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IMPORT SMUGGLING IN THE PHILIPPINES: AN ECONOMIC ANALYSIS

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I. INTRODUCTION

It is not uncommon for students of international trade to run into the phenomenon of smuggling particularly when their task involves translating the results of theoretical analysis into policy advice. Smuggling, being the practice of using illegal trade channels or fake foreign trade declarations for the purpose of evading the payment of duties and taxes, inevitably causes distortions in international trade data and in policies subsequently formulated from it. These distortions usually arise as a consequence of the fact that smuggling, if successfully carried out, results in the omission of some import and export shipments from the data on foreign trade which are normally collected at the customs frontier.

There is reason to believe that such omissions may be quite substantial, with the level depending on the restrictiveness of the trade control regime. For instance, in the Philippines, the Bureau of Customs reported a total of ₱320 million worth of shipments seized in 1981 for various violations of Customs and Tariff Laws. This amount is 2.8 percent of the Customs revenue collected for that year and is 0.6 percent of the total value of import shipments for the same year. Considering the existence of numerous ports of entry in the Philippines and considering that relatively high rates of duty are charged on shipments imported into the country, it is believed that the amount that was successfully smuggled in was larger still and that the amount apprehended was just the tip of the iceberg.

However, research in this area has been hard to come by despite its obvious importance, particularly to developing countries whose economies are normally characterized by restrictive trade policies.

Collector, Port of Manila, Bureau of Customs.

One possible reason for this dearth of research is the sensitivity of the issue involved. For most developing countries, customs duties are a major source of government revenue, and therefore, any hint of mismanagement in this area could easily become a controversial topic. Since one can hardly go into an analysis of smuggling without begging the question of where the fault lies, it may be that researchers tend to avoid the topic because of its potential as an explosive issue.

Another possible reason is the statistical elusiveness of the concept. If the estimation of magnitudes relating to an economic or social phenomenon for which data are openly published sometimes proves difficult, what more for those relating to an illicit activity, the successful accomplishment of which heavily depends on secrecy? As several authors have shown, attempts at quantitative estimation in this area are not only difficult but hazardous as well.

These difficulties, however, do not justify the lack of serious attempts at such an estimation. A review of the literature in this area reveals that empirical studies have mainly been preoccupied with establishing indicators of the presence of illegal trade. Only in Simkin's 1974 article was there an attempt at estimating the level of smuggling. He was able to generate an estimate of unrecorded exports from Indonesia by first postulating a normal price and a normal quantity for some of the country's main export products. A comparison of actual trade figures with these established price and quantity levels has therefore led to conclusions concerning the level of unrecorded exports from Indonesia.

This study is another attempt at generating such an estimate, this time from data on Philippine import trade. However, a more formal approach shall be used which involves, first of all, the development of a microeconomic model which tries to explain the level of smuggling activity in terms of factors which impinge on the trader's decision to engage in smuggling.

A regression estimate of the model shall then be carried out using a comprehensive set of data on Philippine imports which was collated from unpublished records of the GATT Secretariat in Geneva, the Philippines' National Census and Statistics Office, the Bureau of Customs, and from publications of the Central Bank. From the results, conclusions on the nature and on the level of smuggling activity in the Philippines may be drawn. It is hoped that some policy implications could also be derived from them.

II. THEORETICAL FRAMEWORK

A. *The Nature of the Problem*

Smuggling is defined in the dictionary as "the act of importing or exporting goods secretly without payment of legal duty or in violation of law." It is an ancient phenomenon, and today it usually comes about when the government, with an artificial trade barrier, manages to establish a set of prices which make certain transactions profitable and then tries to controvert the incentives to enter into these transactions by making them illegal. Smuggling occurs in both import and export trade. This study is concerned only with the more interesting problem of import smuggling.

A popular notion of smuggling is usually that of some contraband or highly dutiable cargo being carried in a boat which quietly sails into the night and stealthily lands its load in a dark, isolated spot beyond the reach of customs authorities. However, this is not the only way by which smuggling can be carried out. More convenient and possibly less costly methods of evading import duties usually involve the use of legal trade channels in bringing the goods in. The customs processing of these goods is then either short-circuited or manipulated to enable the importer to avoid payment of the correct duties. One such method involves the misdeclaration of the imported items. This is carried out by submitting a fraudulent customs declaration in order to pass the imported goods off as something else. This practice is usually resorted to if the actual importation carries a high rate of duty. The shipment is declared to contain items which carry a lower rate, and although the smuggler would have to pay some duty, he still gains by the amount of duty evaded.

Another way by which the tariff barrier could be contravened is by undervaluing the shipment. This time the shipment is described correctly but the value declared is lower than the actual value of the importation. Although the correct tariff rate is applied, the trader manages to pay a lower duties. This practice is usually prevalent among importers of items which are not often imported, as well as among those who have sole distributorship of certain items, since in these situations, there are usually no other importations of a similar nature against which the customs authorities can cross-check the declaration on the undervalued shipment.

Misclassification is another form of evasion used. This is carried out by erroneously classifying the imported article under a tariff

heading which carries a lower rate than the correct tariff heading. Duties are therefore evaded through the application of the lower ad valorem rate. The chances of success in evading duties through misclassification usually depends on the technical complexity of the imported good. For instance, chemical compounds which need to be analyzed in a laboratory to be identified would more often be the subject of misclassification than, say, a hand tool which the customs examiner may easily identify through a cursory examination.

The method which brings the highest return, however, is that which involves the use of fake delivery documentation in spiriting the imported goods out of the customs zone. No payment of duties is generally made as the signatures of the collecting officers are usually forged. However, the risk involved in this type of operation is normally high.

The schemes employed for the evasion of duties described above will be referred to as "technical smuggling" since the evasion is carried out by fraudulently manipulating the technical process by which duties on the imported goods are assessed. This is to be differentiated from "pure smuggling" wherein the legal channels of importation are by-passed completely, as in the boat-in-the-night type of operation.

The many facets of the smuggling problem discussed above reveal that models which are geared towards the analysis of the pure type of smuggling alone may not totally conform with practical experience, for the various methods of technical smuggling apparently provide more convenient and even possibly more efficient means of evading import duties.

For one, the technological advances in the shipping industry,[1] coupled with the increasing importance of transport and handling costs in coastwise trade, have made technical smuggling an increasingly attractive alternative especially for large-scale operators, as it enables them to take advantage not only of the relatively lower trans-

1. One factor which is believed to have contributed greatly to the present state of affairs in the smuggling field is the increasing use of container vans for seaborne cargo. Container vans are huge steel boxes ranging from 20 to 40 feet in length which are used to hold cargo while in transit. Although they were designed primarily to provide for more ease and efficiency in cargo handling, they have also proven to be convenient vehicles for smuggling cargo. This is because containerized cargo are more difficult to inspect than those which are contained in crates or boxes since containers open only at one end and the only way a customs examiner could verify those items which are packed deep into the container is for him to unload first those that are placed at the outer end. A thorough examination could therefore be time-consuming and costly considering the size of a container and the amount of cargo that could be packed into one. This technological improvement has therefore made it easier for smugglers to conceal undeclared cargo.

port costs but also of the cargo facilities which come with importing through legal channels.

