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THE IMPACT OF MANUFACTURING CONCENTRATION ON REGIONAL INEQUALITY: A CASE OF REGENCY IN JAVA REGION, INDONESIA

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ABSTRACT

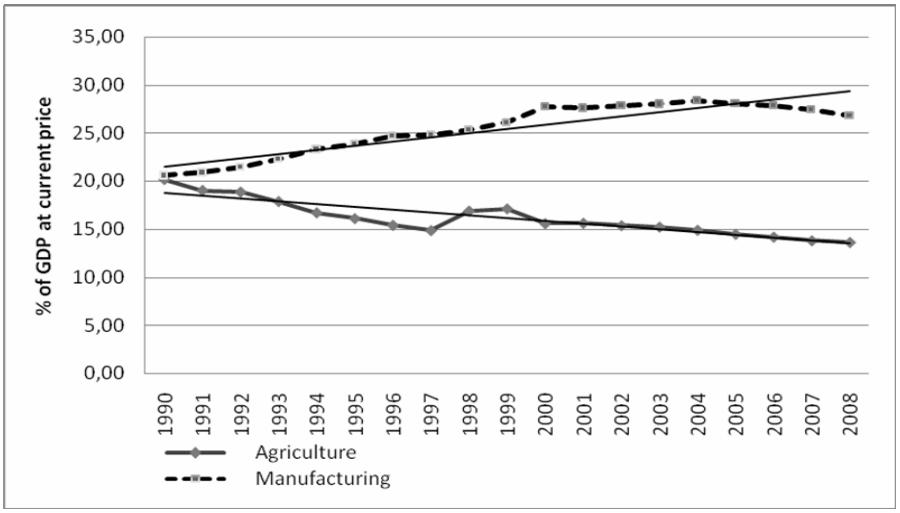
Concentration of manufacturing is an interesting topic in location of economic activity since manufacturing was the leading sector in the Indonesian economy. The previous studies demonstrated that firms were localized in major metropolitan areas as well as a set of emerging regions. The paper aim to complement the findings of the previous studies related to geographical concentration of manufacturing industry by exploring the impact of manufacturing concentration on regional inequality in the regency in Java during the 1998-2007. The Theil index and the location quotient index are employed in order to analysis the inequality and the location of manufacturing industry in Java region.

The study found that the Theil index shows an increasing trend implying that the inequality of the manufacturing industry within regencies has increase. While, the inequality between regency shows a decreasing trend over the period of observation implying that the manufacturing industry in Java spreads only in several regencies. The location quotient index shows an increasing trend that reveals the economy of some regencies are more dependent in manufacturing industry and at the same time it shows that several new manufacturing areas has emerged in Java.

Keywords: *concentration, inequality, manufacturing, Java region*

INTRODUCTION

The structural change in Indonesia economic activities from agriculture to manufacturing sectors, as shown in Figure 1 shows that manufacturing has became an important sector in its contribution to the Indonesian Gross Domestic Product (GDP). During 1990-2008 the role of manufacturing is become important as the engine of growth while agricultural at the same time shows decreasing gradually. Manufacturing was a major contributor to the Indonesia economy which the share on GDP accounted more than 20 percent while the agricultural sector only contributed about 13 percent in 2008. It indicated that the domination of primary sector which based on the agriculture has been replaced by the secondary sector which based on manufacturing.



Source: Central Statistical Office of the Republic of Indonesia (2011)

Figure 1. The Role of Manufacturing and Agricultural to Indonesia Gross Domestic Product (GDP) at Constant Prices 2000

The succeed picture regarding the development of manufacturing industry in Indonesia, however, is not accompany by the distribution of manufacturing around the region. Manufacturing industry only concentrated in certain region and not in other. Data on the number of establishments of manufacturing industry between Java and outside of Java as presented in Table 1 shows that more than 80 percent of total manufacturing industry in Indonesia is located in Java, while the rest is distributed into outside of Java. Further, Kuncoro (2002) in his study found that the concentration of manufacturing industry located in Java was formed that called two-poles patterns of concentration (bipolar pattern) between west and east region.

The densely population of Java is considered as one of the factor that supported for the manufacturing industry to choose and located in Java. The high number of population in Java has an advantage in terms of localization and urbanization economies (Kuncoro, 2002). However, when viewed in more detailed, it was found that the economic activities were

Table 1. The Location of Indonesian Manufacturing Industry (No. of Establishments and Percentage)

Location	2000	2001	2002	2003	2004	2005
Java	17,995	17,413	17,118	16,607	16,901	16,995
	(81.15%)	(81.38%)	(80.95%)	(81.71%)	(81.71%)	(81.99%)
Outside of Java	4,179	3,983	4,028	3,717	3,784	3,734
	(18.85%)	(18.62%)	(19.05%)	(18.29%)	(18.29%)	(18.01%)
Total	22,174	21,396	21,146	20,324	20,685	20,729
	(100)	(100)	(100)	(100)	(100)	(100)

Source: Central Statistical Office of the Republic of Indonesia (2011)

concentrated in certain areas only. It means that the concentration of manufacturing industry in Java were geographical gaps in the smaller circles. For instance, observations in one pole of the existing concentration, Kuncoro (2002) found that there were several concentration of economic activities in the region, for example in Jakarta and surrounding areas such as Bogor, Tangerang and Serang, Bekasi, and Karawang the concentration of manufacturing was called Jabotabek *Extended Industrial Area* (EIA); Surabaya and the surrounding areas such as Sidoarjo, Gresik, Pasuruan, Mojokerto was called Surabaya EIA; city of Bandung and surrounding areas (Bandung and Purwakarta); Semarang and surrounding areas (Salatiga, Kudus, Kendal); and Surakarta and surrounding areas (Klaten, Sukoharjo, Karanganyar).

