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The Metro-Manila Inter-Regional Input-Output Table: Its Attempt of Compilation By the Hybrid Approach

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I. Introduction

This paper is concerned with the general methodology adopted in the empirical investigation of regional economies by the input-output (I-O) approach. In this paper, special consideration is given to the mixed or the so-called hybrid approach of compiling the bi-region inter-regional I-O table for the Philippine economy as a pioneering research project, made recently possible through the logistical support provided by the Japan Society for the Promotion of Science (JSPS)-Manila Project

The first sections of this paper present an overview of the status of I-O accounting in the Philippines and a review of literature on regional I-O compilation techniques. Section IV describes the conceptual and accounting framework of the bi-regional I-O model used, followed by a fairly detailed discussion of the general procedure of compilation under the hybrid methodology. The non-survey technique of generating regional I-O coefficients is also being described and illustrated so that clear distinction between the two approaches could be made.

The next section deals with a summary discussion and illustration of the significant findings of the empirical study. It highlights an analysis of the relative differentials of calculated total (direct + indirect) output multipliers.

Finally, the paper concludes with some recommendatory measures geared towards improving I-O research methodologies, given the existing limitations of the hybrid approach.

II. Overview of I-O Compilation in the Philippines

The Philippines has so far produced eight benchmark national input-output accounts since 1961. These are the 1961, 1965, 1969, 1974, 1979, 1985, 1988 and 1994. The first two tables (1961 and 1965) were prepared and published independently by the National Economic Council (now the National Economic Development Authority or NEDA) and the Bureau of the Census and Statistics (now the National Statistics Office or NSO). The next three IO tables (1969, 1974 and 1979) were produced as collaborative efforts of these two agencies. In 1987, the Statistical Coordination Office of NEDA which was tasked with the compilation of the national accounts and the input-output accounts evolved into an independent body named the National

*** The authors assume sole responsibility for the opinions expressed in this paper.**

Statistical Coordination Board (NSCB). The last four IO's were compiled as collaborative efforts between the NSCB and the NSO. In between benchmark years, input-output updates had also been prepared and made available for years 1983 and 1990. The most recent I-O updating exercise conducted was for CY 1995, the main purpose of which was to provide international users with the country's I-O data used in compiling multilateral international I-O tables. One of these is the country's assistance to JETRO's Institute of Developing Economies' Project in compiling an international I-O account. as well as the Project on Economic Development and Environment Navigation (EDEN) for the Philippines which was sponsored by the Keio Economic Observatory in Japan.]

Presently, the construction of national I-O tables is a collaborative effort between the National Statistical Coordination Board (NSCB), as the government's highest statistical policy-making and coordinating body, and the National Statistics Office (NSO), as the principal statistical data collection agency. The I-O compilation is likewise provided in the Executive Order 352 which is embodied in the Philippine System of Designated Statistics . For the next benchmark IO, the Philippines will adopt the year 2000. This is based on developments in the ASEAN Region during the Bangkok Meeting last March 2001 which stipulated that to make consistent the compilation of the IO with the national accounts (shifting its base year from 1985 to 2000), the year 2000 will also be the next benchmark year for the Philippine IO.

The NSCB is also the official compiler of gross domestic product (GDP) accounts at the national and regional (or subnational) levels alike. A pilot compilation of the Gross Provincial Production Accounts was also undertaken by the NSCB in Provinces of Palawan and Cebu. While the NSCB has been periodically compiling regional economic accounts such as Gross Regional Domestic Product (GRDP) and Gross Regional Domestic Expenditures (GRDE), no official attempt, however, has so far been initiated to compile I-O tables at the sub-national level of geographic classification. The lack of an official decree to engage in the construction of regional I-O tables could be the main reason.

Nevertheless, a number of intra-regional or single-region IO tables compiled by private research organizations and individuals have been made available. Orbeta, Cortez and Calera (1997) created an intra-regional IO table for Southern Mindanao (Region XI) that was used in estimating the impact of macroeconomic policies like trade and agro-industrial policies, local pump-priming programs and overall regional growth targets. Dakila (1998) extracted a single region I-O table for the whole Mindanao economy for the years 1979, 1990 and 1994 using non-survey techniques like location quotient method and RAS, given the national I-O tables.

In 1999, Secretario initiated the compilation of a series of regional I-O tables for the purpose of providing the JSPS -Manila Project with the appropriate database for its economic-environment-related impact assessment studies with emphasis on the highly urbanized Metropolitan Manila area. This component I-O research project started with the construction of an 84-sector single-region or intra-regional I-O table for Metropolitan Manila as the Nation's Capital Region (NCR). The second phase extended the intra-regional framework into a bi-region inter-regional I-O (IRIO) model with NCR and the Rest of the Philippines (ROP) as the component regions. Its objective is to measure inter-regional spillover/feedback effects that are not captured in single-region tables. The third and final phase expanded the spatial coverage of the IRIO model from a bi-region to a multi-region (5-region) IRIO table.

Although still in its initial stage of development in the Philippines, policymakers are starting to appreciate the usefulness of regional I-O tables for policy-making purposes.

