Source of Inter-Regional Economic Differentials: DPG Analysis of the Economies of Metro Manila and the Rest of Philippines, 1994

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1. INTRODUCTION

Some of the current major problems facing Metro Manila policies are persistence of increasing urban population, urban unemployment and under-employment, environmental pollution, among others. These phenomena are **typical** examples that are prevalent in urban areas of developing countries. These occur because of inter-regional differentials in **socio**-economic structures.

Identification and assessment of the composition of structural differences of regional economies in the Philippines is very important for regional development planning and policy formulation. One such effective analytical tool is the DPG (Deviation from Proportional Growth) Index Analysis. It is one structural decomposition analysis method as proposed by Chenery (1960) using the Input Output approach. DPG measures the degree of inter-regional differentials in the composition of sectoral production in terms of the concept of deviations from proportional differences in the production scale.

Since its formulation by Chenery (1960), many applications of growth factor analysis in developed countries have been demonstrated (please see Fujikawa (1992), Akita (1992), JJ.M. Guilhato, and G J.D. Hewings, et al (2001), Akita (2002)). On the other hand, because of data limitations or for some other reasons, only few studies on differential factor decomposition analysis have been attempted except in Fujikawa (1999). Especially in developing countries where the lack of regional income data and/or regional IO accounts is the main constraint, a comprehensive research to observe the source of Inter-Regional Economic Differentials between Urban and Rural is therefore hardly feasible.

This study shows the effectiveness of the DPG approach in the quantitative measurement and analysis of typical variations in economic structures between regions, based on Fujikawa's model as applied to Japanese intra-regional IO tables. Specifically, this paper attempts to examine the causes of observed differentials in the sector composition of production between urban (Metro Manila) and rural (Rest of the Philippines). This study is primarily based on available intra-regional input-output (IO) tables that were specially compiled for Metro Manila and the Rest of the Philippines by JSPS Project-Manila.
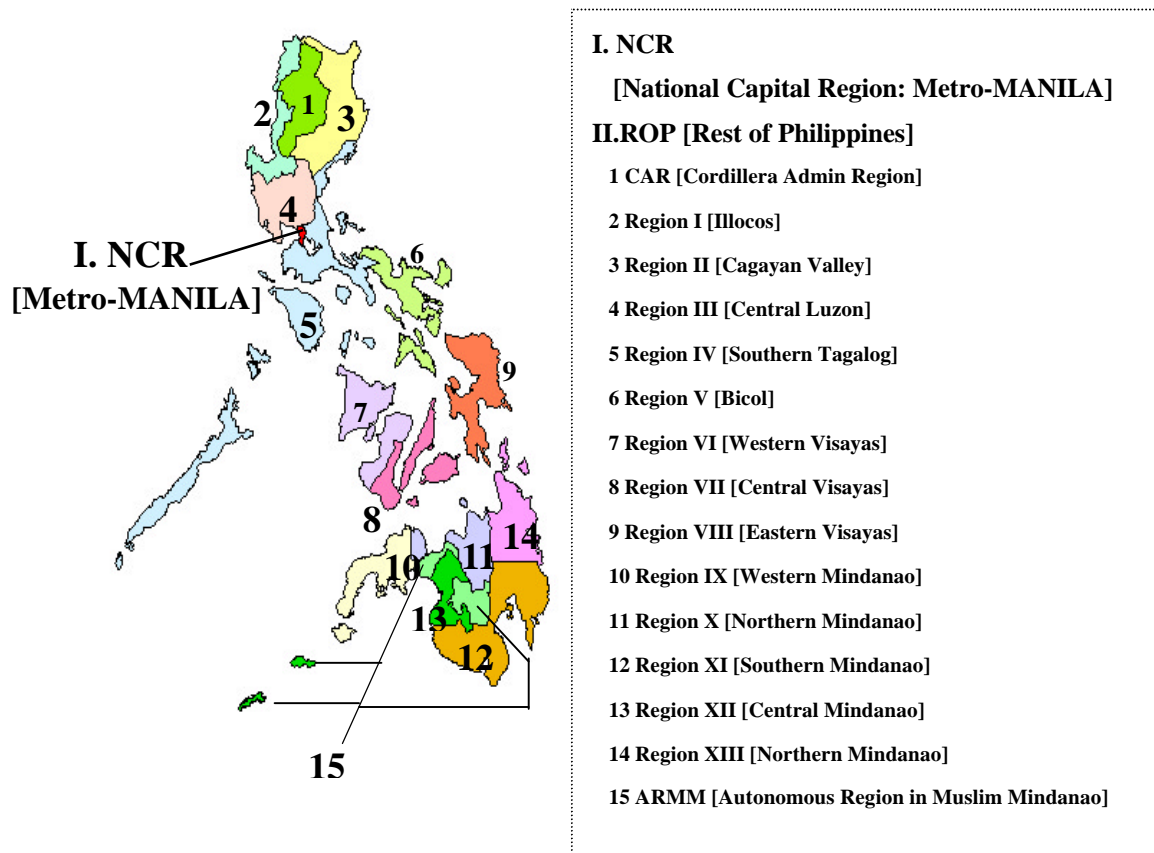
In this paper, time series data on the country's socio-economic indicators at the national and regional level alike are presented in Chapter 2. In Chapter 3, the configuration of

inter-regional economic differentials based on rate share analysis utilizing time series indicators is shown. The methodology and the results DPG analysis are described and analyzed in Chapter 4. The last chapter offers some summary perspectives.

2. CHARACTERISTICS OF REGIONAL ECONOMIES OF METRO MANILA & REST OF THE PHILIPPINES

2-1. Geography and Population

The Philippines is situated at latitude 4.23 to 21.25 degrees north and 116 to 126 degrees east. It consists of more than 7,000 islands with a total land area of approximately 300,000 square kilometers, which is about 80% of Japan's total land area. The largest island is Luzon covering 100.5 thousand km^2, followed by Mindanao Island with a total land area of 90.5 thousand km^2. Metro Manila is one of the country's 16 administrative regions. For the purpose of this study, the regions were regrouped into two (2) study areas namely: (1) Metro Manila or the National Capital Region (NCR) and (2) Rest of the Philippines (ROP) that lumps the other 15 regions. Shown in figure 1 is the regional composition of the study areas.

I. NCR
  [National Capital Region: Metro-MANILA]
II.ROP [Rest of Philippines]
  1 CAR [Cordillera Admin Region]
  2 Region I [Illocos]
  3 Region II [Cagayan Valley]
  4 Region III [Central Luzon]
  5 Region IV [Southern Tagalog]
  6 Region V [Bicol]
  7 Region VI [Western Visayas]
  8 Region VII [Central Visayas]
  9 Region VIII [Eastern Visayas]
  10 Region IX [Western Mindanao]
  11 Region X [Northern Mindanao]
  12 Region XI [Southern Mindanao]
  13 Region XII [Central Mindanao]
  14 Region XIII [Northern Mindanao]
  15 ARMM [Autonomous Region in Muslim Mindanao]

Figure 1. Regional Composition of Metro-Manila & Rest of the Philippines

In 1994, the total population of the Philippines was 67.2 million people. It population density of 224 persons per km^2 is about 67.7% of Japan's population density of 330.7 persons/km^2.

