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ABSTRACT

This study analyzed the different causes that brought employment growth disparity in the Philippine regions by decomposing regional employment change into several components. A Shift-Share Analysis was applied to identify whether a region has favorable mix of industries and/or has comparative advantages. The analysis also distinguished which sector has competitive advantage, has greatest employment potential, and less promising in terms of employment growth.

Data on employment from 1986-2004 across regions and by industry group were used in this study. The data were divided into four study periods in an attempt to determine the components of employment growth or decline of the various ~~different~~ government administrations in the Philippines. The study revealed that employment growth inequality existed in every period. It was found out that employment growth pattern was inconsistent for all regions, except for Region I, V, IX, and Caraga which always posted slower rate of growth compared to the national average.

The observed differences in employment growth were attributable to regional factor effects. Dissimilarities were either due to differences in employment mix found in the region relative to the nation, or comparative advantage or disadvantages that the specific local economy has relative to the country.

Most of the sectors in each region have unstable growth performance, although there were few that showed a steady likelihood for employment opportunities. Despite of poor national sector performance, the counterpart sector in some regions was able to prosper implying a comparative advantage for the region. There were some sectors that served as growth engines or indicators as their performance dictate the overall growth/decline of the region's employment.

I. Introduction

The employment growth of a country is brought about by the performance of its regions. In turn, the growth of the regions depends on their industrial makeup and comparative advantages and disadvantages. Employment, which chiefly determines the level of regional income, is a good indicator of determining regional welfare and development. However, examining the changes in a region's employment over a period of time by merely investigating the trend is insufficient. Regional employment change differentials can be explained through an in-depth analysis by looking at the components of growth or decline. Understanding these components could also lead to identifying which industry or sector of a particular region has competitive and structural advantage/s.

Data used in this study showed that some of the regions progresses faster than the other regions because of comparative advantage. Comparative or competitive advantage in

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this study refers to positive Differential Shift (DS), disadvantage otherwise. There were others which have made advantageous activity portfolio by concentrating economic activities on the fast growing sector without neglecting the lagging industries.

Regional plans and policies are not always effective. Moreover, calamities and natural disasters sometimes derailed a region's employment and output performance. Eventually, there are periods wherein composition and comparative advantages did not materialize. These were the times when a region experienced a setback instead of the expected growth. Changing policies and programs sometimes resulted to disadvantageous industrial mix. An advantageous or favorable industry structure/mix in this study refers to aggregate positive PS, unfavorable otherwise.

It is imperative to find out if a region enjoys competitive and structural advantages or perhaps suffer from these disadvantages. Have these advantages been considered, regional employment will grow in a considerably rapid rate. Comparative gains are not only acquired from natural resource endowment, these are also achieved through efficient planning and implementation. Equally important is the attainment of favorable industry mix that could spur employment growth. Rearranging the industry structure and focusing on sectoral specialization could overcome disadvantages for this component.

II. Methodology

The shift-share technique uses three components, namely: national growth, proportionality shift (also known as industrial mix, composition effect, or structural effect), and differential shift (also known as regional share, competitive effect, or local-factor effect) to explain the disparity between regional and national growth. The national growth component measures the regional economic change that could have occurred if the region had grown at the same rate as the reference area. Proportionality shift or industrial mix component measures the share of local economic change that can be attributed to the local area industry mix, and reflects the degree to which the local area specializes that are fast or slow growing nationally. Differential shift or regional share component measures the change in a particular industry in the region due to the difference between the industry's local growth (decline) rate and the industry's reference area growth rate. This component indicates growth or decline in industries due to the local area's competitive position in a given industry (Dinc, 2002).

In a Modified Shift-share model developed by Stilwell (1969), the differential shift was divided into two components, namely: the Proportionality Modification Shift (PMS), and Residual Differential Shift (RDS). The PMS represents the shift in employment or output which comes about from the modification of the region's industrial mix over the reference

period. RDS, on the other hand, describes the other impacts that cannot be captured by PMS.