III. Review of Literature on Techniques of Constructing Regional I-O Tables

In a review of the history of regional I-O making, Jensen described the different stages in regional I-O construction. The early stages of the development of regional input-output tables involved the work of Isard in 1953 and then Isard and Kuenne in 1953. This involved the usage of unadjusted national coefficients. Then, the next stage involved the use of national coefficients as first approximations of regional coefficients (Moore and Petersen, 1955). The third stage which was called the classical era of regional input-output, gave rise to the existence of "genuine" regional tables, based on regional data. Those who created genuine regional I-O tables included Hirsch (1959) who created a regional I-O table for Boulder, then Miernyk et al in 1967. Other states which had regional I-O tables then were West Virginia (Mierynk , 1970); Philadedphia (Isard and Langford, 1969; Isard,Langford and Romanoff, 1966-68; Isard & Langford, 1971); Kansas (Emerson and Hackmann 1971); Washington (Bourque et al 1967). According to Jensen, this was " the era when professionalism in table construction was at its height, and when researchers shared a unity of purpose. Researchers were engaged in large empirical exercises to develop tables that carried their personal and professional imprimatur and warranty.

However, the high cost of time delays associated with survey-based tables caused the emergence of alternative non-survey techniques in regional I-O construction. One type of non-survey technique used was the usage of quotient-type, single-step methods that produced regional tables as mechanical mini-versions of national tables.

A third approach was the emergence of hybrid tables based on a mixture of survey and non-survey methods that harnessed the advantages of both approaches. Schaffer (1976), Jensen, Mandeville and Karunaratne in (1979) utilized these methods.

From hereon, the trend in regional input-output table construction focused on the derivation of the multipliers from the Leontief inverse, with definitional changes in multipliers. The conventional system of multipliers was still used by Miernyk (1965) and Richardson (1972). West and Jensen (1980) produced a consistent system of multipliers that was adopted in some countries and was similar to the system proposed by Blair and Miller (1985). Multi-regional multipliers were devised by Dipasquale and Polenske (1980) and then by Round in (1985).

Therefore, regional input-output construction has proceeded from the classical context to the situation where several systems coexist in the production of regional tables and multipliers. According to Jensen, there is now a transition from the classical era where the integrity of the table was first priority and the application of the technique was a " high level of exercise of substantial professional merit." The modern era in input-output appears to be heading toward the situation where the integrity of the table is of lower priority and instant results are the norm. Furthermore, Jensen added that the adoption and diffusion path of regional input-output analysis followed this pattern – first knowledge of the technique spread first to a wide range of researchers with interests in theoretical issues, extensions to the model, in experimental empirical applications in a wider context and in making the technique more relevant in a world with a dearth of readily applicable techniques of economic analysis. The experimental applications gained stature in professional circles due to the robustness of the technique and effective dissemination of techniques.

Two possible directions may be tapped with regards to the future of regional input-output construction. The first is the predominance of ready-made models that have "best quality short cut results". More improvements have to be made on the theoretical and logical structure of such models. The second direction is the integration of survey data with non-survey data in a hybrid or mixed-type of I-O tables. This is where the classic tradeoff between accuracy of the table and cost or computational expediency in the derivation of regional input-output tables could be attained.

IV. Construction of Bi-Region IRIO Table for the Philippines

IV-1. Model Used

A single-region I-O model such as the 1994 NCR intra-regional table, as the initial output of the JSPS-sponsored I-O research project in the Philippines, is a general equilibrium model at a specific point in time and space. The focus of the model is on local industrial structure and it sheds light on the impact of exogenous changes in final demand on economic activities of an individual region. However, its usefulness as an effective analytical tool is limited only to its capability to provide a comparative static assessment of the consequences in any policy, with the quantitative estimates serving primarily as indicators of directions of change and relative impact. Its main drawback is that it is not able to capture feedback/spillover effects that are primarily attributable to inter-regional trading. In view of this perceived analytical constraint, a doable bi-region, and subsequently a multi-region, accounting framework was developed and adopted in the construction of inter-regional I-O tables.

Illustrated in ***Figure 1*** is a layout of the conventional bi-region inter-regional I-O model of the static, open type. It is actually a configuration of the accounting framework adopted in constructing the bi-region IRIO table wherein the Philippine territory was divided into two economic regions, namely: Metro Manila or National Capital Region (NCR) and the Rest of Philippines (ROP).

In accordance with the study's terms of reference, the basic table was designed to cover some 84 intermediate sectors, 8 final demand and 4 value added components. Year 1994 was purposely chosen as the reference period in order to synchronize the regional I-O compilation with that of the 1994 mother national I-O table. Thus, numerical consistency with the national I-O table is achieved.