In recent years, the study related to industrial concentration in several countries has been carried out by many scholars while for developing countries is very rarely (Kuncoro, 2002). For Indonesian context, we found that only several studies focused on the industrial concentration such Kuncoro (2002) which took the samples throughout the provinces in Indonesia during 1976-2001; Landiyanto (2003) for the case of manufacturing industry in Surabaya for 1994 and 2002; Hidayati and Kuncoro (2005) for the case of manufacturing industry in Jakarta and Bandung for 1980-2000; Suria (2004) in the case of manufacturing industry in East Java for 1998-2003; and Arifin (2003) for the manufacturing industry in West Java between 1990-1999.

The motivation of the study is to investigate whether concentration of manufacturing industry have impact on regional inequality of the Java region. This paper is organized as follows: in the next section, we offer a brief review of the literature dealing with empirical studies related to manufacturing concentration and regional inequality. The methodology related to data and details of the method of analysis are discussed in Section 3. Section 4 discusses the empirical finding. The summary and implication in Section 5.

LITERATURE REVIEW

This section discussed the literature dealing with empirical studies related to concentration of manufacturing and regional inequality particularly in Indonesia contexts. The several empirical studies could be summarized from the studies Suharto (2002), Kuncoro (2002), Arifin (2003), Landiyanto (2003; 2005), and Hidayati and Kuncoro (2005).

Suharto (2002) explored the trend of regional disparity, specialization, and concentration of manufacturing employment in Indonesia by province and sub-sector with the focus on the large and medium firms of manufacturing industry. His study used secondary data on industrial survey conducted by Central Statistical Office of the Republic of Indonesia for period 1993-1996. The comparative tools consist of the Theil index; regional specialization index, regional Gini coefficient, and locational Gini coefficient were employed in his studies. He found that regional inequality in Indonesia manufacturing employment relatively high, compared to the international inequality standard. However, the study found that the disparity among province and the main island tended to be stable. To sum up, he concluded that the distribution of regional manufacturing industry employment was not different with the overall distribution (national). With the exception of the wood (ISIC 33) and textile (ISIC 32) industries, the manufacturing industry employment was relatively well distributed.

Kuncoro (2002) explored about to what extent the unequal geographical distribution of manufacturing activities in Indonesia has persisted or changed over time. Using the Theil's entropy index, his study proved useful to highlight the uneven geographic distribution in Indonesia. First, he found that Indonesia constitutes an extreme case of geographical concentration. Second, the entropy between is-

lands has played a prominent role in explaining the spatial inequality across provinces in Indonesia. Third, the pattern of spatial inequality formed a "U" curve suggesting a period of dispersing manufacturing activity has been replaced by a period of increasing geographic concentration. Fourth, the Chow tests confirmed that structural change has occurred from 1985 onwards. In the main finding, he concluded that there was a challenge the general consensus in the new economic geography that trade liberalization encourages dispersing manufacturing activity.

Arifin (2003) identified the spatial concentration of large and medium manufacturing industry throughout 25 districts in West Java, Indonesia. Using secondary and establishment data from Central Statistical Office of the Republic of Indonesia for the period 1990 to 1999, the study employed the Geographic Information System (GIS), logistic regression, panel data regression and convergence analysis to identify whether the spatial concentration exists in West Java. He found that the growth of industry in West Java was not distributed equally among districts. Further, several districts have a high industry concentration; meanwhile some district have a low industry concentration. The manufacturing industry mainly concentrated in Botabek (Bogor, Tangerang and Bekasi) and Bandung areas. The logistic regression results that labor cost (salary), output, FDI, economics of scale, dummy crisis and dummy industry were significantly explained on the concentration of manufacturing in West Java with different signs.

Using employment and value added data for manufacturing industries in Surabaya for period 1994 and 2002, and based on the LQ index, Ellison and Glaeser index (Ellison and Glaeser, 1997), and Maurel Sedillot index, Landiyanto (2003) found that manufacturing industry was concentrated in the sub-districts (*kecamatan*) of Rungkut, Tandes and Sawahan, which the industry of food, beverage, and tobacco and metal, machinery and equipment as a leading industry. Further, Landiyanto (2005) investigated the concentration of East Java manufacturing industry, the locational distribution, and the relation between the spatial concentration and specialization of industrial in East Java. He used Location Quotient, Herfindahl Index, Elison-Glaeser Index, Krugman regional specialization index, and Krugman bilateral index to analyze the data. He found that in manufacturing industry, spatial concentration was determined by wages, transportation cost, market access, and externalities which related with localization economies and urbanization economies. The existence of spatial concentration has a relation with industrial specialization which based on industrial structure on that region.