However, the occurrence of the pure type of smuggling cannot be discounted, as there are doubtless a number of traders who may find this type of an operation profitable. If one is to assume that the smuggler acts rationally, then his choice of smuggling technique should be the result of his evaluation of the respective costs and benefits of his options. Therefore, a realistic a priori judgment regarding the type of smuggling activity that is predominant in a particular country cannot be made without first considering the various factors which affect the returns from illegal trade into that country.

Such an analysis, when applied to the Philippine case, tends toward the conclusion that technical smuggling is the likely predominant smuggling activity despite the presence of numerous lairs within the archipelago's seven thousand islands serving as ideal drop-off points for the trader who engages in pure smuggling. This is because one has to consider that Hong Kong and Singapore, the two free trade areas in the region, are 633 nautical miles and 1,342 nautical miles from the Philippines, respectively. Such a situation, therefore, makes these entrepot centers near enough to be convenient sources of items for smuggling and yet far enough as to render the boat-in-the-night type of variety uneconomical. This, coupled with the increasing advantages of shipping through legal channels, makes technical smuggling a relatively more attractive option. The theoretical model to be developed in the following section will therefore be formulated under the assumption that technical smuggling is the predominant illegal trade activity.

B. *The Model*

In this section, an attempt will be made to develop a hypothesis of the smuggler's calculus within the framework of the standard economic theory of choice under uncertainty following the works of Becker (1974) and Ehrlich (1974). It shall be assumed that, at the beginning of each period, the trader makes a choice as to whether he should smuggle or engage in legal trade. If he chooses the latter, he adds to his initial stock of wealth, W, a sum S representing returns to legal trading which we will assume to be riskless. This would enable him to reach a new wealth level Y $(= W + S)$ where Y is assumed to be known with certainty given the state of the world at the beginning of each period.

If, however, he chooses to engage in smuggling, he will realize additional returns, aP_fXR, representing the proportion, a, of the total duties, P_fXR (where P_f is the foreign price of the import shipment X which is being levied a duty at rate R). The proportion a is defined to be $0 \leqslant a \leqslant 1$ where $a = 0$ means that no duties are evaded and that the trader has made a truthful declaration while $a = 1$ connotes pure smuggling.

If the existence of an exchange control regime is assumed, the smuggler will then have to procure foreign exchange from unofficial sources to cover the undeclared portion of the importation, aP_fX. This will in turn entail an additional cost involving the blackmarket premium, $E = E_b - E_o$, on the additional foreign exchange required to carry out the smuggling activity, where E_b is the official rate. This additional cost factor can be expressed as EaP_fX. Smuggling, if successful, may therefore increase the wealth level of the smuggler to:

$$(1) \qquad A = Y + aP_fXR - EaP_fX$$

It is, however, an unlawful activity and any trader who decides to engage in it must assume the risk of getting caught and being imposed the corresponding penalty. If a penalty function $G = FaP_fX$ is defined, where the penalty rate is $F > R$, a failure in the smuggling attempt will bring about a wealth level

$$(2) \qquad B = Y - EaP_fX - FaP_fX$$

If the possibility of being caught is p, then there exists two states of the world for the smuggler: state of the world A, with probability of occurrence $(1-p)$ and state of the world B with probability of occurrence p.

The smuggler will therefore now choose A so as to maximize his expected utility for a one-period consumption prospect:

$$(3) \qquad \max\ E(U)=(1-p)U(Y+aP_fX - EaP_fX) + pU(Y - EaP_fX - FaP_fX)$$ or by using equations (1) and (2) above

$$(4) \qquad \max E(U) = (1-p)U(A) + U(B)$$

where U is an indirect utility function that converts income flows in A and B into consumption flows. In this analysis, it shall be assumed that marginal utility is positive everywhere.

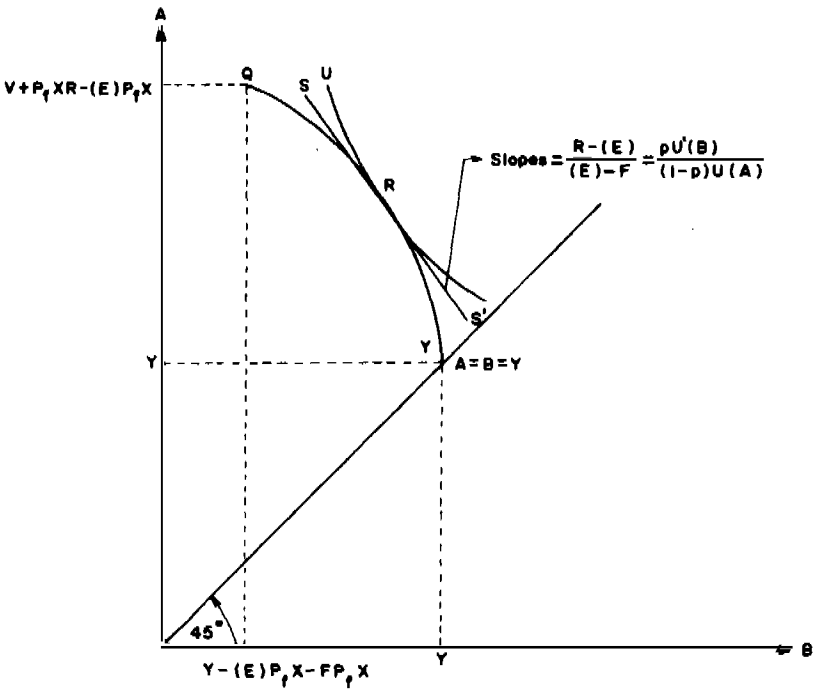
Following Ehrlich's (1974) analysis, it can be established that the first-order condition yields (primes and double primes represent first and second derivatives respectively):

$$(5) \qquad \frac{R-E}{E-F} = \frac{pU'(B)}{(1-p)U'(A)}$$

The left-hand side of the expression is the slope of the transformation curve between the two states of the world confronting the smuggler, while the right-hand side is the slope of an indifference curve defined along $dE(U) = 0$. This is shown in Figure 1 with the axes representing the two states of the world A and B. QV is the transformation curve which extends from point V on the 45-degree certainty line where $a = 0$ (no smuggling) and where $A = B = V$ (legal trade is the only source of income), to point Q where $a = 1$ (the trader engages in pure smuggling) and where

$$A = Y + P_f XR - EP_f X$$
$$B = Y - EP_f X - FP_f X$$

FIGURE 1
GRAPHICAL REPRESENTATION OF THE FIRST ORDER CONDITION



U is the utility curve which is tangent to the transformation curve at point R.