Figure 1. BI-REGION (NCR-RP) IRIO ACCOUNTING FRAMEWORK

From \ To		INTERMEDIATE DEMAND		FINAL DEMAND						GO
		NCR	ROP	NCR			ROP			
		1…j…84	1…j…84	1…k…4	E	(M)	1…k…4	E	(M)	
NCR	1 : i : 84	**(I)** Xij^{NN}	**(II)** Xij^{NR}	Fik^{NN}	**(III)** Ei^{NW}	0	Fik^{NR}	**(IV)** 0	0	$\mathbf{Xi^{N}}$
ROP	1 : i : 84	**(V)** Xij^{RN}	**(VI)** Xij^{RR}	Fik^{RN}	**(VII)** 0	0	Fik^{RR}	**(VIII)** E^{RW}	0	$\mathbf{Xi^{R}}$
ROW	1 : i : 84	**(IX)** Xij^{WN}	**(X)** Xij^{WR}	Fik^{WN}	**(XI)** 0	(Mi^{WN})	Fik^{WR}	**(XII)** 0	(Mi^{WR})	**0**
GVA	1 : p : 4	**(XIII)** Vpj^{N}	**(XIV)** Vpj^{R}	0	**(XV)** 0	MDT^{N}	0	**(XVI)** 0	MDT^{R}	**GDP**
GI=GO		$\mathbf{Xj^{N}}$	$\mathbf{Xj^{R}}$	$\mathbf{\Sigma Fk^{N}}$	$\mathbf{\Sigma E^{N}}$	$\mathbf{\Sigma (M^{N})}$	$\mathbf{\Sigma Fk^{R}}$	$\mathbf{\Sigma E^{R}}$	$\mathbf{\Sigma (M^{R})}$	

Abbreviations: NCR: National Capital Region — GO: Gross Output
ROP: Rest of the Philippines — GI: Gross Input
ROW: Rest of the World — GDP: Gross Domestic Product
GVA: Gross Value Added — MDT: Import Duties and Taxes

The balance equations, in matrix notations, can be formed from Figure 1, as follows:

$$Xi^{N} = Xij^{NN} + Xij^{NR} + Fik^{NN} + Ei^{NW} + Fik^{NR} \qquad (1)$$

$$Xi^{R} = Xij^{RN} + Xij^{RR} + Fik^{RN} + Fik^{RR} + Ei^{RW} \qquad (2)$$

where:

Xi^{N} : vector of NCR outputs
Xij^{NN} : matrix of NCR product i consumed by NCR production sector j
Xij^{NR} : matrix of NCR product i consumed by ROP production sector j
Fik^{NN} : matrix of NCR product i consumed by NCR domestic final demand k
Ei^{NW} : vector of NCR export of product i to ROW
Fik^{NR} : matrix of NCR product i consumed by ROP domestic final demand sector k
Xi^{R} : vector of ROP outputs
Xij^{RN} : matrix of ROP product i consumed by NCR production sector j;
Xij^{RR} : matrix of ROP product i consumed by ROP production sector j
Fik^{RN} : matrix of ROP product i consumed by NCR domestic final demand sector k:

Fik^{RR} : matrix of ROP product i consumed by ROP domestic final demand sector k
Ei^{RW} : vector of ROP export of product i to ROW

Based on Leontief's assumption of linearity in production cost functions, i.e. aij = xij/xj, we have the following regionally-defined structural equations:

$$A^{NN} = X^{NN} / X^{N} \quad (3)$$
$$A^{NR} = X^{NR} / X^{R} \quad (4)$$
$$A^{RN} = X^{RN} / X^{N} \quad (5)$$
$$A^{RR} = X^{RR} / X^{R} \quad (6)$$

Equations (3) and (6) represent the intra-regional direct input coefficients, while equations (4) and (5) account for the inter-regional trade coefficients. Substituting these structural equations into equations (1) and (2), we have:

$$X^{N} = A^{NN} X^{N} + A^{NR} X^{R} + F^{NN} + E^{NW} + F^{NR} \quad (7)$$
$$X^{R} = A^{RN} X^{N} + A^{RR} X^{R} + F^{RN} + F^{RR} + E^{RW} \quad (8)$$

Simplifying equations (7) and (8), we have the Leontief's estimating equation for a 2-region inter-regional I-O model, in matrix form:

$$\mathbf{X} = \mathbf{B} * \mathbf{F} \quad (9)$$

where: X is the matrix of total output requirements; B is the matrix of inter-regional inverse coefficients , further decomposed into sub-matrices Bnn, Brr, Bnr and Brn; and F is the matrix of final demand.

$$\text{Bnn} = \left[I - A^{NN} - A^{NR}\left(I - A^{RR}\right)^{-1} A^{RN}\right]^{-1} \quad (10)$$

$$\text{Brr} = \left[I - A^{RR} - A^{RN}\left(I - A^{NN}\right)^{-1} A^{NR}\right]^{-1} \quad (11)$$

$$\text{Bnr} = A^{NR}\left(I - A^{RR}\right)^{-1} \quad (12)$$

$$\text{Brn} = A^{RN}\left(I - A^{NN}\right)^{-1} \quad (13)$$

where the A's are the input coefficient matrices in the inter-regional table; N and R refer to NCR and ROP, respectively.