The NCR recorded a population of 8.78 million people in 1994, living in a land area of 636 km^2. Its population density of 13,798.7 persons per km^2 is approximately 2.6 times higher than Tokyo's (5,384 persons/km^2) and 79% of Seoul's (17,491 persons/km^2). On the other hand, the population density of ROP was estimated to be 198.8 persons per km^2 in 1994, which is about 66% of the Rest of Japan's (ROJ's) population density (300 persons/km^2), and 57.7 % of Rest of Korea's (ROK's) density (345 persons/km^2).

It can be observed that there exists a huge inter-regional differential in terms of population density between urban (as represented by NCR or Metro Manila) and rural (as represented by ROP). NCR's population density is calculated to be 69.4 times more than ROP's. This is about 3.87 and 1.37 times the population density differentials of Japan (Tokyo/Rest of Japan) and Korea (Seoul/Rest of Korea), respectively. NCR's population, which accounts for 13.1% of the country's total population, is concentrated on only 0.2% of the nation's total land area.

2-2 Economic Indicators

Table 1(See Annex A) compares Metro-Manila (NCR) with Rest of Philippines (ROP) as a whole in terms of major socio-economic indicators for the period of 1975-94. The following are some of the characteristics of regional economies in the Philippines.

Firstly, the gross regional domestic product (GRDP) of NCR accounted for about 30% of the nation's GDP in 1994, much larger than its population share of 13.1 %. Between 1975 and 1994, NCR's GRDP had increased 1.72 times, slightly higher than ROP's increase of 1.68 times. It is also interesting to note that income disparity between NCR and ROP, as measured by per capita income, appeared to have widened from 2.07 times (1988's) to 2.23 times (1994's).

Secondly, a closer look at the composition of GRDP by sector shows that, in relation to national GDP shares, the increase in NCR's GRDP is largely due to the services sector whose contribution had increased by 5.2 % of national GDP in 20 years, while the industry sector's contribution had decreased by 7.7%. In ROP, the trend is reversed with its industry sector's share increasing by 7.7% and services share decreasing by 5.2%. At the 3-sector level of aggregation, the share of the services sector to NCR's GRDP in 1994 increased by 13.6%, resulting in the decline of the industry sector's share by the same value. (In NCR, the contribution of the primary sector (Agriculture, Fishery and Forestry) is very negligible.). In ROP, GRDP shares in the industry and services sectors increased by 1.9% and 2.2%, respectively, at the expense of the primary sector with a 4.1% share decline.

Thirdly, in the case of growth trends in labor employment, Table 1 shows that NCR's total labor population increased 1.9 times from 1.55 million in 1975 to 2.97 million persons in 1994. ROP's total labor population in 1994 numbering 22.19 million persons is 2.48 times that in 1975. By sector, labor population in NCR's industry sector had increased 1.6 times between 1975 and 1994, while that in the services sector by 2.06 times. In ROP, the primary sector's (Agriculture, Fishery, Forestry) labor population increased 2.05 times from 1975 – 1994, the industry sector by 2.9 times, and the services sector by 3.29 times.

Table 1 (see Annex A) also present labor productivity indexes which are calculated as ratios of GDP to labor. It can be observed that labor productivity in all sectors in both regions had decreased since 1980. This observation is notably glaring during the period between 1980 and 1988 when the Philippine economic environment was unstable, resulting in a severe drop of ROP's average labor productivity in 1988 by about 60 % of its 1980 figure.

From the viewpoint of comparative advantages of labor productivity, NCRs Location Quotient (LQ; NCR / Philippines) of average labor productivity had increased from 1.99 or 199% to 2.53 (or 253%). By sector, LQ of the service sector's labor productivity in NCR rose by 1.62 times from 1975-1994, while that of industry by 1.27 times. On the other hand, ROPs LQ of average labor productivity had decreased from 0.827 or 82.7% to 0.794 (or 79.4%). LQs of labor productivity in ROP's service and industry sectors had declined during the period under study by 0.815 and .97 times, respectively.

From the final expenditure side, the composition of regional Gross Domestic Expenditures (GDE), which is equal to GDP as estimated from the production side, is presented in Table 2. It can be gleaned from the table that personal consumption expenditure (PCE), which traditionally accounts for the biggest share of GDE, had been on the uptrend in both regions since 1975. In the NCR, PCE represent 66.2% of total GDE in 1994, up from 57.5% share in 1975. In the ROP, PCE's share increased from 79.6% in 1975 to 83.4% in 1994. It can be observed that these upward trends in PCE shares are attributed to sharp declines in the contribution of net exports (exports less imports). These decreases are more pronounced in NCR where net export share had drastically dropped from 0.6% in 1975 to –15.8 in 1994 from a lower –16.7% share in 1988. In ROP, its share decreased from 0.6% in 1975 to –7.6% in 1994. At the national level, net exports account for –10.0% of national final demand in 1994 from 0.6% in 1975. It should therefore be noted that the Philippine economy has lately become a net importer from a net exporter in the 1970s.

Table 2. Components of Gross Domestic Expenditure (share;%)

	NCR[Metoro-Manila]			ROP[Rest of philippines]			Philippines			
Economic Indicatior	1988	1990	1994	1988	1990	1994	1988	1990	1994	
1. Personal Consumption Expenditure	57.5	60.9	66.2	79.6	79.5	83.4	73.0	73.8	78.3	
2. Government Consumption	14.3	14.3	13.9	4.7	5.1	5.7	7.6	7.9	8.1	
3. Capital Formation	27.7	41.5	35.7	15.0	16.2	18.5	18.8	24.0	23.6	
A. Fixed Capital	25.9	40.7	35.3	14.6	15.0	17.8	18.0	22.9	23.0	
1. Construction	12.1	11.1	10.2	7.5	10.6	9.2	8.9	10.7	9.5	
2. Durable Equipment	13.5	29.3	24.8	5.0	2.4	6.6	7.5	10.7	12.0	
3. Breeding Stock & Orchard Dev't	0.4	0.3	0.4	2.1	2.0	2.0	1.5	1.5	1.5	
B. Changes in Stocks	1.8	0.7	0.4	0.5	1.2	0.6	0.9	1.1	0.6	
4. Net Exports	0.6	-16.7	-15.8	0.6	-0.8	-7.6	0.6	-5.7	-10.0	
Total(%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	

One note of explanation is herein made with respect to the observed wide gap in government consumption (GCE) shares between NCR and ROP. The reason for this big difference is because expenditures by national government agencies with head offices

located in NCR are entirely allocated to NCR due to statistical data constraints in the regional reallocation process.