The second-order condition is:

$$(6) \quad E''(U)=(1-p)U''(A)\,(P_fXR-EP_fX)^2+pU''(B)(EP_pX+FP_fX)^2<0$$

It will be satisfied if $U''(A)<0$ and $U''(B)<0$, implying risk aversion on the part of the smuggler.[2]

In this analysis, an interior solution is of interest particularly since an a priori assumption that $0<a<1$ cannot be made; as such, an occurrence would depend on the parameter values. It would therefore be useful to find out the range of parameter values within which an interior solution may occur. Since expected marginal utility is decreasing with a, it must therefore follow that

$$(7) \quad E'(U)\Big|_{a=0} = (1-p)U'(Y)\,(P_fXR-EP_fX) - pU'(Y)\,(EP_fX+FP_fX)>0$$

and

$$(8) \quad E'(U)\Big|_{a=1} = (1-p)U'(Y+P_fXR-EP_fX)\,(P_fXR-EP_fX) - pU'\,(Y-EP_fX-FP_fX)\,(EP_fX+FP_fX)<0$$

which can be rewritten as

$$(9) \quad (1-p)R>E+pF$$

and

$$(10) \quad (1-p)R<\frac{(1-p)U'\,(Y+P_fXR-EP_fX)\,(E)+pU'(Y-EP_fX-FP_fX)\,(E+F)}{U'(Y+P_fXR-EP_fX)}.$$

By arranging the terms of the first expression to

$$(11) \quad (1-p)\,R-E>pF,$$

its implication becomes clear: the expected rate of return should be

2. The proof of this condition for risk aversion is found in Arrow (1965, pp. 28-44).

greater than the expected penalty rate. The two expressions therefore yield a set of positive-valued limits for the parameters as a condition for the occurrence of an interior solution.

III. EMPIRICAL ANALYSIS

A. *The Empirical Model*

The main objective of this exercise is to carry out an empirical test of the theoretical model developed earlier. Since most of the empirical works in this field of study have mainly been directed towards the task of isolating the smuggling component of the observed discrepancies in partner-country data, it would therefore be interesting to try to find out how well the model would fare in explaining these discrepancies.

Given, therefore, the validity of the theoretical model and the behavioral implications derived from it, a stochastic function defining the amount smuggled in a given period, aP_fX, as a function of its basic determinants may be specified as follows:

$$(aP_fX)_i = F(Y_i, P_i, E_i, F_i, R_i, U_i)$$

where

Y_i = the income level in period i
P_i = the probability of getting caught in period i
E_i = the blackmarket premium in period i. This was represented in the theoretical discussion by the variable $(E_b - E_o)$ where E_b was the blackmarket exchange rate and E_o was the official rate
F_i = the penalty rate in period i
R_i = the nominal rate of duty in period i
U_i = represents random errors and stochastic effects and is assumed to have a normal distribution.

Since time series data will be used to estimate the above, F_i and R_i will be dropped from the list of specified variables since these variables are fixed by legislation and therefore hardly change from year to year. However, the dummy variables d_1 and d_2 will be added to account for possible shifts in the regression plane resulting from the effects of containerization in 1970 and the advent of martial law in 1972, respectively.

The specified equation therefore takes the form:

$$(aP_fX)_i = f(Y_i, p_i, E_i, d_1, d_2, U_i)$$

The matter of estimating each variable in the above specification will now be discussed in turn:

1. The Amount Smuggled (aP_fX):

Since the amount smuggled is not observable, it shall be approximated by the discrepancy in partner country data, $D_i = X_i - I_i$, where X_i refers to the export value reported by the exporting country and I_i refers to the corresponding import value reported by the importing country, both in period i. The analysis covers data relating to Philippine import trade from the country's three major trading partners, namely: Japan, the United States, and the European Economic Community.

However, earlier studies analyzing discrepancies in partner-country trade data have pointed out that smuggling is not the only source of these discrepancies. In fact, for the Philippine case, the 1976 article by Bautista and Tecson mentions a fairly comprehensive list of other possible sources, to wit:

a. transport cost and other charges (whenever export data are expressed in f.o.b. while corresponding import data are expressed in c.i.f.)
b. exchange rate overvaluation
c. time lags in recording
d. faking of export declaration and inaccuracies in export recording
e. difference in commodity coverage and classification
f. difference in the method of designating partner countries as to provenance and destination.

Transport costs and other charges will not be a source of discrepancy in this study since both export and import values are expressed in f.o.b. terms.

As Bautista and Tecson (1976) observed, exchange rate overvaluation may cause a disparity in partner country trade data if the data-collecting institution (the GATT Secretariat in this case), in converting data in domestic currency into dollar equivalents for international comparability, uses an exchange rate which may be different from the free market rate used by developed partner countries. This is normally the case for countries under exchange control and multiple exchange rate systems, which cause a diver-

gence between official and free market rates. However, they also correctly point out that this factor is not likely to be a major source of discrepancy in the Philippine case because the National Census and Statistics Office (NCSO) collects trade data in dollar terms. In fact, the source document for import data is actually a copy of the importer's declaration in dollars, which in turn is based on the commercial invoice issued by the exporter at the other end.

Time lags in recording may result in discrepancies in partner country data because some goods are reported as having been exported by the source country and not as having been received by the importing country. However, as Bhagwati (1974) points out, the effect of this factor shows up in annual import data only if the import level changes over time. For if the import level shows a constant trend, then the discrepancies due to lags in recording would be offsetting from year to year. This is because "the imports of this year which are not recorded due to the lag but which carry over into next year's import statistics will be offset by the imports of last year carried over into this year's statistics" (Bhagwati 1974, p. 140). On the other hand, if the import level is rising, some understatement will occur, while a declining import level will result in some overstatement. However, this factor is statistically estimable and an attempt is made in this study to correct for its effect by adjusting the import values accordingly.

The lag can actually be broken down into two components: the lag due to the transit time between the exporting and importing country and the lag due to the delay in recording at the importing end. If one assumes instantaneous recording at the country of export, then the total lag will consist of the sum of these two components. However, if some delay in the recording of exports is assumed, then the lag from the above-named components will be partially offset by this delay. Table 1 shows approximate travel times to the Philippines from the countries under consideration. NCSO officials engaged in the collection of import statistics have approximated the lag in recording to be one month on the average.

Assuming a minimal lag in export recording for developed countries, the adjustment in import data that would account for the lag in recording could therefore be formulated as follows:

$$a = \left[\frac{I_t - I_{t-1}}{I_t} \quad \frac{12}{(L+R)}\right] \div \left[1 + \frac{I_t - I_{t-1}}{I_t}\right]$$

where

a = the degree of understatement of the import value due to the time lag in recording
I_t = the unadjusted import value
t = the time period in years
L = the lag due to transit time from the exporting country to the importing country in months
R = the net lag in recording time in months which is equal to 1 for trade with the countries considered.

Table 1

ESTIMATED TRAVEL TIME TO THE PHILIPPINES BY SEA

Country/Region	*Travel time in days*[a]
Europe	33
United States	26.6
Japan	9

a. Averaged over the shipping schedules of the members of the Association of International Shipping Lines in Manila, Philippines.

The degree of understatement, a, could then be applied to the unadjusted import value, I_t, to arrive at an import value, I_t^*, which is adjusted for lags in recording. Thus,

$$I_t^* = \frac{I_t}{1-a}$$

I_t^* will therefore be used in generating the discrepancies D_i, defined above.