Hidayati and Kuncoro (2005) examined the existence of industrial concentration in Java and they found that industry concentration became a bipolar pattern: Western (Jakarta and Bandung Greater) and Eastern (Surabaya Greater). Using Geographic Information System (GIS), the study attempted to identify where the agglomeration of Large and Medium Establishment (LME) which tended to locate within the DKI Jakarta and West Java regions as one of industrial concentration polar in Java, to observe its pattern and dynamics in the 1980-2000 period, and to prove whether the industrial concentrations in those regions develop into one big agglomeration or separated. The result of the study showed that in the early of the observation (1980), there were only two industrial agglomeration districts particularly marked "high" criteria in both employment and value added, but in the next decade, a few new industrial agglomeration emerged, moreover in 2000, 13 districts have been observed. For some years of observation, the pattern and dynamics of industrial agglomeration were extending. The extending of the agglomeration was only taking place in the main metropolitan region, Jakarta and

Bandung, and its surrounding regions known as Extended Metropolitan Region (EMR). The study also found the empirical evidence that by 2000, the developing of industrial agglomeration in western polar has been developing into a network city joining Jakarta and Bandung Metropolitan Region as one big agglomeration.

METHODOLOGY

The main purpose of this section is to explain the data and the method of analysis used in the study. The descriptions of the data are presented in the next section. This is followed by section two that describes the method of the analysis.

1. Data

The data used in the study is secondary data. The data is retrieved from the annual survey on large and medium size manufacturing industry conducted by Central Statistical Office of The Republic of Indonesia for period 1998 to 2007 which covers 96 regencies in six provinces in Java region. The six provinces are West Java, Central Java, East Java, D.K.I. Jakarta, D.I. Yogyakarta, and Banten. The West Java province consists of 19 regencies. While the Central Java and East Java, each consist of 31 regencies. The D.K.I. Jakarta, D.I. Yogyakarta, and Banten, each comprise of five regencies.

Medium and large size of manufacturing industry is defined as an establishment that has 20 or more workers. The 3-digit manufacturing industry is selected because it is the highest level of disaggregated manufacturing industry available at the regency level. The data set consists of value added, total number of employees, total payroll for all employees, production worker wages, and exports- or non-exports oriented types of industry. There are 43 three-digit manufacturing industry listed in the *Kelompok Lapangan Usaha Industri (SIC).*

For the purpose of the analysis, the data are selected based on the share of manufacturing output of regency in the Regional Gross Domestic Product (RGDP). The high the share of manufacturing industry in the RGDP means that the high the dependent of a regency on manufacturing industry. The threshold of manufacturing contribution used in this study is a modified version of the study of Bostics, *et al.* (1997). In their study, Bostic, *et al.* used three threshold levels based on the share of employment in manufacturing industry as a percentage of total employment to determine a localized city-industry. The modified of threshold levels, using output data, in the present study are 0.5 percent, 1 percent, and 5 percent. The levels of threshold of output are determined arbitrarily. If the manufacturing industry in regency has a minimum threshold level of employment, for example 0.5 percent, then the regency is included in the sample. Any regency that has less than 0.5 percent level of manufacturfing employment is excluded from the sample.

2. Method of Analysis

The objective of study is to investigate the impact of manufacturing concentration on regional inequality in Java region. In order to investigate this impact, this study employed two procedures: (1) We employ the Theil index to calculate whether inequality between and within region exist over the regency in Java region, and (2) We identify the manufacturing specialization using location quotients (LQs) method. The calculation for those methods is given as follows:

(1) The Theil index

The study used Theil index to investigate whether regional inequality between and within regency exist in Java region. The index was introduced by Henri Theil (1969), which is then more popular, referred to as the Theil index. As presented by Kuncoro (2002), Theil index have advantages to study on regional

inequality since the index has ability to distinguish the gap "between regions" (inequality between region) and gap "in one area" (within-region of inequality). In our study, the total of employment was chosen as the basis analysis to calculate Theil index. The formula is given as follows (Kuncoro, 2002):

$$T\ (s)\ =\ \sum_{i=1}^{N}\ s_i\ \log\ \left(\ \frac{s_i}{N}\ \right) \qquad (1)$$

where *T(s)* is the overall Theil index over spatial gaps in the Java which show from the share of regency *i* to total employment of manufacturing in Java, and *N* is the number of regency. Low index means low in the gap of inequality, and high index indicates high inequality.

In order to check whether concentration of manufacturing in each province based on employment data using Equation 1 was given validity results, we will test using analysis of variance (ANOVA) with hypotheses as follows:

Null hypothesis H_0: $\alpha_1 = \alpha_2 = \alpha_3 = \ldots = \alpha_t$

Means that there is no differences concentration of industrial location during observation.

Alternative hypothesis H_1: $\alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \ldots \neq \alpha_t$

Means that there is differences concentration of industrial location during observation.

The procedure testing is if the value of $F_{calculated} < F_{table}$, then null hypothesis (Ho) is accepted and vice versa, meaning that it can be said there was no difference in the concentration level of manufacturing based on employment during the observation period (1998-2007).