The shift-share model being used in this study may be presented as follows:

E_{ijt} = employment in the i^{th} industry in region j at time t .

E_{ij0} = employment in the i^{th} industry in region j at time 0.

E_n = employment in all the industries in the reference area.

g_{ij} = rates of growth in the i^{th} industry in region j .

g_{in} = rates of growth in the i^{th} industry in all regions.

g_n = the potential rate of growth in all industry in the reference area.

$$g_n = \frac{\sum_{i=1}^T \sum_{j=1}^M E_{ijt}}{\sum_{i=1}^T \sum_{j=1}^M E_{ij0}} - 1$$

$\sum_{i=1}^T E_{ijt}$ = total employment in region j at time t .

$\sum_{j=1}^M E_{ijt}$ = total employment in industry i at time t .

$\sum_{i=1}^T \sum_{j=1}^M E_{ijt}$ = total employment in all regions and in all industries at time t

G_j = actual total growth in employment in region j

N_j = potential growth of employment in region j

$$= \sum_{i=1}^T E_{ij0} g_n$$

TS_j = total shift in employment in region j

$$= \sum_{i=1}^T E_{ijt} - \sum_{i=1}^T E_{ij0} (1 + g_n)$$

PS_j = proportionality shift in employment in region j

$$= \sum_{i=1}^T E_{ij0} (g_{in} - g_n)$$

DS_j = differential shift in employment in region j

$$= \sum_{i=1}^T E_{ijt} - \sum_{i=1}^T E_{ij0} (1 + g_{in})$$

RPS_j = reverse proportionality shift in employment in region j

$$\sum_{i=1}^T E_{ijt} \left(\frac{g_{in} - g_n}{\quad} \right)$$

PMS_j = proportionality modification shift in employment in region j

$$\sum_{i=1}^T E_{ijt} \left(\frac{g_{in} - g_n}{(1 + g_n)(1 + g_{in})} \right) - \sum_{i=1}^T E_{ij0} (g_n - g_n)$$

RDS_j = residual differential shift in employment in region j

$$\sum_{i=1}^T E_{ijt} \left(\frac{1 + g_n(2 + g_n)}{(1 + g_n)(1 + g_{in})} \right) - \sum_{i=1}^T E_{ij0} (1 + g_n)$$

This paper adopts the classification of region/sector based on three-shift grouping formulated by Stilwell. [The classification allows us to determine the possibilities of future changes in employment, given the alteration of industry structure in the region.](#)

III. Findings

The 1986-1991 Period

In this period, regional disparity in employment growth remained visible as some regions had positive employment growth, while others suffered from negative growth. Out of the 13 regions, there were only 3 (NCR, III, XII) that had higher employment growth compared to the country's rate. There were 3 regions that had favorable industry structure, and 4 had comparative advantage.

The three-shift analysis revealed that only NCR and Region III had performed well and expected to do so in the coming years.

Table 1. Actual and Components of Regional Employment Change (in thousands): 1986-1991

Region	Actual Employment Change	=	National Share	+	Proportionality Shift	+	Differential Shift
NCR	790	=	237	+	212	+	340
I	-89	=	161	+	-21	+	-228
II	-159	=	129	+	-44	+	-244
III	284	=	222	+	66	+	-3
IV	297	=	308	+	64	+	-75
V	169	=	177	+	-24	+	17
VI	157	=	226	+	-54	+	-15
VII	20	=	204	+	-20	+	-164
VIII	2	=	155	+	-50	+	-103
IX	61	=	119	+	-37	+	-21
X	137	=	151	+	-24	+	10
XI	78	=	183	+	-40	+	-66
XII	147	=	117	+	-35	+	67

Note: May not add up due to rounding

The 1991-1997 Period

From 1991-1997, high employment growth was not discernible in all regions in the Philippines. Out of the 14 regions, there were 3 region's (NCR, II, IV) that grew higher relative to the country's rate. There were 3 regions that had advantageous industry mix, and 4 regions have comparative advantage.