Discrepancies may also be caused by inaccuracies in recording at the exporting end. Some trading partners may even have existing trade policies which provide incentives for the faking of export invoices. As earlier studies have pointed out, an export duty may give rise to underinvoicing of exports while controls on the acquisition and use of foreign exchange may encourage its illegal outflow through export overinvoicing. By virtue of the earlier definition of the discrepancy, D_i, the former situation could be expected to con-

tribute towards a negative D_i while the latter would tend to strengthen the occurrence of a positive D_i. However, these factors are expected to have only a minimal influence on D_i since the trade policies of the countries under study are seen to offer very little incentive for their occurrence.

As mentioned earlier, misclassification is one of the techniques used in technical smuggling. Therefore, the discrepancies in partner country data caused by its occurrence may either be the result of attempts to evade import taxes or due to just plain inadvertence on the part of those tasked with maintaining the statistics on trade transactions on either side. The effect of the former factor is part of what the model is intended to explain. The latter factor, on the other hand, is viewed as a random event and would therefore not be expected to have any systematic influence on the discrepancy, D_i.

The same thing is true for discrepancies in partner-country data arising out of wrongly designated partner countries. An incentive for doing this on purpose usually arises as a result of a common practice by customs authorities to blacklist countries which are usual sources of contraband or smuggled items and to require a rigid check on imports from these countries. As Bautista and Tecson (1976) have pointed out, the influence of inadvertent errors in designating partner-countries on the discrepancy, D_i, can be expected to be minimal for countries which have very little entrepôt trade. However, the effects of intentional misdeclaration of the source country is an entirely different matter and should be given serious consideration particularly since some products from the U.S. and EEC may pass through either Hong Kong or Singapore first in entrepôt trade before they are imported into the Philippines.

It may be useful to first determine in what direction this factor may affect the discrepancies in partner-country data. As mentioned earlier, the blacklisting by customs of countries which are frequent sources of smuggled goods can give rise to attempts at declaring the wrong source country for imports. This is particularly true in cases where the goods have to pass through some entrepôt countries before reaching their final destination. The imported goods would thus be declared as coming from the entrepôt country instead of from the actual source country. To make the situation appear more convincing to the customs authorities of the country of final destination, the goods may even be warehoused for a few days at the entrepôt country with a new invoice possibly being issued by a subsidiary of the original exporter.

In this case, the transaction would be carried in the trade statistics of the original source country as an export to the country of final destination while the latter would carry it as an import from the entrepôt country. The entrepôt country, on the other hand, may or may not reflect the transaction as an export, depending on the representations made by the parties involved. The resulting discrepancy, D_i, would therefore be positive if the statistics of the source country and the country of final destination were to be compared, while a comparison of the corresponding trade figures of the entrepôt country and the destination country would reveal either a zero or a negative D_i depending on whether or not the transaction is reflected by the entrepôt country as an export. But the absence of any institutionalized scheme for comparing the export and import data covering a particular transaction would make it virtually unnecessary to falsify export declarations at either the source country or the transit country, thereby making the latter case involving a negative D_i for data comparisons with the entrepôt country the more probable occurrence.

However, the blacklisting by customs of some source countries would not serve as a strong incentive for Philippine importers to wrongly declare their imports as originating from the two entrepôt centers for Philippine trade, namely, Hong Kong and Singapore, since these two countries themselves have perennially been in that list, having been frequent sources of apprehended smuggled goods. But this is not the only reason for importers to engage in such a practice; a much more compelling reason is that of undervaluation.

Traders in Hong Kong and Singapore have a reputation for not being too particular about whatever values are reflected in the invoices that they issue. In fact, some have been known to issue two invoices for a single transaction, one being meant for the purpose of making a customs declaration at the importing end. This therefore serves as a strong incentive for traders wanting to undervalue and whose goods transit through these entrepôt centers to misdeclare their imports as having been exported from these transit points rather than from the actual source country, since this would enable them to use an invoice issued in the entrepôt country.

As mentioned earlier, this would result in a positive D_i if the statistics of the source country and the country of final destination are compared. However, this discrepancy is part of what the model seeks to explain since it is due to yet another form of technical smuggling.

It has been argued in this section that of the five factors which have been identified to cause partner-country data discrepancies besides smuggling, one (transport cost) has been made irrelevant by virtue of the choice of data to be used, a second factor (exchange rate overvaluation) has been explained to be inoperable by virtue of the fact that NCSO data are collected in dollar terms from the invoices presented by importers, while a third (time lag in recording) has been taken account of through the application of the appropriate correction factor, two factors (intentional misclassification and misdeclaration of source country) have been identified to be part of what the model seeks to explain, while the rest have been shown to have no systematic effect on the behavior of D_i. Thus the use – for estimation purposes – of D_i as a proxy variable for the amount smuggled seems to be justified since the least squares assumption that the error term U_i of the empirical model reflects only stochastic effects of random events appears to be satisfied.

The data on partner-country discrepancies is generated from annual partner-country export values provided by the GATT Secretariat in Geneva while corresponding import values are from the Philippine National Census and Statistics Office (NSCO). The data runs from 1965 to 1978 and are disaggregated down to the one-digit SITC (section) level. To give an idea of the data structure, the totals per SITC section (aggregated over the period under study) for each of the countries considered are presented in Table 2. The rank alongside each value is the result of ranking them from the highest positive down to the highest negative total.

It should be noted that some totals turned out to be negative. This may be due to several reasons:

a. Undervaluation of exports to evade export taxes in the country of exportation.
b. Import overvaluation for the purpose of salting foreign exchange from the importing country.
c. Export and import misclassification (whether inadvertent or not).
d. Recording errors.

Of the four reasons enumerated, only one – import misclassification – relates to the problem of smuggling. It should, however, be noted that recorded negative discrepancies due to misclassification in one SITC section should turn up as positive discrepancies in some other sections and would therefore be part of what the model seeks to

TABLE 2

PARTNER-COUNTRY DATA DISCREPANCIES AGGREGATED OVER THE PERIOD 1965-1978
(In thousand U.S.$)

SITC Section No. Coverage	*Japan*	*Rank*	*E.E.C.*	*Rank*	*United States*	*Rank*
0. Food & live animals	6,274.72	5	–28,624.11	8	144,554.06	4
1. Beverages & tobacco	492.87	7	2,658.04	4	655.65	9
2. Crude mat., inedible except fuels	6,194.84	9	–18,835.63	7	11,200.13	7
3. Mineral fuels, lubricants & related mat.	1,194.17	6	767.85	5	45,254.85	6
4. Animal & veg. oils, fats & waxes	–309.93	8	–729.49	6	2,143.58	8
5. Chemicals & related products, n.e.s	189,553.89	4	–85,213.57	9	1 8,328.09	5
6. Manufactured goods	703,030.57	1	36,902.05	3	230,771.78	2

7. Machinery & transport equipment	232,763.45	3	983,794.15	1	1,387,706.40	1
8. Miscellaneous manufactured articles	251,857.78	2	67,584.39	2	221,249.25	3
9. Commodities & transactions, not classified elsewhere	−472,766.93	10	−130,119.08	10	−651,090.71	10
Country total	904,895.67		828,185.10		150,946.16	

explain. Since the main objective of the exercise is to test the ability of the empirical model to isolate the import smuggling component of partner-country data discrepancies, and since observed negative discrepancies tend to indicate that factors other than smuggling may have dominated the movement of this variable during the period, the model will therefore be tested only on those sections which show a positive total over the period under study.

