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1. Introduction

Environmental awareness has grown drastically over the last several decades. As concerns have developed, TJETBT1 0 0 1 421.5 i54 656.14 Tm[(c)4(osum)-24(e)4(r)-6( )-179tastse a e tle

audiences provides a reputational benefit é ò[2] Basically, ñ é producers can differentiate their produ

heterogeneous in nature.

Our goal is to examine the heterogeneity of producers within competitive markets with green clubs, so we can expand the policy implications. Similar to Ben Youssef and Lahmandi-Ayed (2008); Baksi and Bose (2006), we focus our analysis oQissu(w)-ocus(g)10(r)-la69(foB)7(ose)-3(nd)-9(

2. The Analytical Framework

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conscientiousness in purchasing the green product is

producers, but we epliducl( )1(y)30 29(re)7[(p-6)4(e)sepr 21(duc)lub6(21(duc)osts)-3(,6( ):)and6( ):4(e)6( ):y6(

2.3 *Green Club Objective*

There are also a variety of potential manager entities of the club with a diverse set of

2.4 *Market Solution with a Green Club*

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membership fees rise, the green price premium increases. However, when abatement costs increase, the green price premium decreases. The reason being that increasing abatement costs leads to lower standards being set by the club which reduces the level of product differentiation between green and non-green products. As a consequence, green price premium decreases. This, combined with our previous result, means that greater consumer preferences for a green product do not result in higher cleanliness standards set by the club, but instead affects the price ofgrpr

contains a green club then the socially optimal number of green producers is:

$$n^{SP} = 1. \tag{22a}$$

Substituting $n^{SP} = 1$ from (22a) back into q in (20a) yields

$$q^{SP} = \frac{2b + t}{2e}. \tag{22b}$$

Based on ^{SP}, q^{SP}, and the social welfare function in (16), we have

Next, we compare the environmental standard in each scenario by using ^{GC} in (8) and q^{SP}, in (22b). Assuming that the market solution yields a higher standard in order to identify conditions where $q^{GC} \geq q^{SP}$,

presence of a green club. This extends the work by David and Sinclair-Desgagne (2005), by evaluating the use of regulation in the presence of a voluntary agreement (club participation) and

With (30a), we use P_e in (28) to calculate the green price premium: [29]

$$\sqrt{\qquad}$$ (30

5. Welfare Implications of a Double-Tool Environmental Policy

We have shown that even with an emission subsidy or club membership tax, the

(33)

Market solution based on the green club objective can be found by taking the derivative of n in (33) with respect to q and setting the resulting expression to zero. This gives the optimal environmental standard set by the green club with the dual policy (denoted by ñ*CD*ò) as:

$$q^{CD} = \frac{\sqrt{F} - ew}{e(S+t)},$$

solving for the optimal emission subsidy, we have

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that green production costs are (,), where *r* represents the m

$p_i \quad (1 \quad i)\, W.$

This shows that regardless of the certifier and their objective, the results are sub-optimal. An industry club will restrict producer access in order to benefit its members. A private certifier will raise the green standard, but only to restrict access and raise the green premium for their own gain. As a result, we see that irrespective of the certifier, additional policy is necessary in order to obtain the socially optimal outcome.

7. Concluding Remarks

In this paper, we have endeavored to analyze welfare implications of environmental regulations for an economy in which heterogeneous consumers choose between green and non-green products, and producer

between market solution and social plannerô

Appendix

A-1.Given that the equilibrium number of green producers in the market is:

we take the derivative of n^{GC} with respect to t, e, and g to obtain the following:

$$\frac{\partial n^{GC}}{\partial t} = \frac{2[t^2\sqrt{ge} - 4ge(t+\sqrt{ge})]}{(t^2 - 4ge)^2} > 0,$$

$$\frac{\partial n^{GC}}{\partial g} = \frac{-te}{\sqrt{ge}(t+2\sqrt{ge})^2} < 0.$$

A-2.Given that the equilibrium value of the green product premium is: we take the derivative of P_e^{GC}

number of green consumers (x). It follows that

$$CS \quad b \; n \; \frac{qt\, x(2 \quad x)}{2} \quad P_e x ,$$

where

References

Dosi, C. and M. Moretto (2001). Is eco-labeling a reliable environmental policy measure?, *Environmental and Resource Economics*,