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Working Paper

Impact of Trade Policy Reforms on the Environment

PIDS Discussion Paper Series, No. 2001-07

Provided in Cooperation with:

Philippine Institute for Development Studies (PIDS), Philippines

Suggested Citation: Medalla, Erlinda M. (2001) : Impact of Trade Policy Reforms on the Environment, PIDS Discussion Paper Series, No. 2001-07, Philippine Institute for Development Studies (PIDS), Makati City

This Version is available at:

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Erlinda M. Medalla

DISCUSSION PAPER SERIES NO. 2001-07

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March 2001

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Impact of Trade Policy Reforms On The Environment

ERLINDA M. MEDALLA, Ph.D.

This paper is an extension of an unpublished paper prepared by the author on Trade and Industrial Policy and the Environment for the United Nations International Development Organization (UNIDO).

ABSTRACT

The paper attempts to provide a theoretical analysis as well as some indicators on the linkage between trade policy and the environment. It looks at what has happened to the share of manufacturing industries by pollution classification over time and finds that the share of non-pollutive/non-hazardous industries have grown over the years covering the period of trade reforms. The impact of trade policy on the environment was also analyzed using a simulation model which predicts what happens to pollution intensity with and without trade reforms. The results indicate some positive impact of trade reforms on the environment and the findings suggest that the Philippines should pursue its current thrust towards greater trade liberalization and implement the corresponding environmental measures.

Keywords: trade policy, trade reforms, environment, pollution intensity

IMPACT OF TRADE POLICY REFORMS ON THE ENVIRONMENT

1. Introduction

Economic growth has understandably been the major preoccupation of countries around the globe. And especially in the Asia-Pacific region before the Asian currency crisis in 1997, the greater openness in the trading regime all over the globe was seen to have contributed much to the dynamic growth in the region. Increasingly, however, the stresses on the environment are being felt such that questions about linkages between growth and the environment in general, and linkages between trade policy and the environment in particular could no longer be ignored.

Trade theory suggests that for a small country, in the absence of market imperfections (e. g. the case of externalities, imperfect competition), the use of trade barriers (whether in the form of tariffs or in the form of quantitative restrictions) creates market distortions which reduce overall welfare. As such, the use of trade measures even for environmental reasons are often considered non-optimal.

Environmental concerns, on the other hand, almost invariably involve externalities which cannot be captured by market forces alone. It is argued that this, especially where property rights are not well defined, calls for the use of trade measures to more effectively achieve environmental goals.

While the nature of environmental concerns could require government intervention, it remains open to question whether the use of trade measures would be the best form of intervention. Nonetheless, questions remain whether the adopted trade policy has contributed to environmental degradation. Hence, a very important question is what has been the impact of Philippine trade policy on the environment, especially considering the trade reforms that have been undertaken.

This paper is an attempt to look specifically into this question. Towards this end, the paper first provides a theoretical analysis of the relationships between the trade regime and the environment in Section 2. Section 3 then provides a brief overview on the evolution of Philippine trade policy to possibly relate it empirically with what has happened to the pollution intensity across sectors. This is done by classifying (four-digit PSIC) manufacturing industries according to how pollutive and hazardous these are and looking at what happened to the share of pollutive industries over the years. While providing some insights into the impact of trade policy on the environment, direct implications could not be conclusively drawn because of numerous other factors that come into play. Hence, an attempt is made in Section 4 to isolate the impact of trade policy using a simulation of the impact of trade reforms on pollution intensity. Finally, conclusions and recommendations are drawn from the results and findings of the previous discussions in Section 5.

2. Trade and Environment Linkages: A Theoretical Analysis

Trade theory suggests that for a small country, in the absence of market imperfections (e. g. the case of externalities, imperfect competition), the use of trade barriers (whether in the form of tariffs or in the form of quantitative restrictions) creates market distortions which reduce overall welfare. As such, the use of trade measures even for environmental reasons are often considered non-optimal.

Environmental concerns, on the other hand, almost invariably involve externalities which cannot be captured by market forces alone. It is argued that this, especially where property rights are not well defined, calls for the use of trade control measures to more effectively achieve environmental goals.

While the nature of environmental concerns could require government intervention, it remains open to question whether the use of trade control measures would be the best form of intervention. Would trade barriers improve environmental conditions and at what costs?

Ideally, distortions should be addressed at the source. For example, if the problem is lack of well-defined property rights, then, measures to directly remedy the situation would be more appropriate. Or if externalities are involved, measures to bring about their internalization should be sought. However, these solutions are usually easier said than done, and the use of trade measures for environmental goals is often considered if not actually resorted to.

While trade measures are often more convenient (politically and otherwise) to implement, the use of trade measures for environmental goals is a roundabout way of addressing the problem suggesting inadvertent costs that could be entailed. Its use might reduce environmental pressures but only at very high costs (or could even aggravate rather than solve the environmental problem). This could be further illustrated in two ways as follows below.

Consider first a single commodity case, an importable which has been imposed an import control (a tariff or a QR) for environmental reasons. The trade measure would raise the domestic market price of the commodity. This would discourage and reduce its consumption. On the other hand, however, the higher price increases the protection of the local producer and thus encourage more local production of the product while curtailing its importation. On the whole then, the trade barrier, instead of limiting the production of the environmentally undesirable commodity, would even tend to increase its local production.

Of course, what should matter more is whether or not the overall global production has been discouraged as a result of the trade restriction, which seems to be implied by the reduction in total consumption. However, that global production on the whole would be reduced does not necessarily follow. From the point of view of the exporter, the price of his output goes down. This could lead to higher consumption of the commodity in the exporting country, offsetting to some extent the decline in consumption of the importing country. Moreover, production has presumably been transferred from the more globally efficient producer (the exporter) to the less globally efficient (the importer) suggesting a global misallocation of resources.

Thus, at best, the use of restrictive trade measures alone is not enough to promote environmental goals. At worst, this could lead, on the whole, to further degradation of the environment. In any case, what is apparent is that the use of unilateral trade control measures does not seem to offer a viable solution to environmental degradation. The ideal solution is for both the importing and exporting countries to impose a consumption or production tax on the commodity in question (and/or implement some form of command-and-control measure addressing the problem at the source, whichever is more effective and efficient) and refrain from the use of distortionary trade measures.

Consider now a multi-sectoral economy with a number of exportable and importable sectors. Non-uniform tariffs and/or nontariff barriers (NTBs) result in uneven effective protection rates (EPR)¹ across sectors. Because resources are limited, protection (which is measured by EPR) is relative. Increasing the EPR of one sector is always at the expense of the rest of the economy. It makes the sector relatively more profitable and would thus accordingly attract a relatively greater flow of resources at the expense of the others.