The three-shift analysis revealed that only NCR, II, and IV had performed well and expected to do so in the coming years. The other regions suffered declining employment growth and expected to continue losing in the future.

Table 2. Actual and Components of Regional Employment Change (in thousands): 1991-1997

Region	Actual Employment Change	=	National Share	+	Proportionality Shift	+	Differential Shift
NCR	696	=	606	+	307	+	-218
CAR	45	=	104	+	-29	+	-30
I	271	=	277	+	-14	+	8
II	283	=	204	+	-30	+	109
III	420	=	469	+	73	+	-122
IV	820	=	631	+	47	+	142
V	284	=	362	+	-53	+	-25
VI	409	=	450	+	-53	+	12
VII	278	=	380	+	-14	+	-88
VIII	121	=	286	+	-41	+	-124
IX	-6	=	233	+	-42	+	-196
X	-235	=	307	+	-40	+	-502
XI	256	=	354	+	-37	+	-61
XII	-245	=	247	+	-73	+	-419

Note: May not add up due to rounding

The 1997-2000 Period

Table 3. Actual and Components of Regional Employment Change (in thousands): 1997-2000

Region	Actual Employment Change	=	National Share	+	Proportionality Shift	+	Differential Shift
NCR	9	=	-16	+	179	+	-154
CAR	-15	=	-2	+	-16	+	4
I	-46	=	-7	+	-18	+	-21
II	-136	=	-6	+	-34	+	-96
III	113	=	-12	+	29	+	96
IV	310	=	-17	+	31	+	297
V	-242	=	-9	+	-20	+	-213
VI	-197	=	-11	+	-29	+	-157
VII	-9.00	=	-9.36	+	-9.14	+	9.50
VIII	-81	=	-7	+	-23	+	-51
IX	-17	=	-5	+	-18	+	6
X	15	=	-5	+	-15	+	36
XI	77	=	-9	+	-14	+	100
XII	46	=	-4	+	-11	+	61
Caraga	-15	=	-4	+	-10	+	-1
ARMM	61	=	-3	+	-21	+	85

Note: May not add up due to rounding

During the 1997-2000 period, regional employment opportunities remained unequal. Nine (9) of the 16 regions in the country experienced reduced employment. There were 8 out of 16 regions that had employment growth higher than the country's rate. There were only 3 regions that had advantageous sectoral composition, and 9 regions had an overall comparative advantage.

The three-shift analysis revealed that NCR, III, IV, VII, X, XI, XII, and ARMM had performed well and expected to do so in the coming years. The other regions were identified as region that suffered declining employment growth but were likely to improve in the future.

The 2001-2004 Period

During this period, three Mindanao regions showed impressive growth: X, XII, and ARMM. Out of the 16 regions, there were 8 regions that have employment growth higher than the national average. There were only 3 regions that had advantageous industrial structure, while 9 regions had an overall comparative advantage.

The three-shift analysis showed that III, VI, VIII, X, XII, and ARMM were the regions that had performed well and expected to do so in the coming years. CAR and Region II were identified as regions that were not yet suffering from declining employment growth but were likely to do so in the future. The other sectors were those that experienced decline in employment share but were likely to improve in the succeeding years.

Table 4. Actual and Components of Regional Employment Change (in thousands): 2001-2004

Region	Actual Employment Change	=	National Share	+	Proportionality Shift	+	Differential Shift
NCR	53	=	216	+	62	+	-225
CAR	53	=	31	+	-7	+	29
I	64	=	89	+	-9	+	-15
II	211	=	67	+	-14	+	158
III	209	=	162	+	-2	+	49
IV	164	=	248	+	7	+	-90
V	44	=	103	+	-4	+	-55
VI	192	=	137	+	-3	+	59
VII	46	=	120	+	-3	+	-71
VIII	104	=	83	+	-1	+	22
IX	62	=	64	+	-5	+	3
X	467	=	69	+	-5	+	403
XI	-509	=	118	+	-5	+	-622
XII	364	=	59	+	-11	+	316
Caraga	17	=	51	+	-6	+	-28
ARMM	115	=	42	+	8	+	65

Note: May not add up due to rounding

Results by Region

NCR - The two important sectors influential in bringing NCR to a rapid employment growth were Manufacturing and Wholesale and Retail Trade. Through the years, however, instability of the performance of these sectors were observed. The simultaneous poor performance of these sectors resulted to a negative total shift in 2001-2004.