The ranking of SITC sections in the order of magnitude of the discrepancies (with the largest positive discrepancy ranked first and the largest negative discrepancy ranked last) reveals that Sections 6, 7 and 8 covering Manufactured Goods, Machinery and Transport Equipment, and Miscellaneous Manufactured Articles, respectively, are consistently ranked among the top three for all the three countries considered. This could be viewed as lending further credence to the assumption that technical smuggling may have been the predominant type of smuggling activity since the products falling under the SITC sections cited, by their nature and relative technical complexity, would be prime choices as the subject of such an illicit operation.

2. *The Income Variable (Y)*

As developed in the theoretical portion of this study, the income variable includes the returns from both legal and illegal trade. The net returns to legal trade enter into the cost-benefit computations of the smuggler since some amount of legal trade is necessary to cloak his illicit activities. Likewise, the price (net of the acquisition cost) which the smuggled portion of the shipment would fetch in the local market is also relevant since this would be weighed against the additional costs and benefits of engaging in illegal trade. If the items that are smuggled in are the same as those composing the legally imported portion of the import shipment, these two values could be expected to coincide. If the items are different, then the two values may vary, although probably not radically since detection would be minimized the less distinguishable the smuggled items are from the legally imported ones. It could then be expected that the effects of these factors would be reflected in a ratio of the relevant domestic wholesale price index (WPI) in the Philippines to the WPI in the exporting country. Since the Central Bank of the Philippines publishes the WPI of imported goods disaggregated to the one-digit SITC level, in its *Statistical Bulletin,* the WPI corresponding to the SITC

section under consideration will therefore be used in computing the ratio[3] of WPIs. The foreign WPI is gathered from various editions of the United Nations' *Statistical Yearbook.*

3. *The Risk of Getting Caught (p):*

The risk of the smuggler getting caught (p) is ideally measured as a ratio between the number of shipments which are either meted fines or forfeited for violating the Tariff and Customs Code and the number of smuggling attempts. Since the number of smuggling attempts is not observable, then the number of known smuggling attempts will be used as a proxy. (The same concept was employed by Ehrlich (1974) in his study on crime.) The proxy variable will therefore take on the following form: the number of shipments which are either meted fines or forfeited over the number of apprehended shipments. It should, however, be noted that the risk variable in this form tends to overstate the actual risk of getting caught.

In view of this, the risk variable will be alternately specified in terms of the average effective rate of duty. The rationale for this specification is the observation that the average effective rate of duty, which is expressed as the ratio of the actual tariff duties collected to the total import value, can be viewed as a reflection of the effectiveness with which the customs authorities perform their job. Thus, a high average effective rate of duty for a certain category of goods may be taken as indicative of the corresponding level of efficiency with which the customs authorities collect the customs duties due on these goods; and the higher the level of efficiency shown by customs authorities, the higher the risk attached to the smuggling attempt.

These data are available in both aggregate and disaggregate form, each having a different source. The aggregate data are taken from the CB's *Statistical Bulletin* while the data which are disaggregated down to the level conforming to the disaggregation of the dependent variable are from the records of the Bureau of Customs. Both forms will be included in the estimation.

3. In 1977, the Central Bank started publishing the WPI, broken down into 26 categories instead of the usual 10 corresponding to the one-digit SITC, with the new categories not convertible into the old. In order to maintain the length of the time series data, the old SITC series was spliced with a new series generated by NCSO using the SITC-based Philippine Standard Commodity Classification (PSCC).

The risk variable will therefore be estimated using three alternative specifications, as follows:

P_1 = number of shipments which are either forfeited or meted fines over the number of apprehended shipments.

P_2 = aggregate average effective rate of duty (total import duties and fines collected over the total value of imports).

P_3 = average effective rate of duty per SITC category. These data are available down to the two-digit SITC level of disaggregation. The level of disaggregation used will therefore follow that of the dependent variable.

4. *The Blackmarket Premium (E):*

Two forms of this variable are tried in the regression estimates. One is the straightforward difference between the blackmarket rate and the official exchange rate of the Philippine peso to the U.S. dollar (E_d). The prevailing blackmarket rates are from Pick's Currency Yearbook while the official exchange rate is from the International Financial Statistics of the International Monetary Fund. The other form is a derivation of the blackmarket premium using the concept of the purchasing power parity (E_p).

In its absolute version, purchasing power parity (PPP) implies that the equilibrium value of the exchange rate between currencies of any pair of countries should be equal to the ratio of the countries' price levels. Under certain conditions, these values could be expected to move together and any divergence could therefore be taken as an indication of the existence of trade impediments and/or restrictions (Officer 1976).

This concept could then be used to generate a proxy for the blackmarket premium as follows?

For a particular import commodity, let

F_t = the foreign price in period t ($t = 0, 1, 2, \ldots . n$)

D_t = the domestic price in period t ($t = 0, 1, 2, \ldots . n$)

thus

$$D_t = r_t^* (1 + T) F_t$$

where

T = tariff rate
r_t^* = effective exchange rate in period t, defined as follows:

$$r_t^* = a r_{bt} + (1 - a) r_t$$

where

r_{bt} = black market rate in period t
r_t = official exchange rate in period t

a and $(1-a)$ = effective weights of r_{bt} and r_t respectively.

Choose a base year t_o where $r_{bo} \cong r_o$ and express the above-defined values in index form as follows:

$$\frac{F_o}{F_o}, \frac{F_1}{F_o}, \ldots \frac{F_t}{F_o}, \ldots \frac{F_n}{F_o}$$

$$\frac{D_o}{D_o}, \frac{D_1}{D_o}, \ldots \frac{D_t}{D_o}, \ldots \frac{D_n}{D_o}$$

$$\frac{r_o}{r_o}, \frac{r_1}{r_o}, \ldots \frac{r_t}{r_o}, \ldots \frac{r_n}{r_o}$$

Note that

$$\frac{D_t}{D_o} = \frac{F_t\ r_t^*\ (1 + T)}{F_o\ r_o^*\ (1 + T)} = \frac{F_t\ r_t^*}{F_o\ r_o^*}$$

since T is assumed to be unchanging from $t = o$ to $t = n$. By using the concept of PPP under the assumption that the base year, $t = o$, is characterized by relative equilibrium in the foreign exchange market, the following relationships are derived:

at $t = o$

$$\frac{(D_o/D_o) \;/\; (F_o/F_o)}{(r_o \;/\; r_o)} = 1$$

at $t = i$

$$\frac{(D_i/D_o) \;/\; (F_i \;/F_o)}{(r_i/r_o)} = \frac{(F_i\, r_i^*/F_o\, r_o^*) \;/\; (F_i/F_o)}{(r_i/r_o)} = \frac{(r_i^*/r_o^*)}{(r_i/r_o)} = \frac{r_i^*}{r_i}$$

and so on up to $t = n$, since the base year is chosen such that

$$r_o^* \cong r_b \cong r_o$$

Thus, $\dfrac{(D_t/D_o)/(F_tF_o)}{r_t/r_o} - 1$ can be take as an estimate of $\dfrac{(r_t^*)}{r_t} - 1$ or $\dfrac{r_t^* - r_t}{r_t}$, which is the premium a trader who is engaged in both legal and illegal trade has to face in procuring foreign exchange from both official and blackmarket sources.

