

April 9, 1999

Two important aspects to be clarified

On the EPR Discussion at OECD

A Paper Presented to OECD Workshop
On Extended Producer Responsibility and Waste Minimization Policy
In Support of Environmental Sustainability
May 4-7, 1999

Mitsutsune YAMAGUCHI
Professor of Economics
Keio University, Tokyo
Fax: 81-3-3798-7480
E-mail: myamagu@econ.keio.ac.jp

The author of this paper thinks that there are several points to be clarified before OECD completes its discussion on Extended Producer Responsibility (EPR). In this paper two important aspects are picked up. They are; 1) comparative study on cost internalization into the product price vs. consumer-pay-at-discharge scheme, and 2) relationship between EPR and the Polluter Pays Principle (PPP).

1. Cost Internalization vs. Consumer-Pay-at-Discharge Scheme

The OECD[1998a] indicates that the producer should bear the responsibility for waste treatment, and further, these costs will not be paid by the consumers at the discharge stage, but should be internalized into the products price at the time of sales. The report cites the Packaging Waste Ordinances in France and Germany as examples. The reasons for the OECD view are that cost internalization would be simpler administratively (therefore the cost being low), and that the payment by the consumer at time of discharge induces illegal dumping ⁱ.

In the development of the discussions above, the OECD assumes that the final burden will be levied 100% on the consumers, even if cost is internalized into the prices of the products ⁱⁱ. Let us examine this point from an economic point of view (the following discussion owes greatly to Hosoda E. [1999]). The conclusions are:

- 1) *The internalized cost will be shared by both the producers and the consumers, provided that portion will depend on the price elasticity of supply and demand.*
- 2) *Regardless of the scheme (whether cost is internalized into the product price or consumers pay at the discharge stage), the net burden will be borne by both the producer and the consumer, and moreover, the portion of burden between the producer and the consumer in both cases are the same.*

1.1 The Cost Burdening to Producers and Consumers in the case of cost internalization

First, I would like to explain point 1) above. Please refer to Figure 1. With regard to a product, let us suppose that equilibrium is attained at the intersection of the demand curve (straight line) D and the supply curve (straight line) S , i.e. Price p^* and Quantity q^* . In this case, the consumer surplus would be p_1ap^* , and the producer surplus would be p_2ap^* . Next, let us suppose that EPR has been introduced, and that the waste treatment cost has been internalized into the product price (in this paper term "treatment" includes collection, transportation, sorting, recycling, incineration and final disposal of wastes). If the price is increased by bc , the supply curve shifts to S' , and the demand becomes equal at point b . The price would be p' , and the quantity would be q' . In this case, the consumer surplus would be p_1bp' , and the producer surplus would be $p'bp_0$. Angles of $p_0p'b$ and $p_0p''c$ are both right-angled, angles of $p'bp_0$ and $p''cp_2$ are equal, and since straight-line $p'b = p''c$, triangles $p'bp_0$ and $p''cp_2$ are congruent. From the above, the reduction portion of the consumer surplus would be $p'bab^*$, and the reduction portion of the producer surplus would be p^*acp'' . These areas show net burdens by the producer and the consumer as a result of internalizing the cost into the price (strictly speaking, the consumer burden would be rectangle p^*dbp' , and the producer burden would be p^*dcp'' , and the area of triangle abc is called as dead weight loss. However, we will not go into detail here). By studying the figure, you can tell that

the net burden of the producer and the consumer are almost equal. This ratio would change depending on the price elasticity of the supply and demand. Please refer now to Figure 2. The only difference with Figure 1 is that the price elasticity of demand is smaller. In Figure 2, both the producer and the consumer assume burden, however, the consumer's burden is much bigger. As to price elasticity of supply, similar fashion will be applied. From the above, the following can be introduced. That is, if the market is perfect,

The smaller the price elasticity of demand is, the greater is the increase in the ratio of the waste treatment burden shifting to the consumer. Contrary-wise, the larger the price elasticity of demand, the greater is the increase in the ratio shifted to the producer.