3. CONFIGURATION OF INTER-REGIONAL DIFFERENTIALS: METRO MANILA VS. REST OF PHILIPPINES

One of the major statistical methods for description of regional characteristics is *"rate share analysis"*. This method shows the configuration of trends on structural change of concentration of regional production by observation of distribution patterns in a 2nd quadrant plane. This 2nd quadrant plane is consists of axis of [1]*"Location Quotient (LQ) index"* that denotes the degree of comparative advantage of production, and axis of [2] *"Expansion Coefficient (z) index"*, that indicates the degree of dispersion of production between NCR and ROP (or Inter-regional GAP). Each of the two indexes is defined as follows:

$$LQ[r, j] = \frac{\{GDP\}_j^r / \sum_j \{GDP\}_j^r}{\sum_r \{GDP\}_j^r / \sum_r \sum_j \{GDP\}_j^r} \tag{1}$$

$$Z[r, s, j] = \frac{LQ[r, j]}{LQ[s, j]} \tag{2}$$

where,

  r, s, : label of region (r: NCR, s: ROP) ,   j: label of industrial sector,

  $LQ[r, j]$: Location Quotient index of industry j in Region "r", and nonnegative

  $Z[r, s, j]$: Expansion Coefficient index of industry j between region "r" and "s", and nonnegative.

  GDP_j^r : Gross Domestic Product of industry j in region "r"

These indices are interpreted as follows (see [1]- [3] and **Figure 2**):

[1] In the case where "$|LQ[r, j]|$ =1 and $|Z[r, s, j]|$ =1", regional dispersion and comparative

  advantage of production in Philippines are non-existent (located at *point "A (1.0, 1.0)"* in **Figure 2**)

[2] In the case where "$|LQ[r, j]|$ 1, $|Z[r, s, j]|$ 1 ", industry j's production in NCR and

 ROP are sparsely distributed (located at near point "A (1.0, 1.0)" in **Figure 2**)

[3] In the case where "$|LQ[r, j]| >> 1$ and $|Z[r, s, j]| >> 1$", industry j's production is

  concentrated in NCR (located at 1st quadrant and far located from "*point A*" in **Figure 2**)

[4] In the case where "$|LQ[r, j]| << 1$ and $|Z[r, s, j]| << 1$", industry j's production is

concentrated in ROP (located at 3rd quadrant and far located from "point A" in **Figure 2**).
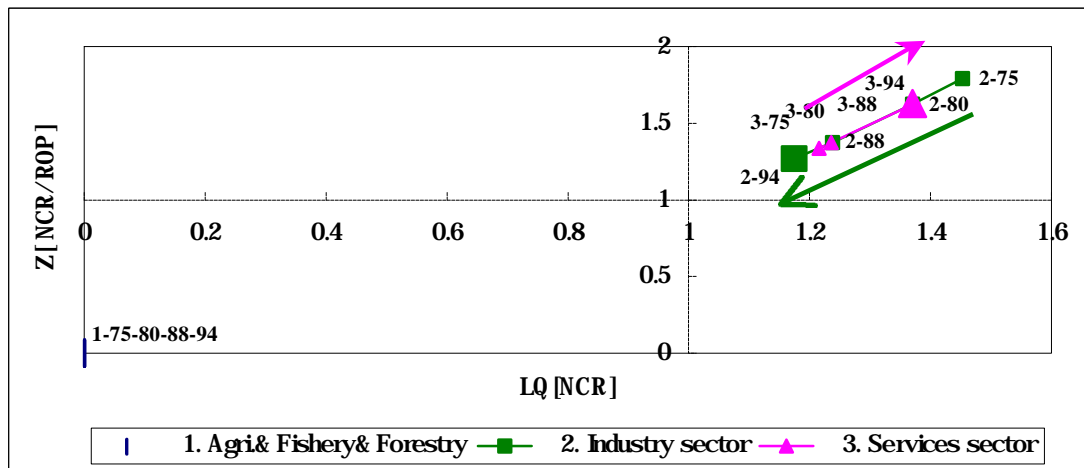
Looking over at **Figure 3**, it can be observed that the scattered point of Agriculture, Fishery, and Forestry sector is located in the 3rd quadrant, while those of Industry and Services are basically located in the 1st quadrant.

Inter-Regional GAP:
Expansion Coefficient: **Z[NCR/ROP]**
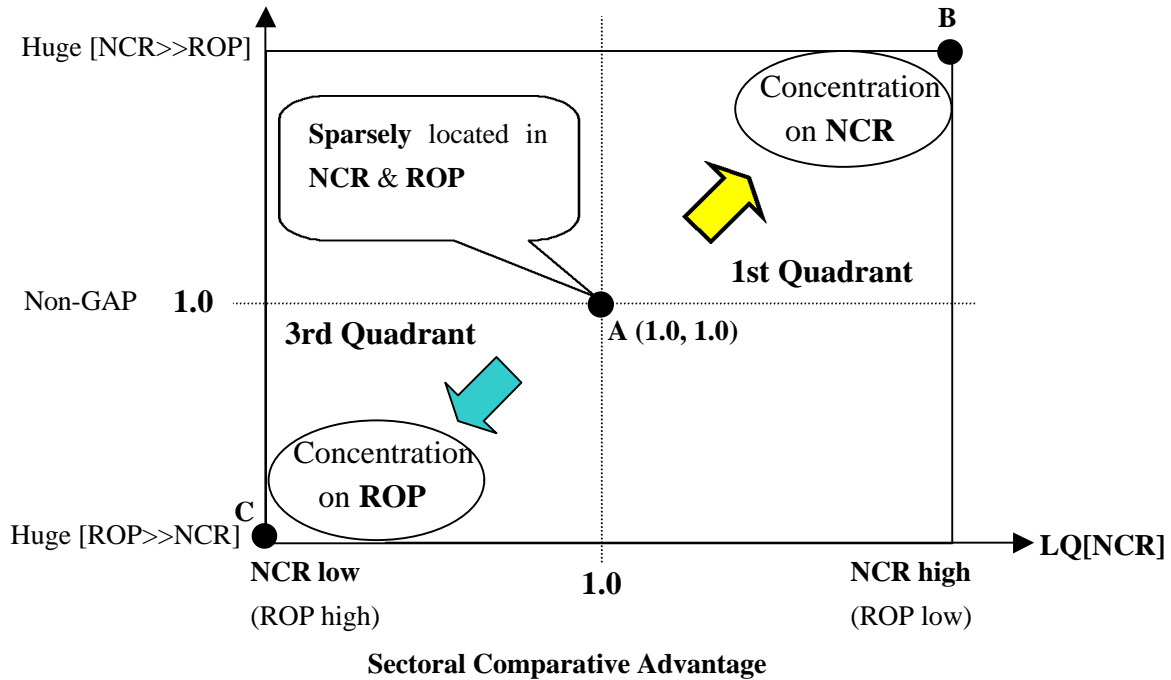
Figure 2. Scatter Chart of Comparative Advantage and Dispersion of Production: NCR & ROP

Figure 3. Scatter Chart of Sectoral (3-sector) Comparative Advantage and Dispersion of Production: NCR & ROP

This means that production of the primary sector such as agriculture, fishery, and forestry is concentrated in the ROP, while concentration of production in the Industry and Services sectors is in NCR. Among the high comparative advantaged sectors in NCR, the scattered point of services sector shifted near point **B** in 20 years. It can therefore be inferred that the

so-called "softening" of the Philippine economy, which refers to the increasing importance of services in production, is more evident in the NCR area since its services sector had been most prominent in 1994.