Thus, suppose the tariff on imports competing with an importable sector associated with high environmental costs is increased. This would lead to a reallocation of resources towards this sector from the rest of the economy (which entail on average lower environmental costs). Thus, on top of the misallocation of resources within the economy resulting from the trade distortion, there would be increased environmental costs involved. On the other hand, if the protected sector has lower environmental costs, then the net effect on the environment would be positive although there could be a loss in terms of allocative efficiency.

The discussion also strongly suggests another interesting conclusion: that activities associated with high environmental costs, rather than being imposed trade restrictions, should be liberalized.

In general, if the protected sectors are also associated with higher environmental costs, then protection would clearly be encouraging higher environmental costs, and vice versa. However, in the latter case (i. e, where protected sectors are associated with lower environmental costs), it is not clear whether the benefits on the environment outweigh the costs in terms of greater allocative inefficiency. In contrast, where environmental measures and/or regulations are enforced to internalize environmental costs and trade measures are avoided, real allocative efficiency is achieved comprehensively and the impact on the whole is clear.

The absence of mechanisms for internalizing environmental costs imply subsidies to the relevant sector. In general, for any given activity, the higher the environmental costs, the greater the implicit subsidy and the higher the implicit effective protection rate. As such, free trade would actually imply higher EPR for activities associated with higher environmental costs. Thus, in the short-medium term,² free trade could lead to environmental degradation without environmental cost internalization. There is, however, a better allocation of resources (excluding the environment) involved with freer trade ultimately leading to higher incomes and this should be weighed against the environmental costs. Again, the net effect is not clear.

What is clear is the near impossibility of designing the tariff structure such that the resulting EPR structure would exactly but inversely match the environmental costs.³ It is thus not unrealistic to imagine that a freer trade (with its possible environmental costs) could be better than a more

1 A tariff on output provides nominal protection for the industry while a tariff on inputs imposes a penalty. The effective protection rate (EPR) is a measure of the net effect of tariffs (or NTBs) on both outputs and inputs on the protection an industry receives. Specifically, the EPR is a measure of protection on value added, i. e., the percentage difference between protected value-added and "free-trade" value added (denoting value-added without protection).

2 The dynamic gains from freer trade in the longer run could lead to gains in the environment arising from cheaper green technology and higher incomes.

3 This is true even if environmental costs could be adequately measured. In the first place, the output of one sector is usually an input to another so that a tariff on one would have repercussion on the other sectors. In the second place, the tariff should be inversely related to the associated environmental costs. This would not be easy to set.

restrictive trade regime which would likely result in a mismatch of required EPRs (from tariff and trade protection) and environmental costs.⁴ Again, the ideal scenario is where environmental measures and/or regulations are enforced to internalize environmental costs and trade distorting measures are avoided.

These are basically the same conclusions drawn in the single commodity case discussed above but highlight more fully the impact of trade measures on resource allocation within the economy.

The analysis in both cases, of course, involves a lot of simplifications. Some could argue that the implicit assumptions are far from reality. Markets are imperfect in the real world. The conclusions derived nonetheless remain valid. Whether or not the market is perfect, an increase in protection would generally induce a corresponding flow of resources towards the benefited sectors. Nonetheless, more empirical analysis is needed to support the conclusions. Thus the next section traces the evolution in Philippine trade policy and attempts to provide some empirical observations on the composition of manufacturing industries with respect to its pollution potential classification.

3. The Philippine Trade Policy Environment and Trends in the Share of Polluting Manufacturing Industries

Trade policy has been the major policy tool which shaped the Philippine industrial policy. Trade policy made liberal use of tariffs and import licensing requirements to protect local industries. Its nature and impact have been well studied. By and large, the Philippines has employed a restrictive trade regime, mainly to promote import-substituting industries starting as early as the beginning of the 1950s. There were short periods of decontrol in the 1960s, but on the whole, the trade protection bias has persisted for decades. It was only in the 1980s when major trade reforms began to be undertaken.

In general, the Philippine trade policy reform experience could be grouped into five periods. The first is the post-war period up to the 1970s covering the pre-reform era of highly trade-restrictive and protectionist policy regime, supporting the inward-looking import-substitution strategy at that time. This is followed by the first major trade reforms during the first half of the 1980s -- the 1981-85 Tariff Reform Program which brought down all tariff range to within 50 percent from highs of 100 percent tariff rates. The third period saw the major import liberalization episodes in 1986-88, soon after the EDSA revolution and under the Aquino Administration. The fourth period is the second phase of the Tariff Reform Program narrowing down the tariff range to mostly within 30 percent. This was implemented by the Aquino Administration under Executive Order 470 (EO 470) over a five-year period from 1991 to 1995. Finally, the fifth major period is the period covered by EO 264 implemented by the Ramos Administration over five years from 1996 to 2000. This further narrows down the range to within 3 and 10 percent (excluding some agricultural products).

⁴ The latter would have both higher environmental costs and greater allocative inefficiency.

Hence we see a gradual transformation of the Philippine trade regime from a highly restrictive trade policy prior to reforms in the mid 1980s to a relatively open trade regime by the end of the 1990s. The reforms were made in recognition of the distortions and adverse effects of the restrictive regime which led to hidden costs and stunted industrial growth.

Other Developments: The GATT-WTO, AFTA and APEC

On top of these unilateral trends are multilateral movements toward greater global and regional liberalization especially in the 1990s. These include, most importantly, the ratification of the GATT-WTO (World Trade Organization), new initiatives under the AFTA (ASEAN Free Trade Area), and wider regional efforts to accelerate liberalization further under the APEC (Asia Pacific Economies).

In view of the unilateral trade reforms, not much further liberalization is effected by the new WTO. Instead, above anything else, the new WTO represents, for the Philippines, efforts to strengthening discipline and rules in the global trade and restore global trading order. It thus reinforces the current trend in trade policy. AFTA and APEC, on the other hand, within their narrower regional context, intend to achieve more in terms of reduction of trade barriers and lowering of tariffs.

More than anything, the commitment to APEC's goals set forth in the *Declaration of Common Resolve* signed in Bogor, Indonesia serves as a confirmation and reaffirmation by member economies to stay faithful to GATT-WTO principles and objectives of global liberalization. The *APEC open regionalism*, as conceived, is probably one of the best ways to ensure that countries uphold their WTO commitments. This intent is further enhanced and strengthened by efforts by the APEC to accelerate and deepen liberalization committed under WTO and achieve a free and open trade and investment regime by year 2020.

These developments complements well the current policy thrust. GATT-WTO, especially, would ensure that trading nations, especially the major industrialized ones, do not become more protective. This, together with the impact of AFTA and APEC, could open market access which would benefit greatly the export push strategy. In any case, these developments ensure that the trends toward greater trade liberalization would continue, at least until the start of the next century.