The smaller the price elasticity of supply is, the bigger becomes producer's burden. On the other hand, the larger the price elasticity of supply is, the easier it is to shift the burden to consumer.

1.2 Cost Internalization vs. Consumer-Pay-at-Discharge Scheme

Next, let us consider the case in which the consumer pays the waste treatment costs at the time of discharge. Please refer to Figure 3. This figure is a copy of Figure 1, striking off S' and newly adding demand curve (straight line) D' . Figure 3 assumes that the consumer pays the waste treatment costs at the time of discharge. Though it depends on the length of the time lag between the purchasing point and the discharge point, if it is supposed that the time lag is short, to pay treatment fees at time of discharge will mean the same, for consumer, as a rise in product prices equivalent to the treatment cost portion. Therefore, the demand curve will shift down. It will shift down in the same height of S and S' in Figure 1 (this is because the increased price, bc , in Figure 1, and the discharge fee for consumer, bc , in Figure 3 are equal to one another). In this case, the equilibrium point moves from a to c , and the price and the quantity become p'' and q' respectively. The reduction portion of the consumer surplus is triangle $p_1ap^* - p_2cp''$, the reduction portion of the producer surplus is $p^*ap_3 - p''cp_3 = p^*acp''$, and this equals the reduction portion of the producer surplus in Figure 1. Next, due to the same reasoning as in 1.1, triangles p_1bp' and p_2cp'' are congruent. Therefore, the reduction portion of the consumer surplus, $p_1ap^* - p_2cp''$ would be equal to trapezoid $p'bab^*$, and this would be equal to the reduction portion of the consumer surplus in Figure 1. From the above, the following can be said:

If the time lag between the purchasing and the discharge period is short, even if the scheme is different (either to internalize the waste treatment costs to the product price, or to have consumer pay at the time of discharge), net burden by the producer or the consumer remain unchanged.

In the case where the time lag is long, as in durable consumer goods, situation may varies depending to what extent consumer, at the time of purchase, take into consideration of the discharge fees they will have to pay at time of discharge. If the consumer does not pay attention to the discharge fees very much, the demand curve will not shift downward that much, and will only be between D and D' (the case will depend on whether the discharge fees are announced in advance, and whether or not there are elements of uncertainty). In this case, the reduction portion of both the producer and the consumer surpluses will be smaller than that of cost internalization scheme. This will mean that, for both the producer and the consumer, the consumer payment at the time of discharge would be easier to accept. However, the opposite may also be possible. In other words, there could be a case in which the consumer will face higher discharge fees than what

they anticipated. However, if the discharge fees actually become lower due to rapid technological innovation, the payment amount at the time of discharge may well be at a level that the consumers anticipated. From a policy point of view, this holds an important meaning.

One of the focuses in Japan's EPR discussions is whether or not to internalize treatment costs to the product prices. Some producers oppose this, because, under the cost internalization scheme, the price hike would be difficult due to keen competition, and as a result, the producers will eventually bear the cost. However, under these circumstances, the result would be the same even if the payment obligations were borne by the consumers at the time of discharge. Let me explain using a figure again. Please refer to Figure 4.

Figure 4 describes the case where the elasticity of demand is extremely high. In this situation, a small rise in prices would greatly reduce the demand. The assertion by the producers mentioned above that a price hike would be difficult points to this situation. In these situations, when the bc portion of the waste treatment costs are added to the product price, the supply curve shifts from S to S' , and along with it, the price rises to p' and the sales quantity drops to q' . In this case, the reduction portion of the producer surplus is p^*acp'' and the reduction portion of the consumer surplus is $p'baq^*$. In other words, the larger the price elasticity of the demand is, higher the ratio of the reduction portion of the producer surplus will become, however, the burden of the price hike (although the ratio is small) will also be borne by the consumer. What will happen if it is a scheme where the consumer pays the treatment costs at the time of discharge as some producers in the same market try to assert? There would be no difference in the results. Please refer to Figure 4 again. In this case, if the time lag is short, the demand curve will shift to D' , and the price and the sales quantity will drop to p'' and q' respectively. Explanations have already been made in the comparison of Figure 1 and Figure 3. Namely, reduction portion of the producer and the consumer surplus is the same as in the case of cost internalization. In other words, in a situation where a price hike is difficult (situation where the demand curve is close to horizontal), even if the consumer pays at the time of discharge, the demand will drop sharply, and the producer's position will not differ from the case of a price add-on. This would be the case theoretically and may apply in the case of packaging waste. In reality, however, this may not be the case due to the existence of time lag. For durable consumer goods such as home appliances, it will take a long period of time between the purchase and the discharge. As mentioned earlier, under the consumer paying scheme, the demand curve will not shift downward to the extent of D' , but most probably stop somewhere between D and D' . If technological innovation progresses, as also mentioned earlier, this will be beneficial since the reduction ratio of both the producer and the consumer surpluses will become smaller. From the above, careful attention should be paid to the level of the shift in the demand curve. It will be affected by those factors as the characteristic of the product, dissemination of information on the discharge fees, and the outlook on technical innovations.