The expression (D_t/D_o) will be represented by the ratio of the WPI for imported goods in the Philippines. Data on this will be taken from the CB's *Statistical Bulletin*. Similarly, (F_t/F_o) will be represented by the ratio of the WPI prevailing in the partner country under consideration. On the other hand, (r_t/r_o) will be represented by the official exchange rate between the Philippine peso and the U.S. dollar. Data on this will be taken from the International Financial Statistics of the IMF. The year 1973 has been chosen as the base year since this was when the Philippines experienced a trade surplus as well as relative stability in the foreign exchange market.

5. *The Dummy Variables (d_1 and d_2)*

Containerized cargoes were received at the Port of Manila as early as 1970. Thus the dummy variable, d_1, which assumes the value zero from 1965 to 1969 and one from 1970 to 1978, is specified to catch the effects of containerization.

In September 1972, martial law was imposed in the Philippines and this was accompanied by comprehensive changes in various government offices, including the Bureau of Customs. Considering that the avowed purpose of these changes was to weed out corruption in the government, they may have therefore influenced the smuggling pattern during the period. The dummy variable, d_2, is

therefore included in the specified equation to reflect the possible impact of this change in policy. This variable is zero from 1965 to 1972 and is equal to one from 1973 to 1978.

B. *Results of Regression*

Using the empirical model developed in the preceding section, ordinary least square regressions were run using time series data at three levels of aggregation: overall total, country level and SITC section level. The equations are chosen on the basis of the level of significance and "correctness" of the signs (in the sense that the signs come out as expected) of the coefficients as well as the magnitude of the R^2 values. The results are presented below, employing variables defined previously as follows:

D = partner-country data discrepancy (exports-imports) in million U.S. dollars.

E_d = blackmarket premium represented as the difference between the blackmarket exchange rate and the official exchange rate of the Philippine peso to the U.S. dollar.

E_p = effective blackmarket premium derived by using the concept of purchasing power parity.

P_1, P_2, P_3 = various forms of the probability of getting caught (see preceding section for a detailed definition of each).

y = the income variable, represented as the ratio of domestic and foreign wholesale price indices.

d_1, d_2 = dummy variables for the advent of containerization in 1970 and the imposition of martial law in the Philippines in September 1972, respectively, where $d_1=0$ from 1965-1969 and $d_1=1$ from 1970-1978 while $d_2=0$ from 1965-1972 and $d_2=1$ from 1973-1978.

1. Overall total

$$D = -428.66 + 245.26E_d - 5855.44P_2 + 3828.39Y$$
$$\qquad\qquad (0.75) \qquad (1.98) \qquad (4.10)$$
$$R^2 = 0.680 \qquad F = 7.07 \qquad \text{D.W.} = 1.25$$

2. Country level
   a. Japan

$$D = -247.80 + 128.82E_d - 1181.25P_2 + 1346.48Y$$
$$\qquad\qquad (14.) \qquad (1.55) \qquad (6.11)$$

$R^2 = 0.850$ $F = 18.92$ D.W. = 1.02

b. USA

$$D = -171.08 + 56.48E_d - 1131.42P_2 + 1060.93Y$$
$$(0.4) \quad (0.85) \quad (2.55)$$

$R^2 = 0.502$ $F = 3.36$ D.W. = 1.28

c. EEC

$$D = -1165.05 + 27.55E_d - 724.06P_2 + 812.39Y$$
$$(0.37) \quad (0.96) \quad (2.75)$$

$R^2 = 0.576$ $F = 4.53$ D.W. = 0.71

3. Section level

a. Japan

Section 0

$$D = -.44 - .82E_d + 5.81P_2 + .73Y$$
$$(0.28) \quad (0.2) \quad (0.1)$$

$R^2 = 0.026$ $F = 0.09$ D.W. = 2.13

Section 1

$$D = -.05 + 0.03E_d + 0.37P_2 + 0.02Y$$
$$(2.26) \quad (4.48) \quad (0.42)$$

$R^2 = 0.746$ $F = 9.82$ D.W. = 2.22

Section 3

$$D = 3.37 - 0.82E_d - 28.80P_3 + 4.38Y$$
$$(0.51) \quad (1.71) \quad (0.87)$$

$R^2 = 0.343$ $F = 1.74$ D.W. = 2.17

Section 5

$$D = -7.63 + 3.30E_d - 13.62P_2 + 55.69Y$$
$$(0.85) \quad (0.41) \quad (7.50)$$

$R^2 = 0.918$ $F = 37.17$ D.W. = 1.83

Section 6

$$D = 34.23 + 40.67E_d - 521.25P_2 + 195.06Y$$
$$(1.67) \quad (2.30) \quad (3.47)$$

$R^2 = 0.608$ $F = 5.16$ D.W. = 2.94

Section 7

$$D = -591.81 + 85.62E_d + 491.50P_2 + 1289.44Y$$
$$(0.79) \quad (0.68) \quad (4.66)$$

$R^2 = 0.777$ $F = 11.63$ D.W. = 0.76

Section 8

$$D = 8.53 + 8.15E_d - 50.02P_2 + 74.96Y$$
$$\quad\quad (1.43) \quad (1.23) \quad (7.02)$$
$$R^2 = 0.868 \quad F = 21.87 \quad \text{D.W.} = 1.30$$

b. USA

Section 0

$$D = 0.81 + 2.65E_d - 38.65P_2 + 31.83Y$$
$$\quad\quad (0.46) \quad (0.2) \quad (1.25)$$
$$R^2 = 0.222 \quad F = 0.95 \quad \text{D.W.} = 3.13$$

Section 1

$$D = 30.42 - 36.60P_2 - 18.75E_p - 36.68Y$$
$$\quad\quad (3.73) \quad (4.3) \quad (4.41)$$
$$R^2 = 0.673 \quad F = 6.85 \quad \text{D.W.} = 1.37$$

Section 2

$$D = 6.55 - 1.42E_d - 13.46P_2 - 6.53Y$$
$$\quad\quad (0.45) \quad (0.46) \quad (0.78)$$
$$R^2 = 0.268 \quad F = 1.22 \quad \text{D.W.} = 1.81$$

Section 3

$$D = 4664.30 - 882.98E_d - 6971.18P_1 - 3775.50Y$$
$$\quad\quad (0.55) \quad (1.81) \quad (1.45)$$
$$R^2 = 0.633 \quad F = 5.75 \quad \text{D.W.} = 1.31$$

Section 4

$$D = -0.82 - 0.71E_d + 14.56P_2 - 2.55Y$$
$$\quad\quad (0.85) \quad (1.86) \quad (1.39)$$
$$R^2 = 0.295 \quad F = 1.40 \quad \text{D.W.} = 2.92$$