Thus, substantial trade reforms have been implemented during the last fifteen years or so and a shift from inward policy orientation towards greater openness and more outward orientation has been effected. Trade policy affects growth and the pattern of production and as such would have a corresponding impact on the environment. The key question is how has the shift in trade policy affected the environment. The standard answer is that so long as good environmental policy is in place and adequately enforced, whatever trade policy adopted should not impose undue burden on the environment. The problem is that the state of environmental management in the Philippines as in many other countries is still far from adequate. Increased production that is not accompanied by improvements in environmental management and under conditions of no improvements in the enforcement of environmental laws will contribute to environmental deterioration, whatever the economic policy environment.

This is a difficult question to answer. We can only surmise from what theory tells us and from whatever indicators we could use. Trade theory tells us that the inherent bias against exports resulting from the trade protectionist regime of the past, made the country heavily dependent on exports where it has huge comparative advantage-- primary products, particularly agricultural crops and other natural resource-based commodities (mining and forestry). These primary industries generally impose greater burden on the environment. Thus, the resulting dependence on primary exports has adverse impact on the environment. Secondly, export industries, which have to compete with the world, would tend to be more adaptive. They need to be abreast with the global developments (technological and otherwise) which are increasingly demanding a cleaner and greener environment.

It is interesting to note that with trade reforms, the level of protection for the relatively more pollutive industries went down substantially. Thus, while trade reforms starting in the 1980s would have mixed effects across sectors with respect to the environment, the reforms would likely have, on the whole, a positive impact on the environment. Moreover, the liberalized trade regime would lower the cost of pollution abatement and other similar equipment.

In addition, investments in new machines proceeded slowly under the inward-looking industrial strategy promoted by the highly protectionist regime. This was due to some extent to the limited domestic market it served and to the lack of competition. For example, up to the late 1980s, the textile industry has had to contend with old technology and capital equipment. It was only in the last years of the 1980s when new investments in new machines started to grow. In general, the sluggish re-investment in new machines was likely to have impacted negatively on the environment.

Finally, global trends towards more open trade promote regional and global cooperation and this is especially true in the case of environmental concerns. This is exemplified by such agreements as the ITTA (International Trade in Timber Agreement), the Montreal Protocol, agreement on trade in hazardous wastes, biodiversity, climactic change etc.

All these insights indicate some positive impact of trade reforms on the environment. The findings and observations on the trend in the share in value added of the different sectors classified by its pollution potential tend to support somewhat these insights.

The Environmental Management Bureau (EMB) of the Department of Environment and Natural Resources (DENR) classified manufacturing sectors (at 4-digit level) according to how pollutive and hazardous they could be, ranging from non-pollutive to extremely pollutive and non-hazardous to extremely hazardous, based mainly on their associated effluents. The share in value-added by pollution potential classification of sectors are then computed using the available census data for 1972, 1975, 1983, and 1988 and annual survey data for 1992. The results are summarized in Table 1. (More details can be found in the Appendix Table1).

No clear patterns can be discerned about the share of non pollutive industries, although some interesting observations can be made. The share of non-pollutive industries is much lower at less than 20 percent than the pollutive industries. The share of non pollutive industries was going up and down during the observation points from 1973 to 1992.

Table 1
SHARE IN VALUE ADDED BY POLLUTION CLASSIFICATION
 In Percent

Pollution Classification	1972	1975	1983	1988	1992
<i>Extremely Hazardous/Highly Pollutive</i>	7.06	16.07	16.44	8.61	9.22
<i>Hazardous/Highly Pollutive</i>	30.63	28.74	25.40	27.97	24.99
<i>Non-hazardous/Highly pollutive</i>	5.51	3.39	6.03	6.35	6.03
<i>Extremely hazardous/Pollutive</i>	3.90	3.39	4.25	5.52	5.09
<i>Hazardous/Pollutive</i>	27.88	22.86	19.34	18.57	18.79
<i>Non-hazardous/Pollutive</i>	9.33	13.49	10.66	11.51	13.35
<i>Hazardous/Non-pollutive</i>	8.90	4.79	5.86	7.14	5.70
<i>Non-hazardous/Non-Pollutive</i>	6.78	7.26	12.03	14.33	16.83
ALL INDUSTRIES	100.00	100.00	100.00	100.00	100.00
Non-Pollutive	15.68	12.06	17.89	21.47	22.53
Pollutive	41.11	39.74	34.24	35.59	37.23
Highly Pollutive	43.21	48.20	47.87	42.94	40.24
TOTAL	100.00	100.00	100.00	100.00	100.00
Non-Hazardous	21.62	24.15	28.73	32.19	36.21
Hazardous	67.42	56.39	50.59	53.68	49.48
Extremely Hazardous	10.96	19.46	20.68	14.13	14.31
TOTAL	100.00	100.00	100.00	100.00	100.00

Filename: SCVAREV.xls\Worksheet B

However, the levels in the latter period from 1983 were generally higher than the earlier, pre-trade reform period. Furthermore, the share of non-hazardous industries steadily rose-- from 22 percent in 1972 to almost 37 percent in 1992. Indeed, the share of pollutive and highly pollutive/hazardous and extremely hazardous consistently went down from 68.5 percent in 1972 to a little over 50 percent in 1992.

Care should be taken in assessing the resulting trend. Is it an indication of the merits or demerits of industrial and environmental policies? What is the ideal trend in the first place? Furthermore, while industrial policy influences the level and composition of industrial activity, one cannot attribute the trend to industrial policy alone. Equally important is the effectiveness of environmental policy and one cannot readily separate their effects.

Nonetheless, the trend provides a good summary indication of the overall impact of these policies. Furthermore, if there is weak or lax enforcement of environmental laws, it is safe to say that the improving trend most likely implies favorable impact of industrial policies and policy reforms. However, if the trend worsens, it is difficult to tell whether this is the result of chosen industrial policy or lack of effective environmental measures. Ineffective environmental measures imply non-internalization of environmental costs which become implicit subsidies to pollutive industries -- hence relatively higher share of the more pollutive type of industries.

Bearing in mind the caveats mentioned, the findings seem to support the view that the industrial policy reforms undertaken in the past decade have been beneficial to the environment, or at least have not led to further environmental degradation than would have been in a more protectionist, inward-looking policy regime. Nonetheless, while providing some insights into the impact of trade policy on the environment, direct implications could not be conclusively drawn because of numerous other factors that come into play. Hence, an attempt is made in the next section to isolate the impact of trade policy using a simulation of the impact of trade reforms on pollution intensity.

4. Impact of Trade Reforms on Pollution Intensity: A Simulation

To illustrate more clearly how trade policy measures affect the environment, a simulation analysis is performed for the Philippine case. Starting in the 1980s, particularly since 1986 when the Aquino Government took over, the Philippines has been implementing significant trade reforms to push Philippine industries to become globally competitive. It would thus be interesting to determine the impact of trade liberalization on the environment.