There are other elements in which consideration will have to be made regarding whether or not to internalize the cost. As mentioned earlier, the reasons that the OECD asserts the cost internalization scheme are because it is administratively easy and low-cost, and that consumer-pay-at-discharge scheme would induce illegal dumping. Japan's Recycling Law of Specified Home Appliances that will take effect in 2001 has adopted the consumer-pay-at-discharge scheme (consumers would pay total amount of the cost needed for recycling and the cost of collection and transportation to the retailers at the time of discharge). From the viewpoint that the treatment cost at the time of discharge cannot be decided in advance regarding durable consumer goods, and that as the operation of a deposit system would be costly, this can be considered as an appropriate choice. However, taking into consideration that the recycling costs differ in every home appliance

manufacturer, and further, the collection and transportation costs differ by location, the operation of this scheme will probably be quite costly. Impressions from the OECD's EPR Workshops were that especially in Europe, illegal dumping and free-riders are major issues. Japan, through experience, will have to ascertain if that will also be the case in its own country. On the other hand, as a benefit of the consumer-pay-at-discharge scheme, by providing incentives to purchase environmentally friendly products and restraining waste by having consumers be aware of the waste discharge cost, an educational effect can be expected.

The issue on the scheme itself, on whether to internalize the cost into product prices or have the consumers pay at the time of discharge, should be decided after a thorough consideration of elements such as the theory, the characteristics of the concerned products, the domestic situation, the possibility of illegal dumping and the political feasibility.

1.3 Issue on Scheme Designing

The discussion so far is based on the assumption that the waste treatment cost is already widely known. This may not be the case with the deposit system. However, even in this case, it is necessary to know the accurate amount at the time of settlement. Moreover, in the case of the consumer-pay-at-discharge scheme, the treatment cost must be clear at that time. There is an interesting study paying attention to these points.

In *Hosoda E.* [1998], it examines from a theoretical aspect the following four systems, and proves that the results from them are all the same: cost internalization, consumer-pay-at-discharge, putting the responsibility of waste treatment on the producer and leave what to do to corporations' initiatives, and, to levy an income tax and use it as a subsidy for waste treatment and environmentally-friendly products. As a result, since all systems, except the method entrusting it to the market, involve enormous information costs (to know an accurate waste treatment cost is difficult), Hosoda concludes that the best choice is to leave it to the market (corporations' initiatives). This study has many hints and suggestions in regard to policy implications.

2. PPP and EPR (Is the Producer the Polluter?)

In the discussion at *OECD*, it seems that the grounds of transferring the responsibility of waste treatment from the local government to the producer are based on Polluter Pays Principle (PPP) ⁱⁱⁱ. The word "PPP", the author believes, is being used in the same meaning as the one appeared in the OECD "Guiding Principle concerning International Economic Aspects of Environmental Policies" adopted in 1972 ^{iv}. The concept of PPP was introduced with the view to internalize cost of pollution prevention (external diseconomies) in order to assure fair international competition. This principle states that the polluter (the source of external diseconomies) pays the pollution prevention cost. As an example, let us suppose that corporations of the same business in competition exist in country A and country B, and in both countries, the pollution regulations have been reinforced. In country A, the corporation bears the cost of pollution, and in country B, it is covered by a subsidy from the government. This will lead to a disadvantage in international competitiveness for the corporation in country A. So as to avoid such disadvantages, the "Polluter Pays Principle" was introduced, having the corporation in country B (the polluter) also pay the costs involved. The important point here is that it is always the "polluter" that pays.