On the other hand, the scattered point of the industrial sector had shifted near point A (1.0, 1.0), exchanging its hierarchy of degree of concentration with the services sector's in 20 years. This means that the country's production activities of industry had been shifted from NCR to ROP. This finding suggests that decentralization of some industry sectors from NCR to ROP had progressed in accord with the government's policy on regional dispersal of industries.

Shown in **Figure 4** is scatter chart of the manufacturing sector disaggregated into 4 sub-groups. It can be gleaned that, in 1975, most of manufacturing activities were located in the NCR area. But in 1994, some manufacturing sectors were observed to have shifted their production activities from NCR to ROP. For example, the scatter chart shows that, in 1994, concentration of production in the industrial materials sub-sector had begun to shift from NCR to ROP. On the other hand, light industries such as food, beverage, tobacco, and other consumer goods are relatively more concentrated on NCR.

The above findings tend to show that inter-regional division of production between NCR and ROP had progressed during the 20-year period under study. Light industries (sector III, IV, in **Figure 4**) as well as assembly industries (sector VI in **Figure 4**) are concentrated in NCR as the base region of production, while material-based heavy industries (sector V in **Figure 4**) had tended to undergo a significant degree of decentralization towards the rural areas such as ROP.
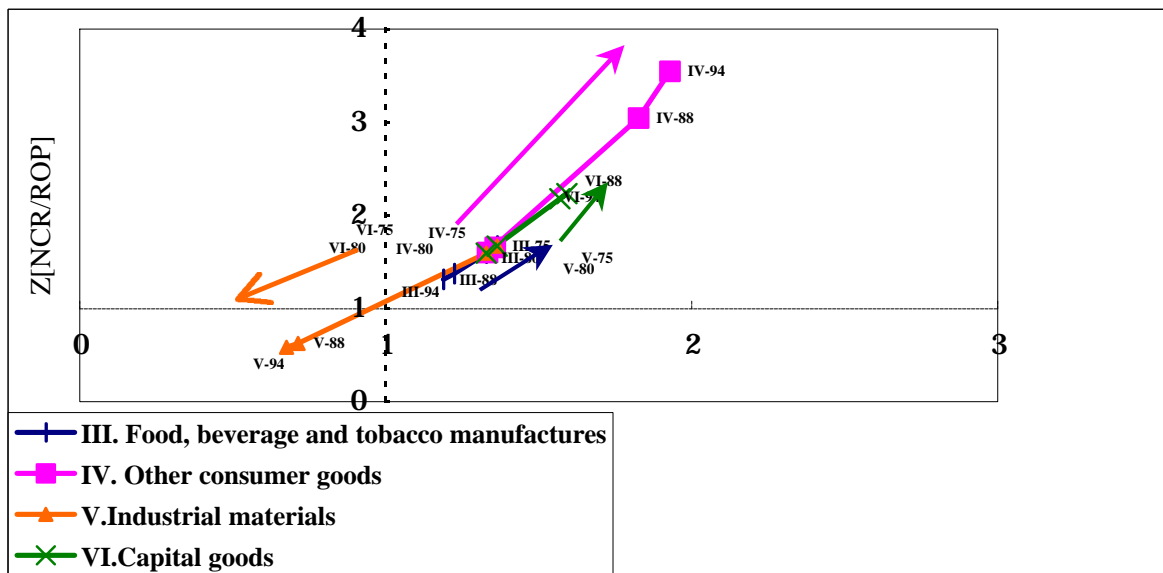
**Figure 4. Scatter Chart of Comparative Advantage and Dispersion of Production
For Manufacturing: NCR & ROP**

Presented in **Figure 5** is a scatter chart of comparative advantage and dispersion of production for the services sector. We can observe clearly some interesting characteristics as follows:

Among the services sector, transportation and communication (Sector X),

government services (sector XIV), other private services (sector XIII), finance and insurance (sector XI) are located in the 1st quadrant. Wholesale and retail trade (sector IX) and real estate and ownership of dwellings (sector XII) are located in the 3rd quadrant of figure 5. It can be observed that among sectors located in the 1st quadrant, the location points of Finance and Insurance and Transportation and Communication had tended to move away from point A (1.0,1.0) (from XI-75 toXI-94, from X-75 to X-88-94). Location point of other private services sector had not changed (XIII-75-80-88-94), while the government services sector's point of location away from point A (1.0,1.0) had remained stable over time.

The above observation suggests that the key sectors of reindustrialization in the NCR economy will be Finance (Sector XI) and Transportation and communication (Sector X) that are both expected to play some role of support for economic activities of the management sector.

Among sectors located in the 3rd quadrant, Real estate (Sector XII) and Trade (Sector IX) in ROP appeared to be promenading towards NCR. This could be interpreted to mean that, while ROP's real estate sector exhibited a high comparative advantage as the result of more trade of real estate for development in the region than in NCR in the 1970s, the regional GAP between NCR and ROP had been declining since 1975 because of expanding huge urban development in the NCR area. The same interpretation could be deduced to the trade sector's shift of its location point to point A (1.0,1.0) (from IX-75 to IX-94), i.e. the inter-regional GAP of the trade sector between NCR and ROP had tended to decrease in the last 20 years.
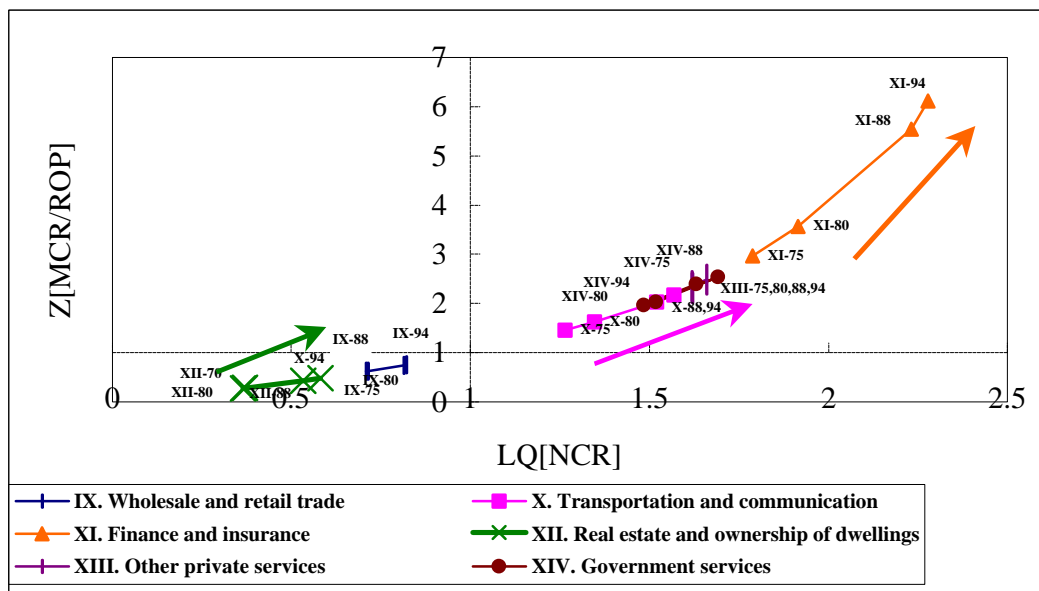
**Figure 5. Scatter Chart of Comparative Advantage and Dispersion of Production
In the Services Sector: NCR & ROP**

In this study, the configuration of the characteristics of inter-regional economic differentials utilizing **rate share analysis** is summarized in **Table 3**. This summary table shows the trends of structural changes of the NCR and ROP economies. However, in order to understand "the source of inter-regional differential " quantitatively, we need not only observe GRDP indices but also to investigate decomposed components of key factors based

on demand side or supply side economies.