The PIDS-DIA project developed a methodology for simulating the impact of trade reforms on output (as well as income and the trade balance). The approach is partial equilibrium in nature in that it assumes zero cross-price elasticities and could not incorporate investment behavior. These shortcomings limit the analysis to comparative statics and short-run impacts. The advantage of the model, however, is its multi-sectoral, input-output framework, highlighting best the variation in EPRs across these sectors and incorporating, to some extent, linkages across them. Furthermore, it is the short-run adjustment costs of reforms which concern policymakers more in the case of policy reforms which are envisioned to have long-term benefits.

Basically, the model works as follows. Changes in tariffs (or tariff equivalents in the case of QR removal) effected by trade reforms result in changes in EPR. Given supply elasticities, these induce changes in output. The changes in output implies also changes in income which lead to changes in final demand (given income demand elasticities). The changes in tariffs also affect the output prices which induce, in addition, changes in demand, given price elasticities. Under the fixed exchange rate assumption, the changes in supply and demand are translated into changes in the trade balance, i. e. exports and imports. Under the flexible exchange rate assumption, the exchange rate acts as the mechanism which restores the original trade balance.

This study uses the 1985 EPR structure as the pre-reform situation -- the base case scenario. Two trade reform scenarios are taken to consideration in the simulation exercise: (1) trade reforms effecting a fifty percent reduction in EPR across the board, and (2) trade reforms levelling tariffs and EPR to a uniform 5 percent. For each case, simulations without exchange rate

adjustment (fixed exchange rate) and with exchange rate adjustment (flexible exchange rate) are carried out. These exercises yield five cases: (1) the base case, pre-reform situation, (2) Case A involving simulation of Scenario 1 trade reform without exchange rate adjustment, (3) Case B involving simulation of Scenario 1 trade reform with exchange rate adjustment, (4) Case C involving simulation of Scenario 2 trade reform without exchange rate adjustment, and (5) Case D involving simulation of Scenario 2 trade reform without exchange rate adjustment.

The pollution intensity ratio (measured by pollution abatement cost per unit of output) for different types of activities using the ENRAP estimates of pollution abatement costs has been estimated. Results are presented in Table 2. This, together with the production/output structure, would yield a weighted average pollution intensity. Specifically, using the simulation results of the five cases described above, each together with the pollution intensity estimates, yields simulation of pollution intensity associated with the different cases of trade reforms.

The results of the exercise are summarized in Table 3. Cases A and C -- both trade reform scenarios (50 percent across the board reduction in tariffs and a move toward uniform 5 percent tariff rate) under a fixed exchange rate system -- represent the worst case scenario. It appears that trade reforms as such, if implemented without a complementary exchange rate adjustment, would lead to a decline in output and at the same time result in higher overall pollution intensity (pollution intensity rose from the base rate of around 1.90 to 2.09 and 2.27 for Cases A and C respectively). This is mainly due to increases in the contribution of agriculture, fishery, forestry activities, mining, and food, beverage and tobacco manufacturing to pollution. (See Tables 4 and 5). This means that trade reforms increased the relative protection (EPR) in these sectors inducing a corresponding increase in the share of these sectors in output. (See Tables 2 and 4). However, because output declined by more than the increase in the pollution intensity, the absolute levels of pollution abatement costs actually went down in these two cases. (See Table 5).

This result illustrates the trade-off between growth and the environment. In this case, the cleaner environment is at the expense of lower growth. Moreover, it seems that the cleaner environment is also achieved at a higher pollution abatement cost per unit of output.

Turning now to Cases B and D, cases with complementary exchange rate adjustment, the simulation exercise show increases in the value of output for both types of trade reforms. Case B show the best result in terms of pollution intensity with the ratio coming down from 1.91 pollution abatement cost per unit value of output in the base case to 1.89 with trade reforms reducing tariffs and EPRs across the board by 50 percent.

The decline in pollution intensity for Case B is accompanied by a 2.87 percent increase in the value of output. This however does not imply that there has been no trade off between growth and environmental costs. The total environmental costs also rises with output growth. (See Table 3) The trade off is less costly however. For Case B, the increase in the value of output is accompanied by a lower increase in abatement costs.

For Case D, pollution intensity increases with trade reforms reducing the tariffs across sectors to a uniform five percent, but only slightly to 1.94. This, however, is accompanied by a higher output growth of 4.02 percent (almost double that of Case B). Is Case D better than case

Table 2
POLLUTION ABATEMENT COST RATIO BY SECTOR
(in percent)

PSIC	Industry & Process	AC/Q
11-13	AGRICULTURE	1.676
11	Agri. crops production	2.340
12	Livestock, poultry, etc.	0.538
13	Agricultural services	0.030
14	FISHERY	0.131
151-159	LOGGING & OTHER FORESTRY ACTIVITIES	28.838
211-212	GOLD & OTHER PRECIOUS METALS	9.117
213	COPPER ORE MINING	7.808
214-219	OTHER METALLIC MINING	34.086
223	STONE ,SAND & CLAY QUARRYING	1.288
221,222,229	OTHER NON-METALLIC MINING & QUARRYING	6.916
311-312	FOOD MANUFACTURING	0.293
313	BEVERAGE MANUFACTURING	0.628
314	TOBACCO MANUFACTURING	0.109
321	TEXTILE MANUFACTURING	0.386
322	WEARING APPAREL	0.125
323-324	MFR. OF LEATHER & LEATHER PRODUCTS	0.480
331	MFR. OF WOOD & WOOD PRODUCTS	1.273
332	MFR. & REPAIR OF FURNITURE	0.298
341	MFR. OF PAPER & ALLIED PRODUCTS	0.660
342	PRINTING, PUBLISHING & ALLIED INDUSTRIES	0.381
351,352 & 356	MFR. OF CHEMICALS & PLASTIC PRODUCTS	0.291
353-354	PRODS. OF PETROLEUM, COKE & COAL	0.045
355	RUBBER PRODUCTS	0.230
36	MFR. OF NON-METALLIC MINING	0.980
371	IRON & STEEL BASIC INDUSTRIES	0.350
372	NON-FERROUS METAL BASIC INDUSTRIES	0.275
381	MFR. OF FABRICATED METAL PRODUCTS	0.228
382	MFR. OF MACHINERY, EXCEPT ELECTRICAL	0.805
383	MFR. OF ELECTRICAL MACHINERY, ETC.	0.110
384	MFR. OF TRANSPORT EQUIPMENT	0.270
385 & 390	OTHER MANUFACTURING INDUSTRIES	0.131
386	MFR. & REPAIR OF METAL FURNITURE & FIXTURES	0.453

NOTE : AC/Q is the ratio of Abatement Cost (1992 in 1988 prices) and Total Output from the 1988 I-O Table (except for sectors 213-Copper ore mining and 214 to 219-Other metallic mining : Output used are from the 1988 Census of Establishments).