(2) Location Quotient index

The location quotient is most frequently used in locational analysis, economic geography, and population geography, but it has much wider applicability. The location quotient (LQ) is an index for comparing an area's share of a particular activity with the area's share of some basic or aggregate. In our study, the LQ is used to identify areas of industrial specialization for industries, states, and regions. The LQ compares the proportion of employment in a particular industry within the local economy to the proportion of employment in that same industry within a larger reference economy (Miller, 1998; McCann, 2001). For computation, the following formula is used:

$$LQ_i = (e_i/e) / (E_i/E) \qquad (2)$$

where LQ_i the location quotient of industry *i* in the local region, e_i employment of industry *i* in the local region, *e* total manufacturing employment in the local region, E_i reference area employment in industri *i*, *E* total reference area manufacturing employment. Here total manufacturing employment includes employment in medium and large scale manufacturing industries. The regencies with a LQ greater than one are selected as having concentrated manufacturing and those with LQ of less than one are selected as having dispersed manufacturing. An increase in the LQ value of a region can be considered as an indication of the increasing importance of the region as a locus of manufacturing activities.

FINDING

As the explained in the methodology section previously, the unit of analysis of this study is the three-digit SIC manufacturing industry at regency level in six provinces in Java region during 1998-2007. The whole regency in Java consists of 96 regencies. In order to select the regency as the sample of study, the study was modified the threshold as used by Bostics, *et al.* (1997). For our study, the four threshold levels of manufacturing output in Growth Regional Domestic Product (GRDP) are used. These threshold levels are 0.5, 1, 5, and 10 percents. Based on the

calculation for each threshold, our study was chosen 0.5 percent as the minimum threshold. Therefore, regency that has a minimum share of 0.5 percent manufacturing output in RGDP is included in the analysis.

The simulation for each threshold used in the study based on the data on growth regional domestic product for the whole regency in Java during 2006 and 2007. In 2006 we found that there were 42 out of 96 regencies that have a minimum of 0.5 percent of manufacturing output in their GRDP in period 2006. However, there were 30 regencies that have a minimum of 1 percent of manufacturing output in their GRDP. If the threshold level was increased to 5 percent, then there were 11 regencies in the sample. Further, it is found that five regencies that have a minimum of 10 percent of manufacturing output in their GRDP. In 2007, there were 42 and 30 regencies for the threshold levels of 0.5 and 1 percents, respectively. For the threshold levels of 5 percent and 10 percent, the number of regencies was 12 and 6 regencies, respectively. Thus, for the sample, this study employed a threshold level of 0.5 percent in selecting the sample of regency. Those regencies that have less that 0.5 percent level of manufacturing output in their GRDP are excluded from the analysis.

Based on the simulation using data on GRDP for each threshold as described previously, the study was chosen 0.5 percent of threshold as the minimum requirement for regency included in the sample, while other are exclude. Table 2 presents the sample of regencies that has a minimum 0.5 percent of manufacturing output in their GRDP. There were 10 out of 19 regencies in West Java were included in the sample of the study. Central Java was represented by 12 out of 31 regencies and East Java has 7 out of 31 regencies in the sample. All regencies in the D.I. Yogyakarta and Banten were included in sample, while 3 out of 5 regencies in D.K.I. Jakarta were also included. The total of samples used in the study is 42 out of the total 96 regencies (43.75 percent) in Java.

1. The Theil Index

The Theil index used to investigate the gap both between and within regions in Java based on the employment data. The Theil have two values, close to zero and close to one. If the value is close to zero means that the manufacturing industry is more scattered, while if the Theil index is close to one means that the industry tends to be concentrated.

Table 2. Sample of Study considered, based on 0.5 percent of Threshold

West Java	Central Java	East Java	DKI Jakarta	DI Yogyakarta	Banten
Bandung	Cilacap	Gresik	East Jakarta	Bantul	Lebak
Bekasi	Jepara	Kediri	West Jakarta	Gunung Kidul	Pandeglang
Bogor	Karanganyar	Malang	North Jakarta	Kulon Progo	Serang
Cirebon	Kendal	Mojokerto		Sleman	Tangerang
Indramayu	Klaten	Pasuruan		Yogyakarta	Cilegon
Karawang	Kudus	Sidoarjo			
Purwakarta	Pati	Surabaya			
Sukabumi	Pekalongan				
Depok	Semarang				
Cimahi	Sukoharjo				
	Tegal				
	Surakarta				
10 samples	12 samples	7 samples	3 samples	5 samples	5 samples

(a) The Trend

Table 3 and Figure 2 display the trend of the Theil index for 42 regencies in Java during 1998-2007. From the Table 3, it can be seen that the Theil index for regency in Java during the period of observation shows an increasing trend. An increasing in the Theil index shows inequality within a regency, while for inequality between regency shows decreasing gradually over the period of observation. It indicates that manufacturing industry in 42 regencies in Java are spread only in several regencies. Furthermore, the existence of this fluctuation also reflects the existence of gaps. However, to ascertain whether there were changes in the concentration levels or not, we need to test statistically, and it is explained in the next section.