In the next section, we will demonstrate the effectiveness of the DPG approach in the quantitative measurement and analysis of typical variations in economic structures between regions

Table 3. Summary Results of Rate Share Analysis

		Comparative advantages of Production		Inter-regional GAP (in 1975-94)			
		NCR	ROP	Increase[1] (same hierarchy)	Increase[2] (Excahnged of hierarchy)	Decrease	No change
In 3 sectors	**Agri.& Fishery& Forestry**	no	prominent				yes
	Industry sector	prominent	no			yes	
	Services sector	prominent	no	yes			
In Manufactures	**Food, beverage and tobacco manufact**	prominent	no	yes			
	Other consumer goods	prominent	no	yes			
	Industrial materials	prominent	no		yes(ROP,1994; prominent)		
	Capital goods	prominent	no	yes			
In Services	**Trade**	no	prominent			yes	
	Transportation and communication	prominent	no	yes			
	Finance	prominent	no	yes			
	Real estate	no	prominent			yes	
	Other private services	prominent	no				yes
	Government services	prominent	no				yes

4. SOURCE OF INTER-REGIONAL ECONOMIC DIFFERENTIALS BASED ON DPG ANALYSIS

4-1 Basic Method

In this section, we will use Deviation from Proportional Growth or DPG Index for an overview of the inter-regional differentials between the NCR and ROP economies. DPG index measures the degree of inter-regional differentials in the composition of sectoral production in terms of the concept of deviations from proportional differences in production scale (Fujikawa(1999)). This decomposition model was applied using Japanese intra-regional IO tables.

DPG Analysis measures the degree of change in sector composition of production in terms of the concept of deviations from proportional growth. The deviations, which we can call DPGs, can be defined as

$$\partial X = X^r - \boldsymbol{b} \cdot X^s \tag{1}$$

where:

X^r, X^s : The column vectors, each element of which is gross production of each sector in Region "r" (base area, or criterion area) and "s" (comparative area).

$\boldsymbol{b}$: The scalar which present the (weighted) average ratio of expansion of production, obtained by the division of total gross production in region "r" by that in region "s"

Each element of ∂X is the DPG of each sector. It is positive when production scale

of a sector is more than the average, and zero when the ratio of expansion of the sector is equal to b. Hence, its sign shows whether a sector has increased its output share or not, and its absolute value depends on the actual growth rate and the production scale of the sector. The DPGs thus defined are analogous to deviations around the mean, the sum of which is therefore zero. DPG analysis decomposes ∂X into several factors as follows:

Factor [I]: Changes in regional final demand

Factor [II]: Changes in regional exports that include domestic outflows

Factor [III]: Changes in regional imports that include domestic inflows

Factor [IV]: Changes in regional technology

The formula for the decomposition model utilized in this study is based on the following balance equation, which is of the competitive type:

$$X^R = B^R \left[\left(I - \overset{)}{M}^R - \overset{)}{N}^R \right) F^R + E^r + D^R \right]$$
$$B^R = \left[I - \left(I - \overset{)}{M}^R - \overset{)}{N}^R \right) A^R \right]^{-1}$$

(2)

where: R: label for region "r" or "s" , I : Identity Matrix

F=F1+F2+F3: Vectors of Final Demand (F1: Consumption expenditure, F2: Gross fixed capital formation (Investment), F3: Change in stocks or inventory)

$\overset{)}{M}^R$: Diagonal matrix of Import coefficients in Region "r" or "s"

$\hat{N}^R$: Diagonal matrix of Inflow coefficients in Region "s" from Region "r" (or Region "r" from Region "s")

D^R: Matrix of Outflow coefficients from Region "s" to Region "r" (or from Region "r" to Region "s")

E^R: Matrix of Export coefficients in Region "s" or "r"

A: Matrix of Input coefficients in Region "s" or "r"

Substituting (2) into (1) yields the following decomposition formula as follows

$$\partial X = \underline{B^{NCR} \left(I - \overset{)}{M}^{NCR} - \overset{)}{N}^{NCR} \right) \partial F} + \underline{B^{NCR} \left[\partial E + \partial D \right]} + \underline{B^{NCR} \left(I - \overset{)}{M}^{NCR} - \overset{)}{N}^{NCR} \right) \partial A b X^{ROP}}$$
$$+ \underline{B^{NCR} \left[\partial \overset{)}{M} + \partial \overset{)}{N} \right] b \left(F^{ROP} + A^{ROP} X^{ROP} \right)}$$

(3-a)

or

$$\partial X = \underline{B^{ROP} \left(I - \overset{)}{M}^{ROP} - \overset{)}{N}^{ROP} \right) \partial F} + \underline{B^{ROP} \left[\partial E + \partial D \right]} + \underline{B^{ROP} \left(I - \overset{)}{M}^{NCR} - \overset{)}{N}^{NCR} \right) \partial A X^{NCR}}$$
$$+ \underline{B^{ROP} \left[\partial \overset{)}{M} + \partial \overset{)}{N} \right] \left(F^{NCR} + A^{NCR} X^{NCR} \right)}$$

(3-b)

where

$$\partial F = F^{NCR} - b F^{ROP}, \quad \partial E = E^{NCR} - b E^{ROP}, \quad \partial D = D^{NCR} - b D^{ROP}, \quad \partial A = A^{NCR} - A^{ROP}$$

$$\partial \overset{)}{M} = \overset{)}{M}^{NCR} - \overset{)}{M}^{ROP}, \quad \partial \overset{)}{N} = \overset{)}{N}^{NCR} - \overset{)}{N}^{ROP}$$

The first term represents the DPGs of production attributable to the DPGs of final demand, ∂F, the ith element of which is positive, zero, and negative when the ith demand has

expanded at a ratio greater than, equal to and smaller than $\boldsymbol{b}$. The second term represents the analogous deviations of production resulting from the DPGs of increases in exports, ∂E, and outflows, ∂D. The third term accounts for DPGs attributable to changes in regional technical coefficients, ∂A. The last term represents the effects produced by changes in regional imports, $\partial \acute{M}$, and inflows, $\partial \acute{N}$.

Fujikawa (1999) made mention of the characteristics of Equations (3-a), (3-b) as follows:

[1] (3-a) is described by B^{NCR} which is the inverse matrix of base region and it plays a role in constructing weights for a "Laspeyres" type of index in ∂X.

[2] (3-b) is described by B^{ROP} which is the inverse matrix of comparative region and it plays a role in building weights for a "Paasche" type of index in ∂X.

[3] So, we can interpret the difference between (3-a) and (3-b) as corresponding to the difference between "Laspeyres Index" and "Paasche Index".

In this study, we also made use of arithmetic average values for two equations.