Coming back to EPR, the OECD [1998a] describes the shifting of responsibility to the producer, on the grounds of PPP, as the essence of EPR. However, this is the same as describing the producer

as "polluter". Is the producer actually the polluter? The introduction of EPR thinking in the general waste field started from packaging and extended to home appliances, and is now at the stage of influencing electronic equipment. Indeed, packaging is manufactured (or used for their own product) by the corporations. However, it is the consumers that ask for them. As an example, the minimal effect when department stores call upon the usage of plain wrappings during the holiday gift season is an issue on the consumer's side. In the case of home appliances, it is the consumer who enjoys utility by purchasing and using those goods. In economic terms, producer surplus and consumer surplus are accrued in accordance with the market price of the products, therefore, by the sales and purchasing of the product concerned, both the producer and the consumer gain benefit. This means that the producer and the consumer stand on equal ground, and does not lead to the idea that producers are polluters. Moreover, it is not true that all wastes pollute the environment. Therefore, to describe the producer as the polluter is itself a false claim. If used anyway, it will cause repulsion of the producers, and result in increasing political uncertainty in introducing EPR policy. If cooperation from the producers is to be obtained, PPP should rather be considered separately from EPR.

References:

- OECD (1998a) "Extended and Shared Producer Responsibility Phase 2 FRAMEWORK REPORT", ENV/EPOC/PPC(97)20/REV2, May 13, 1998
- OECD (1998b) "Extended Producer Responsibility Phase 2 CASE STUDY ON THE GERMAN PACKAGING ORDINANCE", ENV/EPOC/PPC(97)21/REV2, May 13, 1998
- OECD (1998c) "Extended Producer Responsibility Phase 3 CASE STUDY ON THE DUTCH PACKAGING COVENANT", ENV/EPOC/PPC(97)22/REV2, May 13, 1998
- Lifset R. and Lombardi D.R. (1997), "Who Should Pay? And Why? Some Thoughts on the Conceptual Foundations for the Assignment of Extended Producer Responsibility", a paper presented to the OECD International Workshop on EPR. Ottawa, Canada December 1997
- Tanaka M. (1998) "Extended Producer Responsibility strategy at OECD and Japanese reaction" Eco Industry Vol. 3 No. 9, September, 1998 (in Japanese)
- Hosada E. (1998) "Who Pays for Treatment of Household's Waste", a preliminary report presented to the Conference on the Environmental Economics held at the Keio University in December 1998.
- Lindsay C. (1998) "Extended Producer Responsibility Through Voluntary Partnership", a paper presented to the OECD Workshop on Extended and Shared Responsibility for Products. Washington D.C. December 1-3, 1998
- Hosada E. (1999) "Economics of Wastes and recycling" mimeo, discussion paper (Keio University)

Figure 1 Cost burdening to Producers and Consumers (Case 1)
 (Waste treatment cost is internalized into price of goods)