An increasing trend in the Theil index indicates that during 1998 to 2007 there is a decreasing dispersion of manufacturing industry in Java. In other words, until 2007 there is sufficient evidence that spatial concentration of manufacturing industry in Java has increase gradually.

Table 3. The Theil Index for Java based on Regency, 1998-2007

Year	Between Regency	Within Regency	Total	Percentages	
				(Between/Total)	(Within/Total)
1998	0.2610	0.7306	0.9917	26.32	73.68
1999	0.2662	0.7480	1.0141	26.25	73.75
2000	0.2660	0.7563	1.0222	26.02	73.98
2001	0.2655	0.9940	1.2595	21.08	78.92
2002	0.2416	1.0130	1.2546	19.26	80.74
2003	0.2373	0.9958	1.2331	19.25	80.75
2004	0.2412	0.9876	1.2288	19.63	80.37
2005	0.2304	0.9773	1.2077	19.08	80.92
2006	0.2249	0.9337	1.1586	19.41	80.59
2007	0.2304	1.1828	1.4133	16.30	83.70

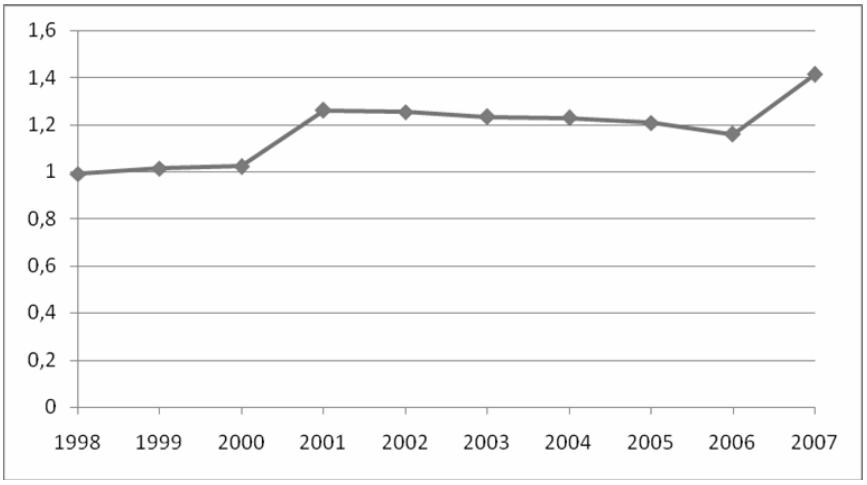


Figure 2. The Trend of Total Theil index: Java, 1998-2007

Inequality between Regency

In term of spatial inequality between regency, from the Table 3, it can be seen that the Theil index shows a declining trend for the inequality between regency. This indicates that during the period 1998-2007 there has been increased dispersion of manufacturing industry in Java. In other words, until 2008, there was evidence that spatial concentration tends to decrease. The difference of a significant share of the workforce over the period 1998-2007 was the cause evidence of spatial concentration. It can be seen from the sixth column of Table 3 which displays that about 73-83 percentages spatial disparity in Java described by the degree of difference between the labor share of the regency.

From the Figure 3, it is found that the Theil index between regency shows an increasing trend during the 1998-2001. This reflects that there is an increasing trend of spatial concentration in some regency or in other words there was a decrease in spatial dispersion of manufacturing industry in 1998-2001. However, this index began to decline gradually beginning 2002, which indicate a declining trend of spatial concentration in some regency.

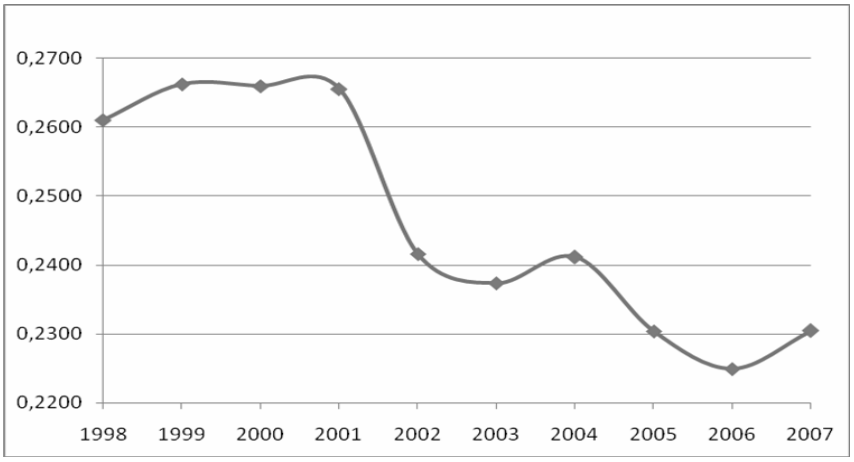


Figure 3. The Trend of Theil Entropy between Regency, 1998-2007

Table 4. Theil Index for Spatial Inequality within Regency, 1998-2007

Year	West Java	Central Java	East Java	DKI Jakarta	DI Yogyakarta	Banten
1998	0.3378	0.1619	0.0501	0.0349	0.1459	-
1999	0.3365	0.1697	0.0496	0.0368	0.1554	-
2000	0.3379	0.1650	0.0465	0.0429	0.1640	-
2001	0.2965	0.1567	0.0440	0.0421	0.1594	0.2952
2002	0.1815	0.1610	0.0443	0.0432	0.1675	0.4156
2003	0.1835	0.1537	0.0418	0.0544	0.1688	0.3935
2004	0.1792	0.1689	0.0462	0.0510	0.1341	0.4083
2005	0.1762	0.1795	0.0449	0.0543	0.1217	0.4007
2006	0.1582	0.1646	0.0390	0.0307	0.1300	0.4111
2007	0.1647	0.2345	0.0361	0.0901	0.2168	0.4405