IV-2. Methodology Employed

The hybrid approach of constructing regional I-O tables was adopted in this bi-region (NCR-ROP) IRIO study. This alternative method, which is a blending of survey and non-survey methods of I-O compilation, was followed in view of the availability of regional survey data for CY 1994 as the chosen reference period. The hybrid method starts with the compilation of the intra-regional tables of the competitive type by utilizing primary as well as secondary data. These include, among others, such major data sources as the 1994 Census of Establishments (1994 CE), the 1994 ad hoc I-O Survey of Establishments (IOSE) and the 1994 Family Income and Expenditure Survey (1994 FIE) . Their availability made possible the building of intra-regional structures on sectoral outputs and inputs as well as final expenditure patterns, given official time series data on regional gross domestic product (GRDP) and expenditure (GRDE) estimates serving as the control totals.

The second phase of the overall compilation work involved the conversion of the resulting competitive intra-regional table into a non-competitive type wherein distinction is made between regionally produced and non-regionally produced goods and services. Non-regionally produced commodities refer to imports either from abroad or from the other regions of the domestic economy or domestic inflows. The competitive-to-noncompetitive conversion process therefore requires the construction of two supporting tables, one for (foreign) imports and another to account for domestic inflows.

In view of the lack of existing data on foreign and domestic flows at the sub-national level, an indirect estimation technique was adopted in compiling the supporting tables on foreign and domestic inflows.

<u>Indirect Estimation of (Foreign) Import Flows</u>

The first step was to build the foreign imports table consisting of Blocks IX to XII as shown in Figure 1. Estimation of regional imports utilized import content ratios derived from the national I-O table on the assumption that consumption of imported commodities by regional sectors, whether intermediate or final, follows the same import usage pattern of corresponding national sectors. For the NCR I-O table, its foreign import content is estimated as:

$$X_{ij}^{WN} \quad = \quad m_{ij}^{WP} \,.\, {}^{C}X_{ij}^{NN} \qquad (14)$$

where: X_{ij}^{WN} is estimated import value of NCR product i consumed by NCR sector j;
m_{ij}^{WP} is import content ratio of national product i consumed by national sector j;
${}^{C}X_{ij}^{NN}$ is competitive input value of NCR product i consumed by NCR sector j.

The same equation (14) is used in estimating the imports table for ROP.

The second step was to estimate domestic inflows using the well-known simple location quotient (SLQ) method.

Indirect Estimation of Domestic Flows: The SLQ Method

The SLQ method assumes that the needs of region *r* for output *i* in each industry relative to the needs for output *i* in each of these industries nationally are the same as the ratio of the total regional to the total national output. In its equation form, the SLQ of product i in region R is calculated as:

$$SLQ_i^R \quad = \quad Q_i^R/T^R \; / \; Q_i^N/T^N \qquad (15)$$

where: Q_{ri} : output of industry i in region r;

Q_{ni} : output of industry i in the Nation;

T_r : total output in region r;

T_n : total output in the Nation.

An SLQ is one measure of the region's self-sufficiency in production. Thus, from equation (15), if SLQi is less than unity, the region imports some of product i elsewhere from other regions. On the other hand, if SLQi is greater than 1.0, the region exports some of its industry's output. If SLQi is equal to 1.0, the region is viewed as self-sufficient with respect to output i.

In this study, SLQs are used to estimate inter-regional domestic inflows. These are applied along the rows of the intra-regional table generated in step 1 (i.e. non-competitive with respect to foreign imports) for sectors with SLQs of less than unity. That is, for the NCR economy,

$$X_{ij}^{RN} = SLQ_i^N \,.\, {}^{ncm}X_{ij}^{NN} \qquad (16)$$

where: X_{ij}^{RN} is the value of ROP's commodity i produced by its sector j consumed by NCR's sector j in production; SLQ_i^N is the calculated SLQ of product i in NCR; and ${}^{ncm}X_{ij}^{NN}$ is the value of commodity i (net of foreign imports) consumed by NCR's sector j in production.

If SLQ_i is greater than or equal to 1.0, equation (16) is not applied because the region is assumed to be self-sufficient and therefore no domestic imports are needed. The resulting NCR's domestic inflows are recorded in block V (intermediate demand) and block VII (final demand). Similarly, ROP's inflows are reflected in block II (intermediate) and block IV (final).

In a 2-region IRIO model, domestic outflows need not be explicitly calculated because domestic inflows of one region are the domestic outflows of partner region. For example, block II (NCR's outflow to ROP's intermediate demand) should equal the estimated intermediate inflow matrix of ROP. Obviously, however, this equality do not hold true in a multi-region (say, 5-region) IRIO compilation, thus underscoring the need for indirect estimation of inter-regional trade (outflow and inflow) coefficients in the absence of actual trade flow data.

Blocks I, III, VI and VIII record the intra-regional consumption structures of regionally produced goods and services. Vectors E (exports) are independently estimated using indicators available from the Census of Establishments.

As in national I-O compilation, the final step is the balancing or "arbitraging" work that involves reconciling the inherent economic accounting identities, i.e. (1) total output of sector i (in the rows) should equal to total input of sector j (in the columns) where i = j, and (2) total GVA (or GRDP) = total final demand (or GRDE). Moreover, prime consideration should be given in maintaining numerical consistency between the generated IRIO table and the national I-O table.

