good is small, so the government has no incentives to encourage a positive level of environmental awareness. There are a large production and consumption of the polluting good. The government is not interested in encouraging any level of environmental awareness because the cost of pollution on people’s health and the loss in the FDI is smaller than the benefit in the producer surplus of the domestic firms. However, the concavity holds when the introjecting process must be slow.

**CONCLUSION**

Environmentalism is an ideological movement that encourages the necessity and responsibility of humans to respect, protect, and preserve the natural world from its action on it. In this sense, environmental awareness is an integral part of the movement’s success and emerges as part of social conscience and affects consumer decisions. There is not such a public policy as environmental awareness because it originates from society. However, there exists public policy addressed to encourage environmental awareness which is affecting directly the consumer decision rather than the producer decision.
The use of policies aimed at promoting environmental awareness is controversial because they focus on the human being with all its natural complexity involved in his cognitive process, and with the uncertainty of his resulting behavior. In other words, environmental knowledge does not imply pro-environment behavior. However, encouraging social awareness seems to be a desirable long-term policy with a well-educated society. Formal policies such as taxes and subsidies do not guarantee a social commitment to the environment by themselves unless certain awareness is promoted. In this document, it is assumed for simplicity that environmental awareness is a direct policy made by the government.

This paper develops a theoretical model in which a representative consumer chose between consuming polluting and non-polluting goods. However, the consumption of polluting goods produces a disutility in consumers given by the harm to the environment. The consumption decision depends on the level of environmental awareness of consumers which is encouraged by the government. Additionally, in this country, there are foreign and domestic firms competing under an oligopolistic framework. Foreign firms are endogenously determined as FDI, and they have an environmentally friendly technology, and the domestic firms have a non-friendly technology. Thus, foreign firms produce non-polluting goods while domestic firms produce polluting goods. The technology used by foreign firms is considered more expensive than the technology used by domestic firms. An increase in the level of environmental awareness affects negatively the domestic firms and increase incoming foreign firms.

The government in the host country should determine the optimal level of environmental awareness taking into account the producer surplus of domestic and foreign firms, the number of incoming firms in the economy, the consumer surplus, and the pollution disutility of the people. The authors found that optimal environmental awareness level depends on marginal pollution disutility. When people perceive that the damage of consuming polluting goods is large enough, the people are not willing to consume polluting goods decreasing the consumer surplus and the producer surplus of domestic firms. Then the government encourages a positive environmental awareness level. However, this policy will be effective if and only if there is a fast level of introjection of the policy. In other words, the learning process in which people translate environmental knowledge into pro-environmental behavior should be fast. Otherwise, policy encouragement would be inefficient to obtain a positive level of environmental awareness.

On the other hand, when people do not care (or do not have a conscience) about the damage of consuming polluting goods, then the people are willing to consume polluting goods increasing the consumer surplus and the producer surplus of domestic firms, but reducing the entry of foreign firms. Then the government does not encourage environmental awareness. With no encouragement by the government, it does not matter the process of introjection of the policy, because there is no policy at all. However, for concavity conditions, the authors consider that the learning process in which people translate environmental knowledge into pro-environmental behavior should be slow.

This work opens the door to some explanations about the reason why environmental awareness, which implies pro-environmental behavior, is so limited in many developing economies. From this model, the authors can infer two reasons, one internal to the process of encouraging environmental awakening, and another external to this process. First, policies aimed at creating a certain environmental awareness, such as educational policies or marketing pro-environmental campaigns, must take into account the level of introjection of these policies on social awareness. The poor design of these policies and the misunderstanding of the social perspective on the people’s priorities make the introjection process not adequate and results in policies of limited scope according to government objectives.

Second, social priorities may differ between developed and developing countries. Employment, national production, and low-cost consumer goods are more important than environmental disturbances caused by polluting production. In this case, the government is reluctant to establish a strict environmental policy even though this policy could promote better long-term social and economic conditions. Urgent needs are short-term priorities.
Our understanding of how people make decisions as consumers is rather limited. From the vision of local governments, recipients of direct foreign investment, we explore the perceptions of risk and profits of receiving foreign companies using a public environmental policy that generates a dilemma in the choice of consumption between domestic or foreign production, through the development of a theoretical model.

Although environmental awareness may vary over time due to economic and political changes, today the idea of sustainability prevails. This model provides novel insights into the micro-fundamentals of consumer decisions and broadens the behavioral perspective on environmental awareness.

In the literature on environmental awareness, there is a clear association of people’s educational level and marketing to have a greater impact on green consumption. The use of environmental awareness as a public policy can be more efficient than conventional market policies since it generates the possibility of perpetuation since it remains and is transmitted generationally from a process of social repetition.

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