Filename: acqbysector_tab2.xls

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Table 3
SUMMARY TABLE

	Base	A	B	C	D
OUTPUT					
% change with respect to base		-5.17	2.87	-8.96	4.02
POLLUTION INTENSITY (in percent)					
ALL	1.9084	2.0901	1.8934	2.2715	1.9389
Manufacturing	0.3405	0.3401	0.3401	0.3395	0.3394

A refers to post trade reform output :changes in output after a 50% proportional decrease in EPR from 1985 levels, given fixed exchange rate.

B refers to post trade reform output :changes in output after a 50% proportional decrease in EPR from 1985 levels, given flexible exchange rate.

C refers to post trade reform output :changes in output given a uniform EPR of 5% across all sectors, from 1985 levels, given fixed exchange rate.

D refers to post trade reform output :changes in output given a uniform EPR of 5% across all sectors, from 1985 levels, given flexible exchange rate.

Base is 1983

Filename: summtab_tab3.xls

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Table 4
OUTPUT SIMULATION UNDER DIFFERENT TRADE REGIME ASSUMPTIONS
Tradable Sectors, 1988 (in million pesos)

I-O Sector	Description	Base	A	B	C	D
03-18	Agriculture	29,585	29,025	32,529	29,148	35,602
19-20	Fishery	20,410	20,225	22,693	20,533	25,177
21	Logging	10,682	10,682	10,682	10,682	10,682
22	Other forestry activities	355	355	355	355	355
23	Gold & other precious metals	4,278	4,356	4,902	4,549	5,633
24	Copper ore	2,647	2,730	3,077	2,888	3,592
25	Other metallic mining	589	608	686	644	802
26	Sand, stone, clay	1,246	1,184	1,322	1,146	1,381
27	Other non-metallic mining & quarrying	590	564	630	550	664
28-45	Food manufacturing	90,726	84,305	100,594	80,869	109,074
46-47	Beverage manufacturing	2,598	2,424	2,893	2,336	3,152
49-50	Tobacco manufacturing	5,129	4,570	5,443	4,161	5,571
51-53	Textile manufacturing	9,140	7,278	8,620	5,595	7,288
54-55	Wearing apparel & footwear	11,346	11,346	13,581	11,800	16,085
56-58	Wood & wood products	11,243	10,633	12,698	10,413	14,083
59-60	Paper & paper products	1,614	1,068	1,252	533	627
61	Publishing & printing	1,380	872	1,019	368	409
62	Leather & leather products	385	377	451	384	522
63-65	Rubber products	1,766	1,179	1,382	603	715
66-75	Chemicals and plastic products	13,556	10,398	12,291	7,468	9,608
76	Products of petroleum, coke & coal	21,462	16,079	18,981	11,018	14,042
77	Cement	1,967	1,679	1,996	1,441	1,913
78	Glass & glass products	1,167	929	1,100	714	930
79	Other non-metallic manufactures	606	517	615	444	589
80	Primary iron and steel prods.	7,643	6,287	7,459	5,102	6,708
81	Non-ferrous basic metals	264	255	304	255	345
82	Fabricated metal products	2,614	1,747	2,049	899	1,067
83	Non-electrical machinery	6,939	3,891	4,507	817	560
84-89	Electrical machinery	8,162	7,291	8,685	6,659	8,920
90-91	Transport equipment	2,142	1,660	1,963	1,215	1,569
92	Wood furnitures	1,170	1,171	1,401	1,218	1,660
93	Metal furnitures	51	36	42	21	26
94-95	Other manufacturers.	429	565	683	732	1,023
96	Miscellaneous manufacturers	1,663	1,178	1,386	712	882
28-96	Manufacturing	205,161	177,736	211,394	155,776	207,372
03-96	ALL	275,544	247,466	288,269	226,271	291,259

NOTES: A refers to post trade reform output :changes in output after a 50% proportional decrease in EPR from 1985 levels, given fixed exchange rate.
B refers to post trade reform output :changes in output after a 50% proportional decrease in EPR from 1985 levels, given flexible exchange rate.
C refers to post trade reform output :changes in output given a uniform EPR of 5% across all sectors, from 1985 levels, given fixed exchange rate.

Table 5
ABATEMENT COST SIMULATION UNDER DIFFERENT TRADE REGIME ASSUMPTIONS
Tradable Sectors, 1988 (in million pesos)

I-O Sector	Description	Base	A	B	C	D
03-18	Agriculture	495.8	486.4	545.1	488.5	596.7
19-20	Fishery	26.7	26.4	29.7	26.9	32.9
21	Logging	3,080.6	3,080.6	3,080.6	3,080.6	3,080.6
22	Other forestry activities	102.4	102.4	102.4	102.4	102.4
23	Gold & other precious metals	390.1	397.2	446.9	414.7	513.5
24	Copper ore	206.7	213.2	240.2	225.5	280.4
25	Other metallic mining	200.8	207.4	233.7	219.7	273.3
26	Sand, stone, clay	16.1	15.3	17.0	14.8	17.8
27	Other non-metallic mining & quarrying	40.8	39.0	43.5	38.0	45.9
28-45	Food manufacturing	265.9	247.1	294.8	237.0	319.7
46-47	Beverage manufacturing	16.3	15.2	18.2	14.7	19.8
49-50	Tobacco manufacturing	5.6	5.0	5.9	4.5	6.0
51-53	Textile manufacturing	35.3	28.1	33.3	21.6	28.1
54-55	Wearing apparel & footwear	14.1	14.1	16.9	14.7	20.1
56-58	Wood & wood products	143.1	135.3	161.6	132.5	179.3
59-60	Paper & paper products	10.7	7.1	8.3	3.5	4.1
61	Publishing & printing	5.3	3.3	3.9	1.4	1.6
62	Leather & leather products	1.8	1.8	2.2	1.8	2.5
63-65	Rubber products	4.1	2.7	3.2	1.4	1.6
66-75	Chemicals and plastic products	39.5	30.3	35.8	21.8	28.0
76	Products of petroleum, coke & coal	9.8	7.3	8.6	5.0	6.4
77	Cement	19.3	16.5	19.6	14.1	18.7
78	Glass & glass products	11.4	9.1	10.8	7.0	9.1
79	Other non-metallic manufactures	5.9	5.1	6.0	4.4	5.8
80	Primary iron and steel prods.	26.8	22.0	26.1	17.9	23.5
81	Non-ferrous basic metals	0.7	0.7	0.8	0.7	1.0
82	Fabricated metal products	6.0	4.0	4.7	2.0	2.4
83	Non-electrical machinery	55.8	31.3	36.3	6.6	4.5
84-89	Electrical machinery	9.0	8.0	9.6	7.3	9.8
90-91	Transport equipment	5.8	4.5	5.3	3.3	4.2
92	Wood furnitures	3.5	3.5	4.2	3.6	5.0
93	Metal furnitures	0.2	0.2	0.2	0.1	0.1
94-95	Other manufacturers.	0.6	0.7	0.9	0.9	1.3
96	Miscellaneous manufacturers	2.2	1.5	1.8	0.9	1.1
28-96	Manufacturing	698.6	604.4	718.9	528.9	703.8
03-96	ALL	5,258.4	5,172.2	5,458.1	5,139.8	5,647.3

NOTES: A refers to post trade reform output :changes in output after a 50% proportional decrease in EPR from 1985 levels, given fixed exchange rate.
B refers to post trade reform output :changes in output after a 50% proportional decrease in EPR from 1985 levels, given flexible exchange rate.
C refers to post trade reform output :changes in output given a uniform EPR of 5% across all sectors, from 1985 levels, given fixed exchange rate.