IV-3. Distinction Between Hybrid & Single Non-Survey Technique

SLQ Method of Regionalizing National I-O Coefficients

The widely used non-survey technique of producing regional I-O tables is the SLQ method. It is one expedient, single-step method of regionalizing nationalizing I-O coefficients. In equation form,

$$\mathbf{a^r_{ij} = SLQ^r_i \,.\, a^n_{ij}} \tag{17}$$

where: a^r_{ij} is the ratio of product i consumed by industry j in region r; a^n_{ij} is national input ratio of product i consumed by industry j; and

$$SLQ^r_i = \begin{cases} SLQ^r_i \text{ if } SLQ^r_i < 1.0 \\ 1.0, \text{ if } SLQ^r_i \geq 1.0 \end{cases}$$

In this case study, the estimation of SLQs using equation (15) was based on available data on regional gross outputs. On the other hand, data on regional employment by industry, which are normally generated more timely than output statistics, could be used as proxy indicators of regional economic activity. It can be observed from equation (15) that in those cases where SLQi is less than 1.0, arij is less than anij for all j industries. The positive difference is a measure of the extent of importing the ith sector's output and this is transferred to the import row of the non-competitive-type of I-O table. If SLQi is greater than or equal to 1.0, then arij and anij are equal, and the region is assumed to be self-sufficient with respect to output i. As an illustration, a hypothetical 3-sector national I-O coefficient table (Table 1) is shown below with calculated regional SLQs. And using equation (17), the following table of input coefficients for Region R is generated (Table 2) In Table 2, cell entries for row and column sectors (1, 2, 3) represent region R's input coefficients of locally or regionally produced goods and services. Imports row represent (foreign + domestic) imported inputs required in production.

It can be observed from Tables 1 and 2 that, while their respective cell elements differ due to the SLQ adjustment process, total intermediate input (TII) coefficients in both regional and national tables remain to be equal. Hence, there exist no technology differentials in terms of total intermediate input consumption between national and regional industries. In effect, regional and national GVA ratios are also equal.

One glaring advantage of the single-step SLQ approach is that it is a simple and fast method and therefore less costly than the survey and hybrid methods. Its accuracy depends on the reliability of the estimated regional SLQs. On the other hand, one disadvantage of the SLQ method is that, since it deals only with regionalizing national I-O coefficients, it is constrained by its inability to generate a full regional I-O table, unlike in the hybrid approach.

***Table 1*. National Input Coefficients and Region R's SLQs**

SLQ^R		1st Industry	2nd Industry	3rd industry
1.2	1	0.10	0.30	0.10
0.6	2	0.25	0.15	0.10
1.0	3	0.05	0.15	0.20
	TII	0.40	0.60	0.40

TII = total intermediate inputs

***Table 2*. Generated Input Coefficients for Region R I/O Table**

	1st Industry	2nd Industry	3rd industry
1	0.10	0.30	0.10
2	0.15	0.09	0.06
3	0.05	0.15	0.20
Imports	0.10	0.06	0.04
TII	0.40	0.60	0.40

Table 3 summarizes the distinction between the hybrid and non-survey method of producing regional I-O tables. It can be observed that the only unique distinction between the hybrid and the non-survey methods is in the generation of the competitive type of regional tables. The hybrid approach used actual regional data, while the non-survey method adopts the national I-O coefficients as the first approximation of the production structure of the region under study. It can thus be concluded that, with actual regional data on hand, the hybrid method is able to portray regional variations in sectoral input structures in the compilation of the basic tables, unlike in the non-survey method wherein structure of regional technology is "borrowed" from the national I-O table.

Table 3. Distinction Between Hybrid and Non-Survey Methods

Procedure	**Output Tables**	**Methodology**	
		Hybrid (HB)	**Non-Survey (NS)**
STEP I Compilation of Single Region IO table (Metro-Manila, Rest of Philippines)	1. Competitive Table	Used actual regional data	Adopted national I-O coefficients
	2. Foreign Imports Table	Used national import content coefficients	Adopted national import content coefficients
	3. Non-competitive Table (net of foreign imports)	Output 1 minus Output 2	Adopted national I-O coefficients
STEP II Estimation of inter -regional commodity flow	4. Domestic Inflow Table	Used SLQ method	Used SLQ method
STEP III Integration and compilation of Inter-Regional IO	5. Non-competitive (net of foreign imports & domestic inflows)	Output 3 minus Output 4 (In values & coefficients)	Output 3 minus Output 4 (In coefficient form only)

Generation of Outputs 2 through 5 follows similar estimation procedures for both methods but with different numerical results because these are derived from the basic tables (competitive) that emanated from different sources.

V. Output Multipliers Generated Under Hybrid & Single Non-Survey Methods

Shown in Table 4 below is a comparison of calculated total (direct plus indirect) output multipliers based on the hybrid (HB) and non-survey (NS) methods, respectively. Total output multipliers are the total output requirements induced by a unit increase in final demand and these are the column sums of their respective inverse coefficient matrices. The HB inverse matrices were calculated based on the full intra-regional I-O tables for NCR and ROP constructed using the HB approach, while the NS inverses were computed from the regional coefficients derived using the SLQ-based non-survey technique as described and illustrated in section IV-3.