4-2. Analysis of DPG Results

In this section, analysis is made of the results of calculated DPG indices that show the inter-regional differentials between the NCR and ROP economies following the Fujikawa(1999) model. The calculation of the GDP indices was made possible with the availability of the just completed NCR-ROP inter-regional IO table that was compiled as a research component of JSPS – Manila Project. For the purpose of this study, the most detailed (84-sector) NCR-ROP inter-regional IO table was collapsed into a 14-sector aggregated table. (See Annex B for IO sector classification).

Shown in **Table 4** are indicators in terms of DPGs, showing the direction, degree, and sources of differences in the composition of output. The results are for NCR & ROP with values expressed in billions of pesos at 1994 prices. The first column shows the total DPG of each sector (DPG (I)), and from the 2nd to the 9th columns are shown the sources of each DPG. **Tables 4 and 5** show the signs of the differential degree (money terms or normalized index) of sectoral output and of all components; the cells shaded in yellow (or dark gray) represent the components that are the key determinant factors of production. The sign of DPG indices points out the following characteristics:

[1] DPG(I)>0;The sector in NCR is prominent and a higher comparative advantage of production than ROP's.

DGP(I)<0:The sector in ROP is prominent and a higher comparative advantage of production than NCR's.

[2] DPG(Factor [I]) >0: The scale of final demand in NCR is relatively larger than ROP's..

DPG(Factor [I]) <0: The scale of Final demand in NCR is relatively smaller than ROP's.

[3] DPG(Factor [II]) >0: The scale of regional export (including outflow to ROP) in

NCR is relatively larger than ROP's.

DPG(Factor [II]) <0: The scale of regional export (including outflow to ROP) in NCR is relatively smaller than ROP's.

[4] DPG(Factor [III]) >0: The scale of regional import (including inflow from ROP) in NCR is relatively smaller than ROP's.

DPG(Factor [III]) <0: The scale of regional import(including inflow from ROP) in NCR is relatively larger than ROP's.

[5] DPG(Factor [IV]) >0: Intermediate Input in NCR is larger than ROP's.

DPG(Factor [IV]) <0: Intermediate Input in NCR is smaller than ROP's

Table 4. Illustration of the Result of DPG Decomposition for NCR and ROP, 1994
(in billion pesos)

	DPG(I)	Facter I. Final demad			Facter II. Regional Exports		Facter III. Regional Imports		Facter IV. Regional Technology
		I-1. CE	I-2. I	I-3. CS	II-1. EX	II-2. OF	III-1. IM	II-2. IF	A
Agriculture, fishery and forestry	-230.6	-21.7	-5.9	-0.4	-20.2	-36.3	1.6	-134.7	-13.0
Mining and quarrying	-15.0	-0.1	0.1	-0.1	-6.8	-0.6	5.5	-10.1	-2.7
Food, beverage and tobacco manufactures	87.1	-13.0	0.0	-1.3	-13.4	87.6	-0.1	30.0	-2.8
Other consumer goods	41.0	-3.9	2.2	0.2	23.5	21.0	-5.5	7.7	-4.3
Industrial materials	-38.7	-0.3	1.8	-0.7	-11.9	9.3	-4.7	-40.4	8.2
Capital goods	7.4	-0.9	19.3	0.3	-21.7	13.0	0.5	-0.4	-2.7
Electricity, gas, steam and water	-7.1	1.0	0.8	0.0	-0.8	-3.8	-0.2	-13.8	9.7
Construction	-6.1	0.7	-2.7	0.0	-0.3	1.5	0.0	-4.1	-1.2
Trade	-11.1	-24.1	12.9	-0.1	-13.7	5.6	-0.3	-5.9	14.5
Transportation and communication	30.0	6.6	3.1	-0.1	3.4	18.5	0.9	2.6	-4.9
Finance	40.7	0.7	1.0	0.0	11.6	12.0	-1.6	4.9	12.1
Real estate	-24.7	-17.6	0.3	0.0	-0.4	-1.7	-0.1	-7.2	2.1
Other private services	78.5	11.9	0.9	0.0	4.5	43.0	-2.5	19.3	1.4
Government services	48.7	48.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.0	-12.3	33.7	-2.2	-46.2	169.0	-6.2	-152.1	16.4

Since the relative degree of the differentials or the relative magnitude of the causes do not always have to be measured in specific money terms, it is then possible to normalize the DPGs to make the table clearer and comparison easier. The normalization is done by dividing each positive DPG by the sum of DPGs that are positive and then multiplied by 100 so that the sum of positive DPGs equals 100. Similarly, each negative DPG is divided by the sum of DPGs that are negative and then multiplied by -100 so that the sum of negative DPGs equals –100. **Table 5** shows the normalized DPGs.

In Table 5, we can observe that sectors with positive signs under column **DPG(I)** are: food, beverage and tobacco manufactures (26.1), other private services (23.5), other consumer goods (14.6), finance (12.3), and transportation and communication (9).

Table 5. Normalized DPG Decomposition for NCR and ROP, 1994

		Facter I.			Facter II.		Facter III.		Facter IV.
		Final demad			Regional Exports		Regional Imports		Regional Technology
	DPG(I)	I-1. CE	I-2. I	I-3. CS	II-1. EX	II-2. OF	III-1. IM	II-2. IF	A
Agriculture, fishery and forestry	-69.2	-6.5	-1.8	-0.1	-6.1	-10.9	0.5	-40.4	-3.9
Mining and quarrying	-4.5	0.0	0.0	0.0	-2.1	-0.2	1.7	-3.0	-0.8
Food, beverage and tobacco manufactures	26.1	-3.9	0.0	-0.4	-4.0	26.3	0.0	9.0	-0.8
Other consumer goods	12.3	-1.2	0.7	0.1	7.0	6.3	-1.6	2.3	-1.3
Industrial materials	-11.6	-0.1	0.6	-0.2	-3.6	2.8	-1.4	-12.1	2.5
Capital goods	2.2	-0.3	5.8	0.1	-6.5	3.9	0.2	-0.1	-0.8
Electricity, gas, steam and water	-2.1	0.3	0.2	0.0	-0.2	-1.1	-0.1	-4.1	2.9
Construction	-1.8	0.2	-0.8	0.0	-0.1	0.4	0.0	-1.2	-0.4
Trade	-3.3	-7.2	3.9	0.0	-4.1	1.7	-0.1	-1.8	4.4
Transportation and communication	9.0	2.0	0.9	0.0	1.0	5.5	0.3	0.8	-1.5
Finance	12.2	0.2	0.3	0.0	3.5	3.6	-0.5	1.5	3.6
Real estate	-7.4	-5.3	0.1	0.0	-0.1	-0.5	0.0	-2.2	0.6
Other private services	23.5	3.6	0.3	0.0	1.4	12.9	-0.7	5.8	0.4
Government services	14.6	14.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total (%)	0.0	-3.7	10.1	-0.7	-13.9	50.7	-1.9	-45.6	4.9

This means that the production scale of these industries in NCR is larger than ROP's relatively. Industries with negative signs are agriculture, fishery and forestry (-69.2), real estate (-11.6), industrial materials (-7.4), mining and quarrying (-4.5), trade sector (-3.3), electricity, gas, steam and water (-2.1), and construction (-1.8). Production scales of these sectors in ROP are relatively larger than NCR's. These findings are consistent with the results based on rate share analysis as tabulated in Table 2.