C because of its higher output? Or is Case B better because of its lower pollution intensity. Or is the earlier case, A, the best scenario, which, although associated with lower output and higher pollution intensity ratio, has the lowest total pollution abatement costs?

The results show that trade liberalization could lead to lower overall pollution intensity. However, there is also increased production and a resulting increase in absolute terms in environmental costs (overall pollution). Without a well-defined social welfare function, it is difficult to judge which case is optimal. One possible indicator which could help is the total output value net of total pollution abatement costs. Netting out environmental costs could be loosely interpreted as cost internalization. If goods and resources have been properly shadow priced, or if costs and benefits as evaluated are close to social prices, then the suggested net value of output would provide a sound (if not perfect) indicator of net welfare, especially for comparison purposes.

The net output for the different cases is presented in Table 6. Using net output as basis, Case D appears to offer the best scenario. This reinforces our earlier conclusion that the ideal scenario is where environmental measures and/or regulations are enforced to internalize environmental costs and trade distorting measures are avoided.

More insights could be gleaned by looking at individual sectors. Table 7 shows the share in pollution intensity by sector. Easily the forestry and logging sectors account for more than half of pollution for all cases. Manufacturing, on the other hand, accounts for only 13 percent in the base case. Moreover, the share of manufacturing even goes down with trade reforms (in all cases). This results despite the increased share of manufacturing in total output with trade reforms because of the decline in average pollution intensity of the sector.

5. Conclusion and Recommendations

As enunciated in the Philippine Medium Term Plan, the overall strategy of the government is to gear the economy toward export-orientation and implement measures that would transform Philippine industries to become globally competitive. A major part of this strategy is the series of trade reforms implemented and scheduled to be implemented, and its active participation in AFTA and APEC.

The results and findings above are very much in line with this thrust. The manufacturing sector accounts for only around 13 percent of abatement costs and simulation results further indicate that the average pollution intensity (abatement cost) for manufacturing declines with trade reforms (for all cases considered). These strongly suggest that the Philippines should vigorously pursue its current thrust towards greater trade liberalization. It should be emphasized however, that the findings also highlight the need to implement environmental measures to address the environmental issues and bring about cost internalization. Stronger and more effective enforcement of environmental measures is necessary.

As earlier tables indicated, the large majority of environmental problem is found in the natural resources sectors, particularly forestry. One implication is that the forestry sector should, in particular, be subject to import liberalization. In relation to the problem of enforcing environmental regulations, the shift toward manufacturing and exporting industries which

Table 6
NET OUTPUT UNDER DIFFERENT TRADE REGIME ASSUMPTIONS
Tradable Sectors (in million pesos)

	Base	A	B	C	D
OUTPUT					
Level, in Mil P (Tradables)	275,544	247,466	288,269	226,271	291,259
POLLUTION ABATEMENT					
COST LEVEL , in Mil P (Tradables)					
ALL	5,258	5,172	5,458	5,140	5,647
NET OUTPUT, in Mil P	270,286	242,294	282,811	221,131	285,612

A refers to post trade reform output :changes in output after a 50% proportional decrease in EPR from 1985 levels, given fixed exchange rate.

B refers to post trade reform output :changes in output after a 50% proportional decrease in EPR from 1985 levels, given flexible exchange rate.

C refers to post trade reform output :changes in output given a uniform EPR of 5% across all sectors, from 1985 levels, given fixed exchange rate.

D refers to post trade reform output :changes in output given a uniform EPR of 5% across all sectors, from 1985 levels, given flexible exchange rate.

Base is 1983

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Table 7
SECTORAL SHARE OF POLLUTION ABATEMENT COST UNDER DIFFERENT
TRADE REGIME ASSUMPTIONS : SIMULATION RESULTS, 1988
(in percent)

I-O Sector	Description	Base	A	B	C	D
03-18	Agriculture	9.43	9.40	9.99	9.50	10.57
19-20	Fishery	0.51	0.51	0.54	0.52	0.58
21	Logging	58.58	59.56	56.44	59.94	54.55
22	Other forestry activities	1.95	1.98	1.88	1.99	1.81
23	Gold & other precious metals	7.42	7.68	8.19	8.07	9.09
24	Copper ore	3.93	4.12	4.40	4.39	4.97
25	Other metallic mining	3.82	4.01	4.28	4.27	4.84
26	Sand, stone, clay	0.31	0.29	0.31	0.29	0.31
27	Other non-metallic mining & quarrying	0.78	0.75	0.80	0.74	0.81
28-45	Food manufacturing	5.06	4.78	5.40	4.61	5.66
46-47	Beverage manufacturing	0.31	0.29	0.33	0.29	0.35
49-50	Tobacco manufacturing	0.11	0.10	0.11	0.09	0.11
51-53	Textile manufacturing	0.67	0.54	0.61	0.42	0.50
54-55	Wearing apparel & footwear	0.27	0.27	0.31	0.29	0.36
56-58	Wood & wood products	2.72	2.62	2.96	2.58	3.17
59-60	Paper & paper products	0.20	0.14	0.15	0.07	0.07
61	Publishing & printing	0.10	0.06	0.07	0.03	0.03
62	Leather & leather products	0.04	0.04	0.04	0.04	0.04
63-65	Rubber products	0.08	0.05	0.06	0.03	0.03
66-75	Chemicals and plastic products	0.75	0.59	0.66	0.42	0.50
76	Products of petroleum, coke & coal	0.19	0.14	0.16	0.10	0.11
77	Cement	0.37	0.32	0.36	0.27	0.33
78	Glass & glass products	0.22	0.18	0.20	0.14	0.16
79	Other non-metallic manufactures	0.11	0.10	0.11	0.08	0.10
80	Primary iron and steel prods.	0.51	0.43	0.48	0.35	0.42
81	Non-ferrous basic metals	0.01	0.01	0.02	0.01	0.02
82	Fabricated metal products	0.11	0.08	0.09	0.04	0.04
83	Non-electrical machinery	1.06	0.61	0.66	0.13	0.08
84-89	Electrical machinery	0.17	0.16	0.18	0.14	0.17
90-91	Transport equipment	0.11	0.09	0.10	0.06	0.08
92	Wood furnitures	0.07	0.07	0.08	0.07	0.09
93	Metal furnitures	0.00	0.00	0.00	0.00	0.00
94-95	Other manufacturers.	0.01	0.01	0.02	0.02	0.02
96	Miscellaneous manufacturers	0.04	0.03	0.03	0.02	0.02
28-96	Manufacturing	13.28	11.69	13.17	10.29	12.46
03-96	ALL	100.00	100.00	100.00	100.00	100.00

NOTES: A refers to post trade reform output :changes in output after a 50% proportional decrease in EPR from 1985 levels, given fixed exchange rate.
B refers to post trade reform output :changes in output after a 50% proportional decrease in EPR from 1985 levels, given flexible exchange rate.
C refers to post trade reform output :changes in output given a uniform EPR of 5% across

would be encouraged by trade reforms could make the task more manageable. The huge abatement costs in forestry activities could simply frustrate efforts to reverse them and would require more of outside assistance like the ODA to flow into its environmental management.