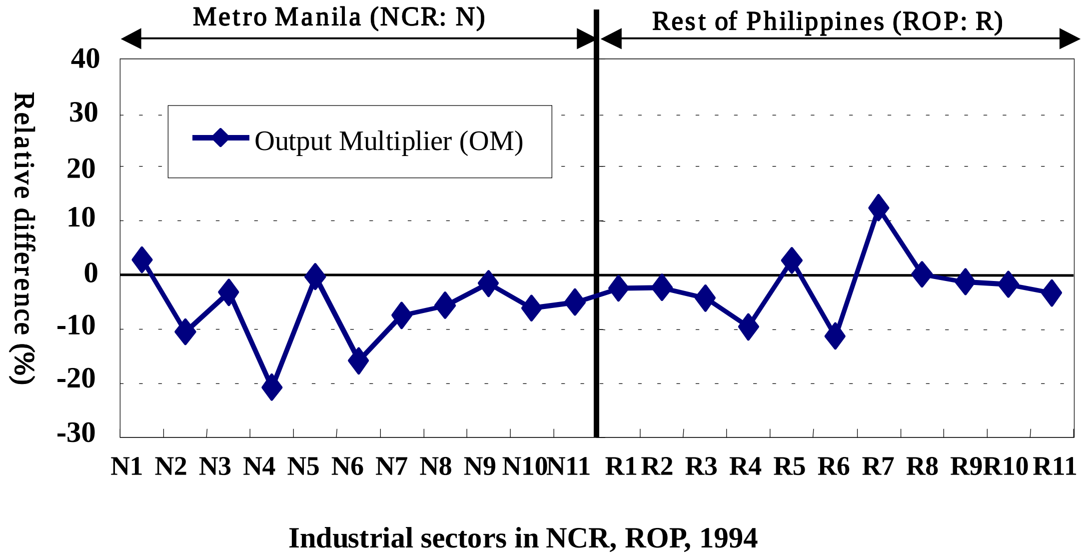
It can be observed from Table 4 and illustrated in Figure 2 that, at the 11-major sector level of classification, it appears that, in the NCR, HB-based output multipliers in all sectors except agriculture, fishery and forestry (sector 1) are relatively lower (negative signs) than non-survey-based with the encircled sectors electricity, gas and water (sector 4), trade (6) and mining (sector 2) exhibiting double-digit negative differentials. Or alternatively, NS-based multipliers are observed be overstated.

One probable reason for the overstatement of NS multipliers is the use of national input coefficients as proxies to regional input structures. For example, the electricity, gas and water sector in the NCR registered an HB-based multiplier much lower than the NS-based (HB=1.167 vs. NS=1.471) because production in these sectors is predominantly carried out outside of the NCR or the Metro Manila area. The NCR economy is therefore a net importer of these utility services; hence its actual regional input coefficient should be expected to be lower than the national average coefficient used in the initial approximation of NS-based regional coefficients.

***TABLE 4.* COMPARISON OF TOTAL OUTPUT MULTIPLIERS: HB vs. NS, 1994**

SECTOR		NCR			ROP		
CODE	DESCRIPTION	HB	NS	Relative Difference (%)	HB	NS	Relative Difference (%)
1	Agriculture, fishery & forestry	1.243	1.209	**2.8**	1.305	1.338	**-2.5**
2	Mining & quarrying	1.292	1.443	**-10.5**	1.419	1.452	**-2.3**
3	Manufacturing	1.323	1.367	**-3.2**	1.545	1.615	**-4.3**
4	Electricity, gas, steam & water	1.167	1.471	**-20.7**	1.362	1.507	**-9.6**
5	Construction	1.361	1.365	**-0.3**	1.414	1.377	**2.7**
6	Trade	1.302	1.548	**-15.9**	1.377	1.551	**-11.2**
7	Transport, Storage & Communication	1.288	1.393	**-7.5**	1.563	1.390	**12.5**
8	Finance	1.233	1.306	**-5.6**	1.282	1.281	**0.1**
9	Real Estate & Ownership of Dwellings	1.130	1.147	**-1.5**	1.147	1.161	**-1.2**
10	Other Private Services	1.379	1.468	**-6.1**	1.497	1.522	**-1.6**
11	Government Services	1.308	1.377	**-5.0**	1.304	1.349	**-3.3**

Figure 2. **Relative Differences of Output Multipliers: Hybrid vs. Non-Survey Method**



In the ROP, HB-based multipliers are observed to be also lower than the NS-generated except for construction (5), transport, storage and communication (7), and finance (8) with the encircled sector of trade (6) registering a double-digit negative difference.

It can thus be inferred from the above findings that the use of national I-O coefficients as initial approximations of regional coefficients tends to overstate the resulting total output multiplier effects.

VI. Concluding Remarks

The hybrid approach, as the tradeoff between the survey and non-survey methods, was used in this study in view of the available, albeit limited, data required in compiling the 1994 regional I-O tables. It has been propounded that the only unique distinction between the hybrid method adopted in this study and the single-step, non-survey technique lies in the building of the basic tables, i.e. the regional input structures of the competitive type. While the hybrid approach utilizes actual regional I-O data, the non-survey method relies on national I-O coefficients as proxies to regional input structures.