Inequality within Regency

Turning to inequality within regency, Table 4 displays the Theil index of spatial inequality within regency in Java during 1998 to 2007. From the table, it can be seen that the trend of spatial inequality within regency are consistent with the spatial inequality of Java (see Table 2) which shows an upward trend. An increase in entropy index in one regency indicates that the share of industrial employment tends to increase during the period of study. Specifically, Theil index of West Java and Central Java shows relatively high value compared to other provinces. In 1998, the Theil index for West Java and Central Java were 0.3378 and 0.1619, respectively. This index rose to 0.1647 for West Java and to be 0.2345 for Central Java for the period 2007.

(b) Statistical Tests

Statistical test for Theil index is employed in order to see whether spatial inequality between and within regency for manufacturing industry in 42 regency in Java as shown in the manufacturing trend in previous section was difference between one to other observation during 1998-2007. To reach the objective, this study employs a single factor *analysis of variance* (ANOVA) with the hypotheses of:

Null hypothesis (H_0): $\mu_1 = \mu_2 = \mu_3 = \ldots = \mu_t$.

There is no difference concentration of industrial location during observation.

Alternative hypothesis (H_1): $\mu_1 \neq \mu_2 \neq \mu_3 \neq \ldots \neq \mu_t$.

There is difference concentration of industrial location during observation.

Table 5 presents the ANOVA results for Theil index's hypothesis testing for inequality between regency and within regency. From the Table 5, it is found that the Theil's hypothesis testing for between regency give the result of F calculated (0.060645) that is smaller than the F critical (1.903903). It means that the alternative hypothesis (H1) is rejected and therefore, the null hypothesis (H0) is accepted. Thus there is sufficient statistical evidence to say that there is no difference in the concentration level of manufacturing during the observation. In terms of the Theil index within regency, the ANOVA also give a similar pattern as shown by between regency, which F calculated (0.030421) smaller than the F critical (1.903841), means that the null hypothesis (H0) is accepted and therefore rejected alternative hypothesis (H1).

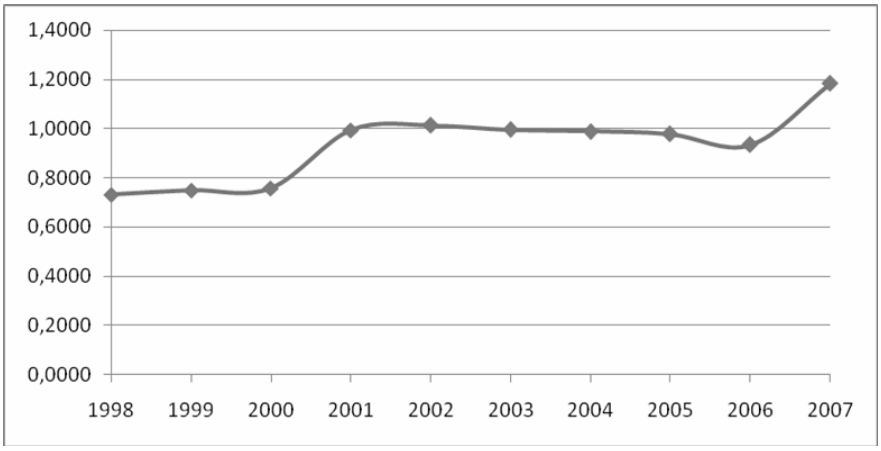


Figure 4. The Trend of Theil Entropy within Regency, 1998-2007

Table 5. The Theil Index's Hypothesis Testing

ANOVA between Regency

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.000263	9	2.92E-05	0.060645	0.999954	1.903903
Within Groups	0.187729	390	0.000481			
Total	0.187992	399				

ANOVA Within Regency

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.0018568	9	0.0002063	0.030421	0.999997	1.903841
Within Groups	2.6517338	391	0.0067819			
Total	2.6535907	400				

2. Location Quotient Index

This study used Location Quotient index (LQ) to investigate the level of relative advantage of a sector in one region compared with other region based on the employment data on manufacturing industry in 42 regencies in Java. The LQ results could be classified into: (1) LQ>1, means that the manufacturing in a region is a manufacturing base, become a leading and has the potential to be developed; (2) LQ<1, means that the manufacturing in an area is not an industrial base as well as group of industry; and, (3) LQ=1, means that the manufacturing in a particular area is only able to fulfill its own territory.

One important point to be kept in mind is about the LQ result is that the change in the value of LQ is affected by regional population shifts. In most cases, an increase in the index is accompanied by an increase in manufacturing employment since our study use this manufacturing data. In the same manner, a decrease in the index does not always mean the loss of employment.