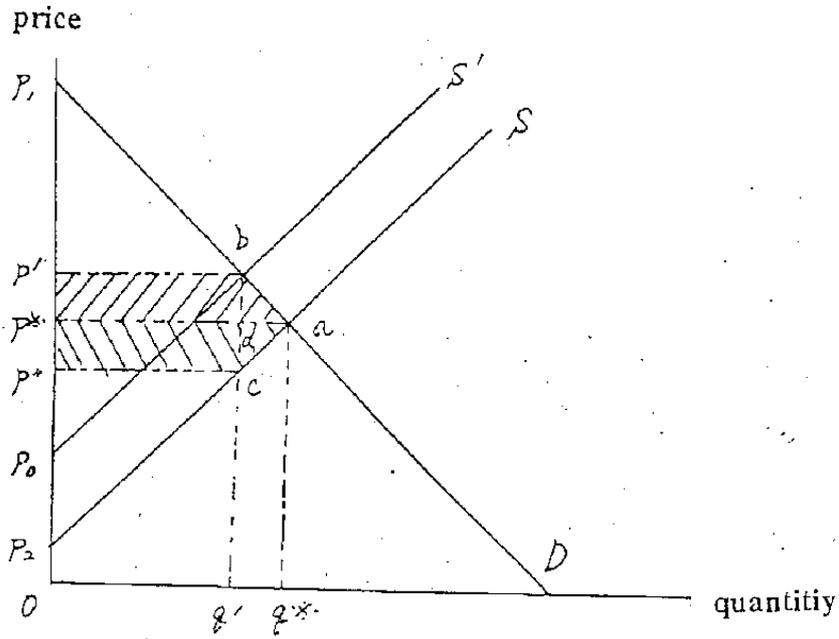


Figure 2 Cost burdening to Producers and Consumers (Case 2)
 (Waste treatment cost is internalized into price of goods)

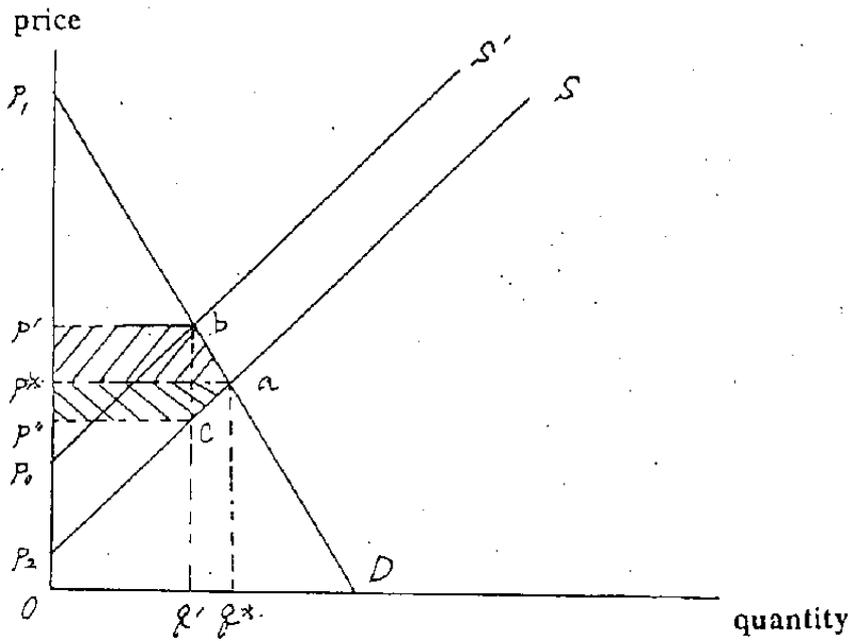


Figure 3 Cost burdening to Producers and Consumers (Case 1)
 (Consumers pay waste treatment fees at time of discharge)