It was only in 1986-1991 when the region posted a comparative advantage, yet the region continued to grow higher than the national average until 2000. It indicates that the improvement of the region's employment in every study period was chiefly attributed to its structural advantages.

CAR - It was only in 2001-2004 when the region rose faster than that of the country. CAR's employment was concentrated towards slow growing industries. In every study period, the industrial makeup of the region was unfavorable. The positive TS of the region in 2001-2004 was brought about by the competitive advantage displayed by Agriculture, Fishery, and Forestry.

From 1991-2000, most of the sectors in CAR have unstable growth. Through the years, however, the employment performance of CAR had gradually improved.

Region I - The inferior performance of Region I was both due to unfavorable industry structure and comparative disadvantage. Principally affecting the region was the poor performance of Agriculture, Fishery, and Forestry.

Most of the sectors in the Ilocos Region grew slower than the same sectors at the national level. All sectors also showed unstable growth. While it is important that the key sectors of the region should post rapid growth, it was insufficient to bring higher overall growth for the region. It is imperative therefore that sectors such as Manufacturing, Construction, and Transportation, Storage, and Communication will also post comparative advantage and register considerable growth.

Region II - had an erratic and unpredictable employment performance. In 1986-1991 and 1997-2000, the region registered a negative total shift but in 1991-1997 and 2001-2004, it manifested a positive total shift.

The growth of Region II depends on its competitive advantages. When the region showed a positive differential shift, the region grew faster than the national average. It can be noticed that whenever Agriculture, Fishery, and Forestry displayed comparative advantage, it carries an overall comparative advantage for the region. The region was also affected by the instability of all the sectors.

Region III - Except in 1991-1997, Region III registered a positive total shift in every study period. The sluggish growth in 1991-1997 was mainly brought about by the poor performance of Agriculture, Fishery, and Forestry and Community, Social, and Personal Services.

All sectors in Region III manifested unstable performances. It can be observed that as long as at least 3 of the four biggest sectors in the region will show comparative advantage, the region will have higher employment growth relative to the country's rate.

Region IV - The region's employment always inclined towards the fast growing sectors. The advantageous sectoral compositions in 1986-1991 and 2001-2004 however,

were not enough to counteract the region's competitive disadvantage resulting to a slower employment growth than that of the country.

The declining share of Agriculture, Fishery, and Forestry sector in Region IV showed a transformation towards an industry and service-oriented region. This would only be profitable if some other sectors could compensate the employment lost in AFF. The employment trend showed that keeping other sectors performance constant, the Wholesale and Retail, Repair of Motor Vehicles, etc. sector stands indicative of the region's overall growth as whenever the sector showed rapid growth and comparative advantage, the entire region prospers.