Table 6 presents the LQ results based on employment data for 42 regencies in Java during 1998 to 2007. Regencies with LQ more than one are classified as industrial area, while LQ less than one is called not an industrial area. From the Table 6, it can be seen that there were 15 out of 42 regencies in Java which have LQ > 1 in 1998. In 2001 the number of regency increasing to 19 regencies then was continuing increase to 25 regencies in 2004. But in 2007, the total of regency with LQ>1 was slightly decreased to 20 regencies. For the summary, the increasing of the LQ value during the period of study showed that there was more areas became new industrial areas. In other words, the manufacturing in Java has spread over the last 10 years.

Based on the Table 7, it can be seen that the 42 regencies in Java were divided into two criteria whereas 20 out of 42 regencies classified as industrial since the average of LQ during the observation shows higher than one. While for the rest (22 regencies) was classified as non industrial areas with the LQ less than one. The interesting found that for the non-industrial areas, the average LQ shows the value that approaching one, it indicate that for the regency in this category has a great chance to become a new industrial area in the next few years.

Table 6. Location Quotient Index for Regencies in Java, 1998-2007

Regency	1998	2001	2004	2007	Average (1998-2007)	Classified	Decisions
Bandung (WJ)	1.21	1.20	0.82	0.86	0.995	LQ < 1	Not Industrial
Bantul (YK)	0.80	1.07	1.04	1.08	0.996	LQ < 1	Not Industrial
Bekasi (WJ)	1.00	0.98	1.09	0.72	0.986	LQ < 1	Not Industrial
Bogor (WJ)	1.11	0.96	1.01	1.06	1.005	LQ > 1	Industrial
Cilacap (CJ)	0.72	1.44	0.64	0.64	0.986	LQ < 1	Not Industrial
Cilegon (BT)	-	1.05	0.99	0.24	0.938	LQ < 1	Not Industrial
Cimahi (WJ)	-	-	1.74	2.02	1.741	LQ > 1	Industrial
Cirebon (WJ)	0.94	0.89	1.02	1.12	1.005	LQ > 1	Industrial
Depok (WJ)	-	1.48	1.44	1.29	1.111	LQ > 1	Industrial
Gresik (EJ)	0.91	1.01	1.00	0.84	0.992	LQ < 1	Not Industrial
Gunung Kidul (YK)	1.42	1.02	0.94	0.04	0.972	LQ < 1	Not Industrial
Indramayu (WJ)	0.99	0.80	0.95	0.47	0.967	LQ < 1	Not Industrial
West Jakarta (JK)	1.00	1.03	0.99	0.92	0.994	LQ < 1	Not Industrial
East Jakarta (JK)	1.13	0.99	0.94	0.67	0.982	LQ < 1	Not Industrial
North Jakarta (JK)	0.94	0.99	1.03	1.18	1.011	LQ > 1	Industrial
Jepara (CJ)	1.08	0.76	0.79	1.56	1.006	LQ > 1	Industrial
Karanganyar (CJ)	0.98	0.98	1.10	0.93	1.002	LQ > 1	Industrial
Karawang (WJ)	0.95	0.97	1.03	0.69	0.984	LQ < 1	Not Industrial
Kediri (EJ)	0.98	0.97	1.00	1.26	1.013	LQ > 1	Industrial
Kendal (CJ)	1.36	1.09	1.07	0.36	0.990	LQ < 1	Not Industrial
Klaten (CJ)	0.92	1.10	1.13	0.69	0.989	LQ < 1	Not Industrial
Kudus (CJ)	1.05	0.94	0.93	1.44	1.014	LQ > 1	Industrial
Kulonprogo (YK)	0.52	0.48	1.55	1.79	0.992	LQ < 1	Not Industrial
Lebak (BT)		4.72	0.25	0.05	0.850	LQ < 1	Not Industrial
Malang (EJ)	0.95	0.98	1.00	1.28	1.014	LQ > 1	Industrial
Mojokerto (EJ)	1.00	1.08	0.92	0.93	0.996	LQ < 1	Not Industrial
Pandeglang (BT)		1.56	1.35	0.18	0.925	LQ < 1	Not Industrial
Pasuruan (EJ)	1.00	0.96	1.01	1.06	1.004	LQ > 1	Industrial
Pati (CJ)	0.91	1.05	1.06	0.98	0.999	LQ < 1	Not Industrial
Pekalongan (CJ)	0.89	0.89	0.88	0.56	0.974	LQ < 1	Not Industrial
Purwakarta (WJ)	1.02	0.94	0.91	1.13	1.006	LQ > 1	Industrial
Semarang (CJ)	0.95	1.01	1.03	1.08	1.002	LQ > 1	Industrial
Serang (BT)		0.78	0.99	1.40	1.037	LQ > 1	Industrial
Sidoarjo (EJ)	0.94	1.05	0.97	0.81	0.990	LQ < 1	Not Industrial
Sleman (YK)	0.96	0.95	0.98	1.19	1.006	LQ > 1	Industrial
Sukabumi (WJ)	0.78	0.73	0.90	2.35	1.058	LQ > 1	Industrial
Sukoharjo (CJ)	1.11	1.04	1.02	0.94	1.004	LQ > 1	Industrial
Surabaya (EJ)	1.14	0.96	1.05	1.01	1.001	LQ > 1	Industrial
Surakarta (CJ)	1.15	1.11	1.02	0.67	0.995	LQ < 1	Not Industrial
Tangerang (BT)		0.92	1.03	1.00	1.002	LQ > 1	Industrial
Tegal (CJ)	0.91	0.95	1.17	1.07	1.002	LQ > 1	Industrial
Yogyakarta (YK)	1.41	1.10	0.89	0.45	0.998	LQ < 1	Not Industrial