Based on the decomposition of DPGs into the 4 factors as described above, the following structural characteristics are observed:

1. The component of outflows or exports (II-2.OF: 50.7%) largely contributed to increasing production scale in NCR. Sectors with positive signs of **DPG (II-2.OF)** are food, beverage and tobacco (26.3), Other private services (12.9), Other consumer goods (6.3), Transportation and communication (5.5), Capital goods (3.9), Finance (3.6), Industrial materials (2.8), Trade(1.7) and Construction(0.4). On the other hand, sectors with negative signs of **DPG (OF)** are Agriculture, fishery and forestry (-10.9), Mining and quarrying (-1.1), Electricity, gas, steam and water (-0.5), and Real estate (-0.2).

2. The second contributor to increasing production scale in NCR is the **component of Investment (I-2.I; 10.1%),** with such sectors as Capital goods (5.8%), Trade (3.9), and Transportation and communication (0.9), Other consumer goods (0.7), Industrial materials (0.6), Finance (0.3), Other private services (0.3), Electricity, gas, steam and water (0.2), and Real estate (0.1). On the other hand, negative sign sector of **DPG (I-2.I)** are Agriculture, fishery and forestry (-1.8), and Construction (-0.8).

3. The third contributor to increasing production scale in NCR is **the component of Regional Technology (IV; 4.9%)**. A sector with a positive sign of **DPG (IV)** suggests that its *"roundabout production technology"* **is** relatively more intense in NCR than ROP's. These sectors are Trade (4.4), Finance (3.6), Electricity, gas, steam and water (2.9), Industrial materials (2.5), Capital

goods (0.8), Real estate (0.6), and Other private services (0.4). On the other hand, sectors with negative signs of **DPG (IV),** and therefore are more intense in terms of "*roundabout production technology*" **in ROP,** are Agriculture, fishery and forestry (-3.9), Transportation and communication (-1.5), Other consumer goods (-1.3), Food, beverage and tobacco manufactures (-0.8), Mining and quarrying (-0.8), and Construction (-0.4).

4. From the ROP side, the highest contributing factor to increasing production scale in ROP is **the component of Regional Inflow (III-2; -45.6%)**. Sectors with negative signs of **DPG (III-2) are** Agriculture, fishery and forestry (-40.4), Industrial materials (-12.1), Electricity, gas, steam and water (-4.1), Mining and quarrying (-3.0), Real estate (-2.2), Trade (-1.8), Construction (-1.2), and Capital goods (-0.1) This means that NCR's inflows of the above sectors from ROP are relatively larger than ROPs inflows from NCR. On the other hand, sectors with positive signs of **DPG (III-2) are** Food, beverage and tobacco manufactures (9.0), Other private services (5.8), Other consumer goods (2.3), Finance (1.5), and Transportation and communication (0.8).

5. The second largest contributor to increasing production scale in ROP is **the component of Export (II-1; -13.9%).** Sectors with negative signs are Capital goods (-6.5), Agriculture, fishery and forestry (-6.1), Trade (-4.1), Food, beverage and tobacco manufactures (-4.0%), Industrial materials (-3.6), Mining and quarrying (-2.1), Electricity, gas, steam and water (-0.2), Real estate (-0.1), and Construction (-0.1). This means that exports of these sectors in NCR to the Rest of the World are relatively larger than ROP's. In contrast, sectors with positive signs of **DPG (II-1) are:** Other consumer goods (7.0), Finance (3.5), Other private services (1.4), and Transportation and communication (1.0)

6. The third largest contributor to increasing production scale in ROP is **the component of consumption expenditure (I-1.CE; -3.7%)**. Sectors with negative signs of **DPG (I-1, CE) are:** Trade (-7.2), Agriculture, fishery and forestry (-6.5), Real estate (-5.3), Food, beverage and tobacco manufactures (-3.9), Other consumer goods (-1.2), Capital goods (-0.3), and Industrial materials (-0.1). On the other hand, sectors with positive signs of **DPG (I-1 CE) are:** Government services (14.6), Other private services (3.6), Transportation and communication (2.0), Electricity, gas, steam and water (0.3) Construction (0.2) and Finance (0.2). This means that the consumption scale of the products of these industries in NCR is larger than ROP's relatively. It is interesting to observe that the total component of **DPG (I; 14.6)** in Government services goes almost entirely to component of consumption expenditure **I-1. PCE; (14.6).**

7. We can also observe the other contributors to increasing production scale in ROP, namely: **component of Import (III-1, IM; -1.9%)** and **Change in Stocks (II-2. CS;-0.7%).**

5. CONCLUSIONS

We have presented a method to explain quantitatively the causes of observed regional differentials in the composition of industries. We have extensively applied the DPG analysis method in this study, given the 1994 regional IO tables for Metro Manila and Rest of the Philippines.

To summarize, we have observed the structural characteristics and source of inter-regional economic differentials, as follows:

1. In this study, one major finding is that **NCR plays a major role as a production base of light industry goods, and ROP plays a major role as a supply base of primary materials for the NCR economy**. Notably, we observed that among the light industry sectors, the increasing production scale of the Food, beverage and tobacco sector had resulted in the improvement of trade with partner region ROP and the Rest of the World (ROW), in terms of material input purchases to sustain its increasing production scale as well as outflows of its products. A big portion of other consumer goods in NCR is textile-related goods, accounting for 64.9% of total production in other consumer goods sectors (ROP's share is 51.2%). These producing sectors also caused the improvement of trade by way of purchases of natural agricultural material goods such as natural fiber, etc. from ROP and ROW, and exports to outside of NCR (ROP and ROW).

2. According to the observation of manufacturing sectors at the 14-sector level of aggregation, the production scale of the industrial materials sector in NCR was observed to be smaller than ROPs, although its degree of "*roundabout production technology*" in ROP is smaller than NCR's. On the other hand, production scales of light industry sectors like food, beverage and tobacco manufactures and other consumer goods in NCR were larger than ROP's, although their degrees of "*roundabout production technology*" in NCR are observed to be smaller than ROP's. In the case of Capital goods sector (or Assembly and processing), relationship between production scale and degree of *roundabout production technology* in NCR are also similar as that of light industries. This illustrates the mechanism of examining the gap between production growth and employment growth, which is typical e of industrialization different from developing countries. Consistency in employment growth with production scale reflects the typical trend of the Philippine economy.

3. **NCR plays a role as a producing center** of services goods such as finance, private services and transportation and communication for supporting management sector's activity. **ROP is a heavy purchaser or importer** of services from NCR.

Finally, given the observed limitations and perspectives of this study, the following general areas of concerns are presented for consideration,

1. Improvement of data quality
2. Enhancing scope and coverage of regional IO table compilation by taking into consideration expansion of bi-region IO into a multi-region IO table compilation;
3. Updating of the benchmark 1994 IO tables to provide researchers with timelier and therefore more meaningful IO data;
4. Continuing efforts on inter-regional IO-based applied research for more indepth analysis on inter-regional interdependencies between the NCR and ROP economies; and
5. Strengthening the country's professional/technical capability in regional I/O compilation.