Table 5. Components of Regional Employment Change: 1986-2004

Region/Year	1986-1991		1991-'97	1997-'00	2001-'04	Region	1986-1991		1991-'97	1997-'00	2001-'04
NCR	PS	+	+	+	+	VII	PS	-	-	-	-
	DS	+	-	-	-		DS	-	-	+	-
	TS	+	+	+	-		TS	-	-	+	-
	PMR	+	+	+	+		PMR	+	+	+	+
	RDS	+	-	-	-		RDS	-	-	-	-
CAR	PS	na	-	-	-	VIII	PS	-	-	-	-
	DS	na	-	+	+		DS	-	-	-	+
	TS	na	-	-	+		TS	-	-	-	+
	PMR	na	+	+	-		PMR	+	+	+	+
	RDS	na	-	-	+		RDS	-	-	-	+
I	PS	-	-	-	-	IX	PS	-	-	-	-
	DS	-	+	-	-		DS	-	-	+	+
	TS	-	-	-	-		TS	-	-	-	-
	PMR	+	+	+	+		PMR	+	+	+	+
	RDS	-	-	-	-		RDS	-	-	-	-
II	PS	-	-	-	-	X	PS	-	-	-	-
	DS	-	+	-	+		DS	+	-	+	+
	TS	-	+	-	+		TS	-	-	+	+
	PMR	+	+	+	-		PMR	+	+	+	+
	RDS	-	+	-	+		RDS	-	-	+	+
III	PS	+	+	+	-	XI	PS	-	-	-	-
	DS	-	-	+	+		DS	-	-	+	-
	TS	+	-	+	+		TS	-	-	+	-
	PMR	+	+	+	+		PMR	+	+	+	+
	RDS	-	-	+	+		RDS	-	-	+	-
IV	PS	+	+	+	+	XII	PS	-	-	-	-
	DS	-	+	+	-		DS	+	-	+	+
	TS	-	+	+	-		TS	+	-	+	+
	PMR	+	+	+	+		PMR	-	+	+	+
	RDS	-	-	+	-		RDS	+	-	+	+
V	PS	-	-	-	-	CARAGA	PS	na	na	-	-
	DS	+	-	-	-		DS	na	na	-	-
	TS	-	-	-	-		TS	na	na	-	-
	PMR	+	+	+	+		PMR	na	na	+	+
	RDS	-	-	-	-		RDS	na	na	-	-
VI	PS	-	-	-	-	ARMM	PS	na	na	-	+
	DS	-	+	-	+		DS	na	na	+	+

	TS	-	-	-	+		TS	na	na	+	+
	PMR	+	+	+	+		PMR	na	na	+	+
	RDS	-	-	-	+		RDS	na	na	+	+

Region V - For all study periods, Region V had negative total shift. Manufacturing sector always had negative shift, while the other sectors displayed unstable growth. Observation on the employment trends of Region V indicates the need to reconsider the different employment-generation programs implemented in the region. Since the region manifested a consistent unfavorable industry structure, there is a need to investigate the role of each industry to achieve a regional fast-growing mix of industries.

Region VI - It was only in 2001-2004 when the region's growth rate rose faster than the national average. The region's employment was tilted towards the slow growing sectors. The Agriculture, Fishery, and Forestry of the region highly contributed to this disadvantage.

Wholesale and Retail Trade, the second leading employment-generating sector consistently registered negative shifts in all study periods, except in 2001-2004. The sector's improvement in this period was the main reason for the positive total shift of Region VI. The other sectors displayed unstable growth, which in general contributed to the instability of the region's performance.

Region VII - The region's rate of growth was slower than the national average for all study periods, except in 1997-2000. For the four study periods, Region VII manifested unfavorable industrial makeup. Nonetheless, it was the comparative advantage that chiefly contributed to the region's slower growth.

The positive total shift in 1997-2000 was the result of positive differential shift. In this period, Manufacturing posted comparative advantage that added 58 thousand jobs due to its competitive position. This increase largely contributed to the higher employment growth of the region. The only stable sector in Region VII was TSC.

Region VIII - Comparative advantages established the overall performance of the region. When the region possesses localization disadvantages, the region in turn grew slower than the national rate. All sectors manifested unstable growth, except for Agriculture, Fishery, and Forestry which showed a steady negative shift. Whenever Manufacturing and Wholesale and Retail, Repair of Motor Vehicles, etc. sectors posted comparative advantage, the region attained positive total shift.

Region IX - could not only rely on Agriculture, Fishery, and Forestry sector being the primary employment provider. Other sectors, especially Wholesale and Retail, Repair of Motor Vehicles, Construction, Fishing, and Public Administration and Defense should also be able to outpour employment opportunities. All sectors in the region displayed unstable growth.

Region X - From a negative total shift in 1986-1991 and 1991-1997, the region registered a positive total shift in 1997-2000 and 2001-2004.