Notes: WJ is West Java, CJ is Central Java, EJ is East Java, JK is DKI Jakarta, YK is DI Yogyakarta, and BT is Banten.

Table 7. Classification of Regency in Java based on LQ Index

Category	Regency	Average of LQ (1998-2007)
Industrial (LQ > 1)	Bogor (WJ)	1.005
	Cimahi (WJ)	1.741
	Cirebon (WJ)	1.005
	Depok (WJ)	1.111
	North Jakarta (JK)	1.011
	Jepara (CJ)	1.006
	Karanganyar (CJ)	1.002
	Kediri (EJ)	1.013
	Kudus (CJ)	1.014
	Malang (EJ)	1.014
	Pasuruan (EJ)	1.004
	Purwakarta (WJ)	1.006
	Semarang (CJ)	1.002
	Serang (BT)	1.037
	Sleman (YK)	1.006
	Sukabumi (WJ)	1.058
	Sukoharjo (CJ)	1.004
	Surabaya (EJ)	1.001
	Tangerang (BT)	1.002
	Tegal (CJ)	1.002
Not Industrial (LQ < 1)	Bandung (WJ)	0.995
	Bantul (YK)	0.996
	Bekasi (WJ)	0.986
	Cilacap (CJ)	0.986
	Cilegon (BT)	0.938
	Gresik (EJ)	0.992
	Gunung Kidul (YK)	0.972
	Indramayu (WJ)	0.967
	West Jakarta (JK)	0.994
	East Jakarta (JK)	0.982
	Karawang (WJ)	0.984
	Kendal (CJ)	0.990
	Klaten (CJ)	0.989
	Kulonprogo (YK)	0.992
	Lebak (BT)	0.850
	Mojokerto (EJ)	0.996
	Pandeglang (BT)	0.925
	Pati (CJ)	0.999
	Pekalongan (CJ)	0.974
	Sidoarjo (EJ)	0.990
	Surakarta (CJ)	0.995
	Yogyakarta (YK)	0.998

CONCLUSIONS

The objective of the study is to investigate the impact of manufacturing concentration on regional inequality in Java region, Indonesia. Data on manufacturing employment for the whole regency in Java during 1998 to 2007 was used to explain the impact of manufacturing concentration on regional inequality. Before conducting the Theil index and Location Quotient analysis, in the beginning, our study was conduct the selection of sample based on the share of manufacturing on the regional gross domestic product (RGDP) which adopting the procedure proposed by Bostic, Gans and Stern (1997). The 42 regency which have the 0.5 percent threshold level of manufacturing output in RGDP included in the analysis. Thus, the sample of the study consists of 10 out of 19 regencies in West Java, 12 out of 31 regencies in Central Java, and 7 out of 31 regencies for East Java. All of regencies in the DI Yogayakarta and Banten are included in the samples of study, while 3 out of 5 regencies in DKI Jakarta are also included in the sample. Consequently, the total samples used in the study are 42 regencies out of 96 regencies (43.75 percent).

In term of inequality, the Theil index found that there are changes in regional disparities among regency in Java with an increasing trend. An increasing Theil index mainly shows form inequality within regency. While the inequality between regency shows a decreasing gradually over the period of observation. It indicates that manufacturing in 42 regencies in Java are spread only in several regencies. Turning to Location quotient (LQ), our study revealed that the number of regency which has LQ greater than one shows increasing gradually during 1998 to 2007. Specifically, in 1998, there were 15 out of 42 regencies in Java have the LQ index greater than one. In 2001, there 19 regencies have the LQ index greater than one. In 2001, there were 25 regencies have the LQ greater than one. However, in 2007 it was found that 20 regencies have LQ greater than one. Based on the results, we can conclude that increasing the number of regency with have LQ greater than one show that there was more areas become new industrial areas in the next future years. In other words, the manufacturing in Java has spread over the last 10 years.

For the conclusion, concentration of manufacturing in Java region was given effect on regional inequality among regency during the study which was revealed by inequality within regencies that shows increasing trend which implying that the manufacturing industry in Java concentrated only in several regencies. Further, the location quotient index shows an increasing trend that reveals the economy of some regencies are more dependent in manufacturing and at the same time it shows that several new manufacturing areas has emerged in Java. The policy related to development and arrangement of manufacturing is very important in order to encourage the manufacturing to concentrate in other regency. If the manufacturing dispersed gradually for the next year, then the economic growth for the whole regency in Java which based on the manufacturing sector created.

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