Section 5

$$D = -36.59 - 7.45E_d + 91.36P_1 + 42.47Y$$
$$\quad\quad (0.26) \quad (1.18) \quad (1.10)$$
$$R^2 = 0.281 \quad F = 1.30 \quad \text{D.W.} = 1.70$$

Section 6

$$D = 17.80 - 4.13E_d - 181.35P_2 + 71386.94Y$$
$$\quad\quad (0.7) \quad (2.91) \quad (4.31)$$
$$R^2 = 0.670 \quad F = 6.77 \quad \text{D.W.} = 2.06$$

Section 7

$$D = -337.60 + 52.83E_d - 117.47P_2 + 803.18Y$$
$$(1.1) \quad (0.33) \quad (4.99)$$
$$R^2 = 0.821 \quad F = 15.25 \quad \text{D.W.} = 0.93$$

Section 8

$$D = -18.62 + 6.81E_d - 72.59P_2 + 81.43Y$$
$$(0.7) \quad (0.99) \quad (3.85)$$
$$R^2 = 0.664 \quad F = 6.61 \quad \text{D.W.} = 1.04$$

c. EEC

Section 1

$$D = 1.70 + 0.58E_d - 1.65P_1 - 2.19Y$$
$$(0.53) \quad (0.55) \quad (0.4)$$
$$R^2 = 0.034 \quad F = 0.12 \quad \text{D.W.} = 2.20$$

Section 3

$$D = 0.97 - 0.31E_d - 6.47P_2 + 0.57Y$$
$$(0.56) \quad (1.34) \quad (0.3)$$
$$R^2 = 0.244 \quad F = 1.07 \quad \text{D.W.} = 2.41$$

Section 6

$$D = 5.33 + 5.80E_d - 156.78P_2 + 50.01Y$$
$$(1.12) \quad (2.42) \quad (2.44)$$
$$R^2 = 0.430 \quad F = 2.51 \quad \text{D.W.} = 1.32$$

Section 7

$$D = -387.20 - 48.25E_d + 461.14P_2 + 844.75Y$$
$$(0.57) \quad (0.91) \quad (2.20)$$
$$R^2 = 0.532 \quad F = 3.78 \quad \text{D.W.} = 0.44$$

Section 8

$$D = -6.40 + 1.04E_d - 22.60P_2 + 37.14Y$$
$$(0.35) \quad (0.99) \quad (4.54)$$
$$R^2 = 0.745 \quad F = 9.75 \quad \text{D.W.} = 1.33$$

The numbers in parentheses underneath each coefficient are the *t*-values. The coefficient of determination (R^2), the F, and the Durbin-Watson statistics for each equation are also reported. The R^2 values reveal that the model is able to explain quite a significant amount of variation in the discrepancy D at all levels of aggregation. It should also be noted that the R^2 values for equations cover-

ing trade with Japan at both the country and section levels are relatively higher than those for the U.S. and the EEC. It could be that Japan's relative proximity to the Philippines makes it a more accessible and cheaper source of smuggled goods.

Furthermore, at the section level, equations covering Sections 6, 7 and 8 show relatively high R^2 values. It should be recalled that these sections consistently ranked among the top three for all three countries when the sections were ranked in the order of magnitude of the positive discrepancies at the section level. These results therefore tend to indicate that quite a significant amount of these discrepancies may have been due to smuggling.

The coefficients of the dummy variables d_1 and d_2 did not turn out to be significantly different from zero at any level of aggregation; thus, the variables were subsequently dropped from the equations. The country level equations as well as the equation covering the overall total show Y to be the only variable with significant coefficients. However, at the section level, the coefficients of P_2, in addition to those of Y, show consistently significant t-values in equations covering Section 6 (Manufactured Goods) for all three countries. Since the variable P_2 represents the aggregate effective rate of duty, the above results indicate that the efficiency with which import duties are collected by customs authorities may have had quite a significant deterrent effect in the smuggling of manufactured goods. In fact, the estimated equations show that, everything else remaining the same, an increase in the aggregate effective rate of duty by 10 percentage points would result in a decline of $52 million in smuggling from Japan, $18 million from the U.S., and $16 million from the EEC for a total decline of $86 million in smuggling from the three countries considered. The results indicate that it may therefore be worthwhile for the Bureau of Customs to consider further increasing its efficiency in the collection of import duties, particularly on imports of manufactured goods.

It should also be noted that the equation covering Section 1 for the United States shows highly significant t-values for the coefficients of P_2 (the coefficient of y is also significant although the sign is perverse). Section 1 covers beverages and tobacco and it is quite a well-known fact that such items from the United States have a relatively high consumer demand in the Philippines and are therefore likely to be objects of smuggling attempts. The customs authorities at the frontier are also possibly aware of this; thus, shipments

which are either known or suspected to contain these items are most probably subjected to careful scrutiny. One would therefore expect the coefficient of the risk variable to turn out to be significant.

Another item of note is the fact that the variable representing the blackmarket premium (E_p, in this case) shows a significant coefficient in the equation covering Section 1 for the U.S., while the same variable shows an insignificant coefficient in the equation covering Section 6, whether it be for the U.S. or the other two countries represented. (It will be recalled that products under Section 6 were mentioned earlier to be likely objects of smuggling and that the risk variable was observed to have a significant coefficient.) One possible explanation for this is the fact that most items under Section 1 are classified by the Central Bank as either banned or under import quota (Non-Essential Consumer or NEC and Unclassified Consumer or UC categories) while most items under Section 6 are not under such restrictions. Thus, illegal importations of goods under Section 1 would most likely come in as undeclared items, possibly packed together with items which are legally importable. Since the foreign exchange which was used to buy the undeclared portion of the shipment could not be procured from legal sources, it would have had to be bought from the blackmarket and the smuggler would have had to face the blackmarket premium. Given this scenario, one would therefore expect the variable representing the blackmarket premium to come out with a significant coefficient in the equation covering Section 1.

Most items under Section 6, on the other hand, could be imported through the use of a letter of credit opened with the bank. This gives the importer access to foreign exchange at the official rate. Any evasion of duties and taxes could then be accomplished through less risky means such as misclassification or underdevaluation.

This could also be taken as the explanation for the higher level of significance of the coefficient of the risk variable in Section 1 (U.S.) relative to that in any of the equations covering Section 6 (the t-value for P_2 for Section 1 (U.S.) is 3.73 while for Section 6, t is equal to 2.2 for Japan, 2.91 for the U.S. and 2.42 for the EEC). Misdeclaration (the most probable method of smuggling in Section 1 items) is relatively more risky than either misclassification or undervaluation (the most probable method of tax evasion on shipments of items under Section 6) since the mere discovery of the

undeclared items by the customs examiner is usually taken as prima facie evidence of fraud and therefore makes the shipment subject to seizure by the customs authorities. On the other hand, the seizure of an importation which is the subject of either misclassification or undervaluation (or both) usually requires a more technically involved process, thus affording the smuggler much greater odds.

The regression results indicate that the empirical model developed in this study can provide some interesting and useful insights into the nature of smuggling activities. The results also reveal the extent to which information is lost in an aggregative analysis of the problem and therefore serve to emphasize the advantages of a detailed analysis in this area of study.