A problem that could arise is the environmental management of the small and medium scale enterprises (SMEs). The survey undertaken for this study seems to suggest that compliance with environmental regulations is lower for SMEs. The SMEs' difficulty to comply could be a financing issue, and/or it could arise from economies of scale in waste management. If it is the latter, one solution is for government to encourage common treatment facilities. This would be limited however, since most SMEs would not be located close to each other. Another possibility is to encourage the development of firms which would lease out such waste-management services. If it is a financing issue, due for example to huge initial capital requirement, measures to lower interest costs are perhaps called for. This could be in the form of subsidized credit or lengthening the loan maturity.

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Appendix Table 1
SHARE IN VALUE ADDED BY POLLUTION CLASSIFICATION
In Percent

PSIC Code/Pollution Classification	1972	1975	1983	1988	1992
<i>Extremely Hazardous/Highly Pollutive</i>	7.06	16.07	16.44	8.61	9.22
3511 Mfr. of basic ind'l chemical except fert.	0.84	0.66	1.34	1.21	1.17
3529 Mfr. of chemical products, n.e.c.	1.01	0.90	1.12	1.41	0.78
3530 Petroleum refineries	5.18	14.44	13.92	5.90	7.14
3540 Mfr. of misc. products of petr & coal	0.03	0.06	0.05	0.10	0.12
<i>Hazardous/Highly Pollutive</i>	30.63	28.74	25.40	27.97	24.99
3123 Sugar milling & refining	11.15	12.99	3.83	3.98	4.60
3131 Distilling, rectifying & blending spirits	3.06	4.47	2.18	0.57	1.15
3132 Wine manufacturing	0.03	0.07	0.00	0.01	0.00
3133 Malt liquors & malt	0.00	0.00	0.00	7.99	3.93
3211 Spinn'g, weav'g., text'g & finish. textiles	5.52	3.11	4.38	3.18	2.32
3231 Tanneries & leather finishing	0.08	0.07	0.12	0.04	0.08
3232 Mfr. of lthr & lthr. subst.excp. ftwr. & wear.app.	0.05	0.06	0.06	0.14	0.17
3411 Mfr. of pulp, paper & paperboard	2.19	1.83	1.52	2.01	1.70
3419 Mfr. of pulp, paper & paperbrd. Art. NEC	0.31	0.18	0.05	0.00	0.01
3523 Mfr. of soap & clean'g sol., perfumes, cosme'	3.06	1.16	3.07	2.69	4.97
3630 Mfr. of cement	2.81	1.89	1.64	1.40	1.85
3710 Iron & Steel Basic Industries	2.30	2.57	7.96	3.74	3.53
3720 Non-Ferrous Metal Basic Industries	0.08	0.34	0.59	2.22	0.70
<i>Non-hazardous/Highly pollutive</i>	5.51	3.39	6.03	6.35	6.03
3111 Slaughtering and meat packing	0.25	0.48	0.25	0.86	0.99
3112 Mfr. of dairy products/processed milk	1.32	0.34	0.68	0.15	0.68
3113 Mfr. of dairy products except Milk	1.13	0.58	0.88	1.70	1.50
3114 Canning & preserving of fruits & veg.	1.77	1.51	1.66	2.33	1.15
3115 Cann'g & Presrv'g. Fish	0.13	0.14	0.46	1.01	1.23
3117 Mfr. of vegetable & animal oils & fats	0.91	0.35	2.10	0.31	0.48
<i>Extremely hazardous/Pollutive</i>	3.90	3.39	4.25	5.52	5.09
3512 Mfr. of fertilizers	0.57	0.96	1.26	1.32	1.32
3513 Mfr. of synt.resins, plastic mat'l, exc.glass	0.66	0.51	0.61	0.88	0.59
3514 Mfr. of pesticides, insecticides, oth.	0.08	0.21	0.27	0.57	0.44
3521 Mfr. paints, varnishes & lacquers	0.49	0.28	0.31	0.44	0.38
3551 Tire and tube mfg.	1.55	1.07	0.93	1.49	1.49
3552 Mfr. of rubber footwear	0.32	0.19	0.79	0.61	0.66
3559 Mfr. of rubber products, n.e.c.	0.21	0.17	0.09	0.20	0.20