The good performance of the region mainly depends on its comparative advantage and the performance of its key sectors: Agriculture, Fishery, and Forestry, Wholesale and Retail, Repair of Motor Vehicles, and Community, Social and Personal Services sectors. It can be observed that whenever these sectors jointly posted a considerable employment growth, the region in general, will grow higher relative to the nation.

Region XI - The positive total shift of the region in 1997-2000 was brought about by positive differential shift. This is the period when the region's Agriculture, Fishery, and Forestry sector registered comparative advantage. Supplementing this were the improvements of the other leading sectors, namely, Wholesale and Retail, Repair of Motor Vehicles, and Community, Social and Personal Services sectors. The performance of Region XI in 2001-2004 however, could not be used for evaluation due to differences in regional configuration that have significant effect on its employment pattern.

Region XII - It can be observed that Agriculture, Fishery, and Forestry sector served as the indicator for faster employment growth in the region. The sector's comparative disadvantage in 1991-1997 brought negative total shift to the region, while the sector's performance in the other 3 periods was highly responsible for the higher employment growth. TSC showed a steady positive shift, while the other sectors manifested unstable growth performance.

Caraga - The inferior performance was attributed to both structural and competitive disadvantages. Particularly affecting the region was the variable and weak performance of its two leading sectors: Agriculture, Fishery, and Forestry and Wholesale and Retail, Repair of Motor Vehicles. There was no period when these two sectors had a simultaneous comparative advantage. If this could happen, the region would have grown faster than the country's rate given the large contribution of these sectors to the total employment in Caraga. Potential support industries in the region are Mining and Quarrying and Public Administration and Defense. The growth of all sectors was highly variable that the government should impose policies for specialization.

ARMM - always registered a positive total shift. Evidently, the good performance of ARMM depends on how its Agriculture, Fishery, and Forestry sector performed. Fishing and Wholesale and Retail, Repair of Motor Vehicles sectors also highly contributed to the employment increase in the region.

IV. Summary and Conclusion

Regional employment growth disparity continued to prevail from 1986 to 2004. Using the national standard, some regions grew faster or slower than the country's rate. Some

regions had advantageous industry structure, some had comparative advantage, while others had both or none. The study, however, showed that having favorable industry mix or comparative advantage alone does not guarantee a relatively higher employment growth.

The change in government administration and presumably of programs and policies to generate employment was observed to have certainly affected employment performance as shown by the differences in the pattern of regional employment growth through the years and across regions.

With the employment trends and the factors that affect them, the study found out that the general comparative advantage of a region highly depended on the performance of its leading sectors. No region showed a consistent comparative advantage from 1986-2004. Favorable industry structure was often achieved when the leading industries were fast growing sectors. It was remarkable that in every study period, there were only 3 regions that had favorable industrial makeup. Despite the dynamic changes in the country's industrial activity, NCR and Region IV maintained a favorable industry structure from 1986-2004. Region III obtained a good industry mix from 1986-2000, while ARMM was from 2001-2004.

Since shift-share is a descriptive analytical tool, it is also necessary that the analysis imparted in this study be supplemented by other methods of regional analysis.

References

- Martin Shields, 'Using Employment Data to Better Understand Your Local Economy', College of Agricultural Sciences, Agricultural Research and Cooperative Extension, <http://pubs.cas.psu.edu/freepubs/pdfs/UA373.pdf>, (cited 15 March 2006)
- Mian B. Ali, P. Nagarajan, and Wimal Rankaduwa, 'Structural Adaptation of Atlantic Provinces: Growth of Employment and Output: 1987-1997', University of Prince Edward Island, http://www.unb.ca/econ/acea/P&P_2001_AliEtAlEmployment.pdf, (cited 22 February 2006)
- Mustafa Dinc, 'Regional and Local Economic Analysis Tools' (2002), <http://info.worldbank.org/etools/docs/library/128789/Dinc%202001.pdf>, (cited 18 July 2006)
- National Statistical Coordination Board, 'Philippine Statistical Yearbook' (1987, 1992, 1998, 2001, 2005). Republic of the Philippines.