IV. AN ESTIMATE OF THE SMUGGLING LEVEL

In this section, an attempt is made to generate an estimate of the smuggling level from the partner countries considered during the period under study. This is accomplished by substituting the values of the independent variable appearing in the regression equations estimated in the preceding section, to come up with the computed discrepancy, $\bar{D}$. Given the validity of the theoretical analysis made earlier, the empirical model formulated from it could be expected to account for the variation caused by the smuggling component of the discrepancy, $\bar{D}$, in partner-country data. It was further argued that the components of the error term Ui of the empirical model are generally random in nature and tend toward zero in the long run such that the least squares assumption that $E(Ui) = 0$ is satisfied. In the light of the above, it would therefore be justified to assume that the computed discrepancy, $\bar{D}$, represents an estimate of the smuggling level. The equations generated from time series data as presented in Section 4.2 above, are used in generating the estimate.

Table 3 presents values of $\bar{D}$ at various levels of aggregation. The estimate of the smuggling level from the three countries for the period 1965-78 therefore ranges from \$5,968,301,350 to \$11,093,939,350. These figures are 28.95 percent and 53.81 percent, respectively, of the reported total export value to the Philippines during the period. The regression equations at aggregate levels are expected to yield lower estimates than those at the section level since the effects of misclassification which is seen to be a predominant method of technical smuggling are not evident at higher aggre-

TABLE 3

ESTIMATE OF SMUGGLING AT DIFFERENT AGGREGATE LEVELS

I. Estimate Using Regression on Over-all Total

$\bar{D}^b$ = \$5,968,301,350 % of Total Export Value = 28.95

II. Estimate Using Country Level Equations: % of export value[a]

A. Japan : $\bar{D}^c$ =	\$3,054,734,210	32.3
B. U.S.A. : =	1,930,549,230	25.5
C. EEC : =	\$1,071,259,540	28.8
Total $\bar{D}$ =	\$6,002,548,980	29.11

III. Estimate Using SITC Section Level Equations

	Japan[d]	*% of Export Value*	*U.S.A.*[d]	*% of Export Value*	*EEC*[d]	*% of Export Value*
Section 0	\$6,274,510	1.91	\$146,911.650	13.42		
Section 1	493,450	62.30	655.500	0.37	2,162,740	6.49
Section 2.			11,200,300	1.94		
Section 3	1,194,300	2.30	4,511,191,410	4.05	767,620	6.66
Section 4			2,147,680	6.04		
Section 5	189,553,770	17.15	118,328,010	12.82		
Section 6	703,030,550	22.63	230,771,730	20.7	36,902,000	9.10
Section 7	2,327,697,700	57.30	1,367,706,370	45.0	897,629,800	45.24
Section 8	251,857,710	71.54	221,249,130	59.37	67,584,420	53.75
Country Total	\$3,480,101,990		\$6,608,850,780		\$1,005,046,580	

Overall total:

$\bar{D}$ = \$11,093,999,350

% of Total Export Value[a] = 53.81

a. % of export value = ($\bar{D}$/Export value) x 100.
b. Estimated smuggling level as computed from aggregate regression equation.
c. Estimated smuggling level as computed from country level equations.
d. Estimated smuggling level as computed from section level equations.

gate levels. This is becausè, at these levels, the positive discrepancies which would normally be observed in sections wherein the misclassified articles are declared would cancel out the negative discrepancies observed in sections where these articles should have been declared.

The smuggling estimates at the section level reveal that the sections covering items which may be considered to be likely objects of technical smuggling have a relatively high smuggling incidence. The columns showing smuggling as a percentage of reported exports reveal that sections 6, 7 and 8 covering manufactured goods, machinery and transport equipment, and miscellaneous manufactured goods, respectively, consistently show the highest percentages. In fact, it is only in the case of Japan – where Section 1 (covering beverages and tobacco) has the second highest percentage – that the above observation does not hold.

The items under these sections, as may be gathered from their descriptive headings, consist mainly of finished products and would therefore be expected to be relatively diverse and complex as compared to those in other sections. Furthermore, one would expect a relatively dynamic basket of goods under these sections in the sense that new product lines are constantly emerging and there is a relatively high rate of change in the design and specifications of existing ones. These are the characteristics which make it difficult for the customs authorities to accurately determine the proper value and classification of imported items. Attempts at evading import duties through technical smuggling would therefore have relatively high chances of success if the shipments in question contained items under the aforementioned sections. The fact that the estimated smuggling levels are highest for these sections therefore lends further support to the assumption made earlier that technical smuggling is the predominant form of evading import duties in the Philippines.

V. SUMMARY AND CONCLUSION

This study has endeavored to demonstrate the usefulness of a model based on the smuggler's calculus in providing insights into the nature and extent of smuggling activity in the Philippines. A theoretical model was developed along the lines suggested by Becker (1974) and Ehrlich (1974), and the behavioral implications derived from it were in turn used as a basis for formulating an empirical model which

sought to isolate the smuggling component of discrepancies in partner-country data.

The empirical model was estimated at different levels of aggregation using data on discrepancies arising out of Philippine trade with its major trading partners. A study of the regression results revealed the advantages of a detailed analysis in this endeavor, as the conclusions that were derived concerning the nature of smuggling activity in the Philippines were formulated from a study of the estimates generated at the one-digit SITC level. These inferences were not evident from an analysis of the results at higher aggregation levels.

In particular, the results rendered further credence to the assumption that technical smuggling through legal trade channels is the predominant smuggling activity in the Philippines. Relatively good fits were found for equations corresponding to SITC sections covering items which are seen to be vulnerable to technical smuggling.

The regression results were also used to come up with an estimate of the smuggling level. This estimate was found to range from 28.95 percent (for the estimate derived from a regression of the overall total) to 53.81 percent (from section level regressions) of the reported exports tot he Philippines of the partner-countries considered during the period under study.

The model, therefore, has been found to provide a useful framework for an analysis of smuggling in the Philippines. It has not only made possible the formulation of conclusions concerning the nature of the smuggling activity which may prove useful in policymaking as regards the enforcement of customs and tariff laws, but more importantly, it has also served as a framework for the generation of an estimate of the smuggling level which may be used to correct a possible bias in foreign trade data which is due to smuggling.

There are, however, some areas which still remain unexplored and which could be the subject of further studies. For one, the model, having been developed under the assumption that technical smuggling is the predominant smuggling activity, is not equipped to fully address the situation where pure smuggling dominates the smuggling industry. Although this is represented in the theoretical model by the case where the choice variable "a" is close to or equal to one, there are additional costs to pure smuggling which could be significant enough under this situation as to require explicit consideration in the model.

Corollary to this is the need to directly address the issue of the existence of legal trade at the industry level under the pure smuggling situation. Although the cases where a=1 necessarily means that the smuggler has decided not to use legally traded goods to cloak his illegal shipments, the question as to whether or not legal trade will still exist if all smugglers decided to do the same thing was not considered in the analysis. There is therefore a need to further explore the macroeconomic implications of the model.

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