Hazardous/Pollutive	27.88	22.86	19.34	18.57	18.79
3140 Tobacco manufactures	6.00	6.12	3.80	6.22	4.88
3212 Knitting mills	0.79	0.93	0.75	0.76	0.53
3214 Mfr. of carpets & rugs	0.19	0.18	0.10	0.03	0.09
3216 Mfr. of artif. leath,oil cloth, oth impreg fabrics	0.03	0.04	0.10	0.01	0.01
3217 Mfr. of fiber batting, pad'ng & uphl.fill'g incl. c	0.02	0.91	0.02	0.02	0.04
3219 Mfr. of textiles, n.e.c.	0.00	0.00	0.00	0.00	0.00
3311 Sawmills & planing mills	3.46	1.76	1.57	1.03	0.38
3312 Mfr. of veneer & plywood	3.37	1.15	2.14	1.07	0.52
3313 Mfr. of hardboard & particleboard	0.00	0.00	0.00	0.00	0.01
3314 Wood drying & preserving plants	0.08	0.12	0.12	0.12	0.07
3315 Millwork plants	0.01	0.01	0.10	0.16	0.13
3560 Mfr. of plastic products, n.e.c.	1.25	1.28	1.66	1.66	1.65
3610 Mfr. of pottery, china, and earthenware	0.13	0.35	0.26	0.35	0.48
3620 Mfr. of glass & glass products	1.29	0.56	0.74	1.30	0.88
3691 Mfr. of structural clay products	0.26	0.15	0.23	0.18	0.41
3692 Mfr. of structural concrete products	0.45	0.45	0.44	0.24	0.38
3699 Mfr. of non-metallic minl products, n.e.c.	0.27	0.10	0.28	0.37	0.55
3812 Mfr. of structural metal products	1.48	0.87	0.50	0.31	0.53
3813 Mfr. of metal containers	0.44	0.38	0.63	0.47	0.37
3814 Metal stamping, coating & engraving mills	1.25	0.23	0.46	0.42	0.38
3815 Mfr. of fabricated wire products	0.17	0.34	0.18	0.09	0.15
3816 Mfr. of non-electric lighting & heating fixtures	0.03	0.05	0.05	0.02	0.05
3821 Mfr.of eng.&turbn,excp.for transport eqpt	0.00	0.02	0.00	0.01	0.01
3822 Mfr. of agrl machy & eqpt	0.23	0.26	0.04	0.04	0.04
3823 Mfr. of metal & woodworking machy	0.03	0.08	0.04	0.04	0.08
3824 Mfr.spec'l indl machy excp.metal & woodworl	0.07	0.37	0.06	0.04	0.05
3829 Mfr. of machy & eqpt excp. elect n.e.c.	1.23	1.03	0.65	0.70	0.99
3831 Mfr. of elect ind'l machy & apparatus	0.16	0.09	0.17	0.24	0.41
3833 Mfr. of elect appliances & housewares	0.54	0.94	0.92	0.29	0.42
3834 Mfr. of primary cells & batteries	0.67	0.37	0.27	0.43	0.50
3835 Mfr. of electric accumulators	0.00	0.00	0.16	0.08	0.18
3841 Ship bldg & rprg	0.94	0.33	0.55	0.30	0.37
3842 Mfr. of railroad eqpt.	0.00	0.00	0.00	0.00	0.00
3843 Mfr. & assembly of motor vehicles	2.24	2.41	1.39	0.96	1.22
3844 Reblgd. & major alt. of motor vehicle	0.18	0.19	0.07	0.05	0.06
3845 Mfr. of motor vehicle parts & accessories	0.33	0.50	0.70	0.28	1.60
3846 Mfr. motorcycles & bicycles	0.30	0.30	0.17	0.22	0.34
3847 Mfr. of aircraft	0.00	0.00	0.00	0.05	0.00
3849 Mfr. of transport eqpt, n.e.c.	0.00	0.00	0.00	0.00	0.04
Non-hazardous/Pollutive	9.33	13.49	10.66	11.51	13.35
3124 Mfr. of cocoa, chococlate & sugar confect.	0.57	0.47	0.32	0.40	0.41
3125 Mfr. of dessicated coconut	0.63	0.42	1.36	0.51	0.23
3126 Mfr. of ice except dry ice	0.14	0.17	0.14	0.15	0.09
3127 Coffee roasting & processing	0.91	0.69	0.41	0.39	0.36
3129 Food manufacturing, n.e.c.	1.41	0.95	1.07	1.91	1.75
3134 Soft drinks & carbonated water mfg.	1.75	8.46	3.26	2.84	3.76
3522 Mfr. of drugs & medicine	3.24	1.79	3.21	4.49	4.94
3836 Mfr. of electric wires & wiring devices	0.26	0.20	0.22	0.40	1.15
3839 Mfr. of elect apparatus & supplies, n.e.c.	0.26	0.23	0.41	0.20	0.37
3860 Mfr. & rpr. of furn. & fixt. primary of metal	0.08	0.05	0.06	0.04	0.08
3902 Mfr. of musical instruments	0.03	0.01	0.03	0.03	0.02
3904 Mfr. of surgical, dental, medical& orthd. supp	0.01	0.01	0.00	0.04	0.09
3905 Mfr opth. goods e.g. eyeglasses & spect.	0.02	0.04	0.00	0.05	0.05
3907 Mfr. of stationers',artists' & office supplies	0.03	0.02	0.17	0.05	0.05

Hazardous/Non-pollutive	8.90	4.79	5.86	7.14	5.70
3118 Rice & corn milling	2.69	1.79	0.96	0.90	0.90
3119 Flour milling, excpt. cassava	1.32	0.01	0.42	1.13	0.62
3121 Mfr. of other grain mill products	0.04	0.03	0.00	0.01	0.00
3128 Mfr. of prep. & unprepared feeds	0.83	0.52	0.81	1.31	0.68
3215 Cordage, rope & twine mfg.	0.27	0.45	0.23	0.23	0.28
3319 Mfr. of wood, cork, & cane products, NEC	0.05	0.11	0.11	0.11	0.07
3320 Mfr. & rpr.of rrrnture & fixtrs excp.prim.of metz	0.90	0.77	0.92	1.40	0.97
3412 Mfr. of containers & box of paper & paperbrd	0.80	0.27	0.33	0.49	0.46
3413 Mfr. of articles of paper	0.00	0.00	0.58	0.14	0.20
3414 Mfr. of articles of paperboard	0.00	0.00	0.00	0.00	0.01
3420 Printing, publ. & allied industries	2.01	0.86	1.49	1.43	1.52
Non-hazardous/Non-Pollutive	6.78	7.26	12.03	14.33	16.83
3116 Prod'n of crude coconut oil, incl.cake&meal	1.18	0.81	2.12	1.37	0.72
3122 Mfr. bakery products	1.21	1.45	1.28	1.43	1.87
3213 Mfr. made-up textile goods, excp. wearing ap	0.24	0.70	0.42	0.24	0.27
3220 Mfr. of wearing app. except footwear	2.19	2.45	3.48	6.03	6.01
3240 Mfr.of ftwr,excp. rubbr or plstc. or wood ftwr.	0.29	0.24	0.58	0.31	0.42
3316 Mfr. of wood'n. cane contn.&small cane ware	0.06	0.02	0.03	0.22	0.14
3317 Mfr. of wood carvings	0.19	0.17	0.03	0.09	0.06
3811 Mfr. of cutlery, hand tools & gen. hardware	0.07	0.07	0.14	0.23	0.30
3819 Mfr. of fabr'd metal prod.excp.machy & eqpt,	0.32	0.63	0.07	0.06	0.04
3825 Mfr. of office, computing & acctng machy	0.00	0.01	0.01	0.09	0.11
3832 Mfr. of radio, TV sets, sound recording	0.96	0.63	3.77	3.88	6.34
3851 Mfr. of prof. & scient. & meas'g contr. eqpt.	0.00	0.02	0.01	0.05	0.06
3852 Mfr. of photographic & optical instruments	0.00	0.00	0.00	0.00	0.10
3853 Mfr. of watches & clocks	0.00	0.00	0.00	0.00	0.00
3901 Mfr. of jwlry & related articles	0.03	0.04	0.04	0.06	0.15
3903 Mfr. of sporting & athletic goods	0.04	0.00	0.02	0.08	0.11
3906 Mfr. of toys & dolls, excpt. rubr. & plast. toys	0.00	0.00	0.02	0.18	0.13
ALL INDUSTRIES	100.00	100.00	100.00	100.00	100.00
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