ACKNOWLEDGMENTS

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ANNEX A: Table 1. Major Economic Indicators, 1975-1994: Philippines

Economic Indicators	NCR[Metoro-Manila]				ROP[Rest of philippines]				NCR/Philippines(%)				ROP/philippines(%)			
	1975	80	88	94	1975	80	88	94	1975	80	88	94	1975	80	88	94
Land area (square km)	636.0	636.0	636.0	636.0	293918.0	293918.0	293918.0	293918.0	0.2	0.2	0.2	0.2	99.8	99.8	99.8	99.8
Population (in 1000 persons)	4999.0	5970.0	7561.0	8776.0	37260.0	42346.0	51161.0	58442.0	11.8	12.4	12.9	13.1	88.2	87.6	87.1	86.9
Pop.Density (persons/Sq.km)	7860.1	9386.8	11888.4	13798.7	126.8	144.1	174.1	198.8	5478.6	5722.6	5963.3	6046.7	88.4	87.8	87.3	87.1
Income/capita (peso)			15057.6	34926.4			6094.6	15780.2			207.7	221.3			84.1	81.8
GDP (in 1billion pesos)																
1.Agri.& Fishery& Forestry	0.0	0.0	0.0	0.0	112.1	143.2	155.3	167.0	0.0	0.0	0.0	0.0	100.0	100.0	100.0	100.0
2.Industry sector	71.9	100.5	84.8	92.9	95.9	146.6	147.2	171.3	42.9	40.7	36.6	35.2	57.1	59.3	63.4	64.8
3. Services sector	60.2	80.5	109.6	134.1	107.7	139.0	161.6	192.9	35.8	36.7	40.4	41.0	64.2	63.3	59.6	59.0
total	132.1	180.9	194.4	227.0	315.6	428.7	464.2	531.2	29.5	29.7	29.5	29.9	70.5	70.3	70.5	70.1
GDP (Sectoral share, in %)																
1.Agri.& Fishery& Forestry	0.0	0.0	0.0	0.0	35.5	33.4	33.5	31.4	0.0	0.0	0.0	0.0	141.8	142.2	141.9	142.7
2.Industry sector	54.5	55.5	43.6	40.9	30.4	34.2	31.7	32.3	145.3	137.0	123.8	117.4	81.0	84.4	90.0	92.5
3. Services sector	45.5	44.5	56.4	59.1	34.1	32.4	34.8	36.3	121.5	123.6	136.9	137.0	91.0	90.1	84.6	84.2
Persons Employed (in 1000)																
1.Agri.& Fishery& Forestry	0.0	0.0	0.0	0.0	5486.4	6309.8	9920.3	11248.5	0.0	0.0	0.0	0.0	100.0	100.0	100.0	100.0
2.Industry sector	516.2	621.0	703.7	832.0	1080.1	1261.7	2628.7	3133.8	32.3	33.0	21.1	21.0	67.7	67.0	78.9	79.0
3. Services sector	1034.0	1316.3	1737.1	2135.6	2372.0	2938.9	6491.9	7810.3	30.4	30.9	21.1	21.5	69.6	69.1	78.9	78.5
total	1550.3	1937.3	2440.8	2967.7	8938.4	10510.4	19040.8	22192.6	14.8	15.6	11.4	11.8	85.2	84.4	88.6	88.2
Labor Productivity (in 1000 pesos)																
1.Agri.& Fishery& Forestry	NA1•j	NA1•j	NA1•j	NA1•j	20.4	22.7	15.7	14.8	NA1•j	NA1•j	NA1•j	NA1•j	100.0	100.0	100.0	100.0
2.Industry sector	139.3	161.8	120.5	111.7	88.8	116.2	56.0	54.7	132.6	123.3	173.1	167.6	84.4	88.5	80.4	82.1
3. Services sector	58.2	61.1	63.1	62.8	45.4	47.3	24.9	24.7	118.1	118.5	191.4	191.0	92.1	91.7	75.5	75.1
total	85.2	93.4	79.7	76.5	35.3	40.8	24.4	23.9	199.6	190.7	259.8	253.9	82.7	83.3	79.5	79.4
GRDE (in 1billion pesos)	NA2•j	NA2•j	197.3	227.3	NA2•j	NA2•j	461.3	539.0	NA2•j	NA2)	30.0	29.7	NA2)	NA2)	70.0	70.3

Note: [1] National Statistical Coordination Board(NSCB) has been producing GRDP data since 1975.

GRDP Accounts are regulaly published staring 1988 to present but only in 11 sector aggregation

[2] GRDP= Gross Regional Domestic Product, and GRDE= Gross Regional Domestic Expenditure.

[3] Figures in NCR/Philippines, ROP/Philippines colums corresponding to are Location Quotients

[4] Price index is constant price in 1985

[5] Agri & Fishery & Forestry = Agriculture, Forestry and Fishery. Industry sector= Mining, Manufacturing, and Constraction; and Services sector=Wholesale and retail trade, Finance and insurance, Real estate and ownership of dwellings, Other private services, Government services

[6] NA1)= GRDP in NCR is not measured in CE data

[7] NA2)= GRDE data in NCR was compiled since 1988.

Source: [1] Generation of Time series data for selected economic indicators (unpublished), Francisco T.SECRETARIO

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ANNEX B: Sector Classification

14 sectors		35 sectors	
	14 sectors		**35 sectors**
01	**I. Agricultue, fishery & forestry**	01	**Agriculture and fishery**
		02	**Forestry**
02	II. Mining and quarrying	03	**Mining and quarrying**
	III. Manufacturing		
03	**III-1 Food, beverage & topbaco manufacturing**	04	**Food manufacturing**
		05	**Beverage Industry**
		06	**Tobacco manufacturing**
04	**III-2 Other consumer goods**	07	**Textile manufacturing**
		08	**Wearing apparel & other textile goods**
		09	**Wood and cork products**
		23	**Misc. manufacturing, n.e.c.**
		11	**Paper and paper products**
		12	**Publishing and printing**
		13	**Leather and leather products; footwear**
05	**III-3 Indusrial materials**	14	**Rubber products**
		15	**Chemicals and chemical products**
		16	**Petroleum refinery**
		17	**Non-metallic mineral products**
		18	**Basic metal industries**
06	**III-4 Capital goods**	19	**Metal products except machinery**
		20	**Machinery except electrical**
		21	**Electrical machineery**
		22	**Transport equipment**
		10	**Furniture and fixtures**
07	**IV Electricity, gas,steam & water**	24	**Electricity, gas,steam & water**
08	**V Construction**	25	**Construction**
09	**VI. Wholesale and retail trade**	26	**Wholesale and retail trade**
10	**VII Transportation and telecommunication**	27	**Land transport**
		28	**Water transport**
		29	**Air transport**
		30	**Storage & other services allied to transport**
		31	**Post and telecommunication**
11	**VIII. Finance and insurance**	32	**Finance and insurance**
12	**IX. Real estate and ownership of dwellings**	33	**Real estate and ownership of dwellings**
13	**X. Other private services**	34	**Other private services**
14	**XI. Government services**	35	**Government services**