A comparative assessment was further conducted of the empirical results using the hybrid and the non-survey methods. It has been inferred in this study that, on the assumption that actual regional data used in the hybrid approach are reliable, the use of national coefficients as initial approximations of regional input structures tends to overstate the total output multipliers.

<u>Limitations of Hybrid Technique Used in Terms of Data Quality</u>

1) Due to lack of actual survey data on inter-regional flows that conform to the conceptual framework of I-O accounting, i.e. the producer-to-user concept, the indirect SLQ method of measuring inter-regional trade was adopted.

2) Due to absence of data on (foreign) imports at the regional level, national import content ratios were used in building the imports table on the assumption that regional sectors follow the same import consumption pattern as the national sectors.
3) The building of detailed I-O structures is constrained by the limited scope and coverage of the ad hoc I-O survey for the national I-O, which is basically a small, purposive sample survey. It therefore underscores the need to improve the sampling design and spatial coverage of the survey.

Recommended Future Directions

Given the above major constraints of the hybrid approach adopted in this study, the following major statistical activities should be conducted to improve the adequacy and reliability of intra-regional and inter-regional I-O table compilation in the Philippines:

1) Study to regionalize data collection/processing of foreign trade;
2) Conduct of ad hoc survey on inter-regional trade, given the I-O framework;
3) Improvement of the survey design of I-O ad hoc survey of establishments (IOSE) to be able to generate detailed I-O indicators at the regional level; and
4) To be able to conduct inter-temporal analysis, timely updating of regional I-O tables should be carried out.

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ANNEX A-1. REGIONAL COMPOSITION OF THE PHILIPPINES

<table>
<tr><th colspan="3">REGION</th><th>PROVINCES/CITIES COVERED</th></tr>
<tr><td colspan="3">NATIONAL CAPITAL REGION
(METRO MANILA)

(NCR)</td><td>1. MANILA
2. QUEZON CITY
3. PASAY CITY
4.. KALOOKAN CITY
5. MAKATI CITY
6. MANDALUYONG CITY
7. PASIG CITY
8. MARIKINA CITY
9. VALENZUELA CITY
10. PARANAQUE CITY
11. LAS PINAS CITY
12. MUNTINLUPA CITY
13. PATEROS
14. TAGUIG
15. SAN JUAN
16. MALABON
17. NAVOTAS</td></tr>
<tr><td rowspan="6">REST

OF

PHILIPPINES

(ROP)</td><td>CAR</td><td>CORDILLERA</td><td>ABRA
BENGUET
IFUGAO
KALINGA
MOUNTAIN PROVINCE
APAYAO</td></tr>
<tr><td>I</td><td>ILOCOS REGION</td><td>ILOCOS NORTE
ILOCOS SUR
LA UNION
PANGASINAN</td></tr>
<tr><td>II</td><td>CAGAYAN VALLEY</td><td>BATANES
CAGAYAN
ISABELA
NUEVA VIZCAYA
QUIRINO</td></tr>
<tr><td>III</td><td>CENTRAL LUZON</td><td>BATAAN
BULACAN
NUEVA ECIJA
PAMPANGA
TARLAC
ZAMBALES</td></tr>
<tr><td>IV</td><td>SOUTHERN TAGALOG</td><td>BATANGAS
CAVITE
LAGUNA
MARINDUQUE
OCCIDENTAL MINDORO
ORIENTAL MINDORO
PALAWAN
QUEZON
RIZAL
ROMBLON
AURORA</td></tr>
<tr><td>V</td><td>BICOL REGION</td><td>ALBAY
CAMARINES NORTE
CAMARINES SUR
MASBATE
SORSOGON</td></tr>
</table>

ANNEX A-2. REGIONAL COMPOSITION OF THE PHILIPPINES (Continued)

REST OF PHILIPPINES (ROP)	VI	WESTERN VISAYAS	AKLAN ANTIQUE CAPIZ ILOILO NEGROS OCCIDENTAL GUIMARAS
	VII	CENTRAL VISAYAS	BOHOL CEBU NEGROS ORIENTAL SIQUIJOR
	VIII	EASTERN VISAYAS	EASTERN SAMAR LEYTE NORTHERN SAMAR SAMAR (WESTERN SAMAR) SOUTHERN LEYTE BILIRAN
	IX	WESTERN MINDANAO	BASILAN ZAMBOANGA DEL NORTE ZAMBOANGA DEL SUR
	X	NORTHERN MINDANAO	BUKIDNON CAMIGUIN MISAMIS OCCIDENTAL MISAMIS ORIENTAL
	XI	SOUTHERN MINDANAO	DAVAO (DAVAO DEL NORTE) DAVAO DEL SUR DAVAO ORIENTAL SOUTH COTABATO SARANGANI COMPOSTELA VALLEY
	XII	CENTRAL MINDANAO	LANAO DEL NORTE COTABATO (NORTH COTABATO) SULTAN KUDARAT COTABATO/MARAWI CITIES
	XIII	CARAGA	AGUSAN DEL NORTE AGUSAN DEL SUR SURIGAO DEL NORTE SURIGAO DEL SUR
	ARMM	AUTONOMOUS REGION IN MUSLIM MINDANAO	LANAO DEL SUR MAGUINDANAO SULU TAWI-TAWI