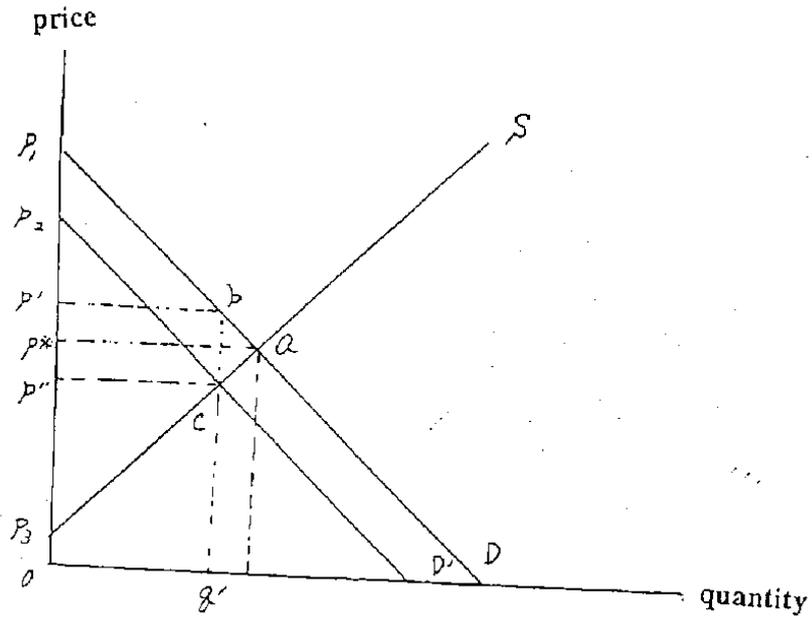
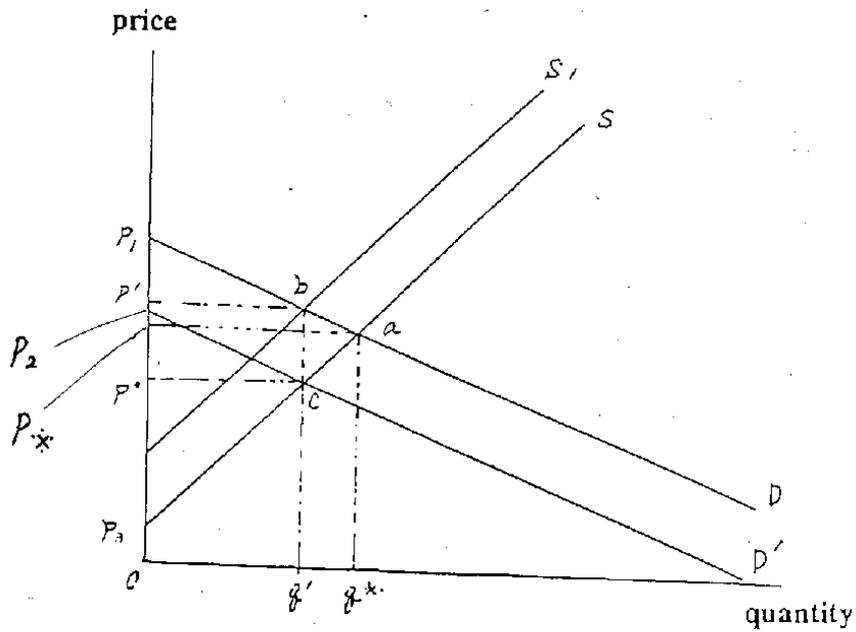


Figure 4 Cost burdening to Producers and Consumers (Case 2)
 (Consumers pay waste treatment fees at time of discharge)



ⁱ It states, "to assess the fee at the point of original sale is administratively the most simple and effective way." and, "To impose a separate fee at the time of disposal, as some producers have urged, may provide an incentive to consumers to engage in fee evasion." OECD [1998a], page 25. Furthermore, it could be gathered from this statement that producers in every country assert the consumer-pay-at-discharge scheme.

ⁱⁱ Regardless of whether cost is internalized in the price or the conventional treatment by local governments, it states that "it is inescapable that costs are always passed on or back to the consumer/taxpayer, who inevitably pays for waste management." (OECD [1998a], p. 29).

ⁱⁱⁱ As in, "Many OECD countries --- in accordance with the Polluter Pays Principle (PPP) --- are taking measures to expand private sector (corporate) responsibility ----. This approach of Extended Producer Responsibility (EPR) ---" (page 2), and, "When properly undertaken, EPR's strength lies in ----- the Polluter Pays Principle" (page 5).

^{iv} According to OECD Guiding Principles concerning international economic aspects of environmental policies adopted in 1972, the Polluter Pays Principle is a principle "to be used for allocating costs of pollution prevention and control measures to encourage rational use of scarce environmental resources and to avoid distortions in the international trade and investment". It further continues as, "This principle means that the polluter should bear the expenses of carrying out the above-mentioned measures decided by public authorities to ensure that the environment is in an acceptable state. In other words, the costs of these measures should be reflected in the cost of goods and services which cause pollution in production and/or consumption". OECD Guiding Principles Concerning International Economic Aspects of Environmental Policies.