ANNEX B-1. SECTOR CLASSIFICATION SCHEME

11-SECTOR CLASSIFICATION		84-SECTOR CLASSIFICATION		229-SECTOR
Code	**Description**	**Code**	**Description**	**NATIONAL IO CODES**
PRODUCTION SECTORS:				
01	**AGRICULTURE FISHERY AND FORESTRY**	**01**	Palay (paddy)	001
		02	Fruits	005-009
		03	Other edible crops	002-004;010-011;015-016
		04	Non-edible crops	012-014;017-018
		05	Agricultural services	024
		06	Dairy farming and livestock raising	019-023
		07	Fishing	025-026
		08	Forestry	027
02	**MINING AND QUARRYING**	**09**	Coal mining	033
		10	Crude petroleum and natural gas	034
		11	Metal ore mining	028-032
		12	Non-metal ore mining and quarrying	035-037
03	**MANUFACTURING**	**13**	Meat and meat products	038-039
		14	Dairy Products	040-043
		15	Rice & corn, flour & bakery products	050-053
		16	Sugar, chocolates & sugar confections	054-055
		17	Fish preparations	045-046
		18	Oil and fats	047-049
		19	Animal feeds	059
		20	Coffee and tea, processed	058
		21	Other food manufactures	044;056-057;060-062
		22	Beverages	063-065
		23	Tobacco products	066-068
		24	Spinning and weaving	069
		25	Knitting	070
		26	Wearing apparel & other fabricated textiles	071-081
		27	Timber and wooden products	085-092
		28	Wooden furnitures	093-095
		29	Pulp, paper & paper products	096-098
		30	Printing and publishing	099-101
		31	Leather and leather products	082-084
		32	Basic industrial chemicals	102
		33	Fertilizers	103
		34	Pesticides	105
		35	Drugs and medicines	107
		36	Soap, detergent and toiletries	108-109
		37	Other chemicals and chemical products	104;106;110
		38	Plastic products	116
		39	Rubber products	113-115
		40	Petroleum refineries	111
		41	Coke and other petroleum and coal products	112
		42	Pottery, china and earthenware	117
		43	Glass and glass products	118-120
		44	Cement manufacture	121
		45	Other non-metallic mineral products	122-124
		46	Iron and steel	125
		47	Iron and steel products	126
		48	Non-ferrous metal products	127-128
		49	Fabricated metal products	129-136
		50	Non-electrical machinery and equipment	137-142
		51	Household electrical appliances	144;147
		52	Other electrical machinery, apparatus and parts	143;145-146;148-151
		53	Motor vehicles	152
		54	Motorcycles, bicycles and parts	153-155
		55	Shipbuilding and repairing	156
		56	Other transport equipment	157
		57	Precision instruments	158-160; 165
		58	Metallic furniture	161
		59	Other manufactured products	162-164;167-169

ANNEX B-2. SECTOR CLASSIFICATION SCHEME (Continued)

04	**ELECTRICITY, GAS AND STEAM AND WATER SERVICES**	**60**	Electricity generation and distribution	171
		61	Gas and steam	172
		62	Waterworks and supply	173
05	**CONSTRUCTION**	**63**	General building construction	}
		64	General engineering construction	} 170
		65	Special trade construction	}
06	**TRADE**	**66**	Wholesale and retail trade	174
07	**TRANSPORTATION, STORAGE AND COMMUNICATION**	**67**	Railway transport services	175
		68	Road transport	176-180
		69	Water transport	181-182
		70	Air transport	184
		71	Storage & other transport-related services	183;185-187
		72	Postal and telecommunication services	188-190
08	**FINANCE & INSURANCE**	**73**	Financial and insurance services	191-195
09	**REAL ESTATE & OWNERSHIP OF DWELLINGS**	**74**	Real estate services	196-197
		75	Ownership of dwellings	198
10	**PRIVATE SERVICES**	**76**	Restaurants & other eating & drinking places	224
		77	Hotels and other lodging places	225-226
		78	Business services	119-207
		79	Minor repair of motor vehicles	218
		80	Miscellaneous repair services	219
		81	Private education services	209
		82	Private health services	210-211
		83	Other private services	208;212-217;220-223
11	**GOVERNMENT SERVICES**	**84**	Government services	227-229
FINAL DEMAND SECTORS:				
PCE		**PCE**	Private Consumption Expenditures	PCE
GCE		**GCE**	Government Consumption Expenditures	GCE
GFCF		**GFCF**	Gross Fixed Capital Formation	GFCF
CS		**CS**	Change in Stocks (Inventories)	CS
FXP		**FXP**	Foreign Exports	E
FMP		**FMP**	Foreign Imports	M
DXP		**DXP**	Domestic Exports	***
DMP		**DMP**	Domestic Imports	***
VALUE ADDED SECTORS:				
CE		**CE**	Compensation of Employees	CE
DPN		**DPN**	Depreciation	DEP
IT-S		**IT-S**	Indirect Taxes less Subsidies	IT-S
OVA		**OVA**	Other Value Added	OVA