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INTERREGIONAL COMPETITION AND
COMPLEMENTARITY IN INDONESIA

Suahasil Nazara, Michael Sonis
and Geoffrey J.D. Hewings

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Suahasil Nazara

Regional Economics Applications Laboratory, University of Illinois, 607, S. Mathews, #236, Urbana, Illinois 61801-3671, USA and Demographic Institute, University of Indonesia, Jakarta, Indonesia
e-mail: nazara@uiuc.edu

Michael Sonis

Regional Economics Applications Laboratory, University of Illinois, 607, S. Mathews, #236, Urbana, Illinois 61801-3671, USA and Bar Ilan University, Ramat Gan, Israel
e-mail: sonism@mail.biu.ac.il

Geoffrey J.D. Hewings

Regional Economics Applications Laboratory, University of Illinois, 607, S. Mathews, #236, Urbana, Illinois 61801-3671, USA
e-mail: hewings@uiuc.edu

Abstract

This paper examines the nature of interregional competition and complementarity in Indonesia. The analysis is important for the island country given the heterogeneity of the regional economies and will provide insights into the structure of economic interactions that should prove useful for policy-makers considering alternative decentralization schemes. Covering the 1975-1999 period, the analysis provides a picture of the interregional interactions by focusing on derived linkages between the regional economies. The analysis is based on the application of the Dendrinos-Sonis model to six major regions in Indonesia. Characterized by a discrete socio-spatial dynamics, the model is empirically applied by making use of the log linear interaction function. The system of interregional interactions is modeled using the Seemingly Unrelated Regression (SUR) estimator. The quantitative analysis confirms the prevailing belief that regions within the western part of Indonesia complement each other, i.e., their relative share of income increasing simultaneously. In addition, there is also evidence that the western part is in competition with the eastern part Indonesia, i.e., the relative share of the former increases on the expense of the latter. The nature of the competition and complementarity that is revealed raises important issues for the development of appropriate policy initiatives designed to address problems of efficiency and equity in the distribution of national expenditures in the decades ahead.

1. Introduction

Entering the new millennium, Indonesia has adopted a new regional policy that highlights decentralization. Although the term is not altogether new to the country's regional policies, the new scheme introduces entirely new features. The district and city (*kabupaten* and *kota*) have full regional autonomy, the province has a much greater autonomy power than before, and the national or central government has only limited areas of responsibility. One of the important

research questions arising from these new policies is the degree to which the new scheme will bring new forms of interregional relationships in two senses. First, how will this change vertically related interregional relationship (national-regional) and secondly, how will the relationships change between the regions (horizontal relationships).

This paper focuses on the horizontal relationship among regions in Indonesia at a macro level. Indonesia is divided into six major regions, Sumatra, Java, Bali and Nusa Tenggara, Kalimantan, Sulawesi, Maluku & Papua, shown in figure 1. While this set of regions may not be optimal from a policy perspective, the provincial aggregation into six regions is driven in large part by limitations in the time series regional data in Indonesia. The 1975-1999 Gross Domestic Regional Product, deflated by the 1993 constant price, data are used in this study.



Figure 1: Indonesian regions

Regional interaction can take many forms. A fairly simple, yet appealing, classification involves the possibility of a region to engage in a competition or complementarity mode with another. A literature review on this subject will be the topic of Section 2. More specifically discussion will center on the appropriate meaning of the term regional competition. Section 3 of the paper will discuss recent Indonesian regional development. Next, Section 4 elaborates the model used in

this study, i.e., the Dendrinos-Sonis model. This section will also discuss some estimation procedures appropriate for the model. The fifth part presents the results of estimation and analysis of the outcome. Both quantitative and qualitative interpretations will be discussed here. Section 6 returns to engage policy perspectives for the results of this study. Some concluding comments complete the paper.

2. Regional Competition: A Review of Literature

Referring back to the tradition in the regional economics' literature, the notion of interregional competition and complementarity is well illustrated by the competitive-generative theory of regional growth as outlined by Richardson (1973). The theory offers two ways of looking at national growth from regional perspectives. In the competitive framework, regions are seen as competing for a somewhat existing and predetermined national level of economic growth. The national level growth is then to be distributed among competing regions in a zero-sum manner, in the sense that higher growth received by one region must be at the cost of growth in another region. In retrospect, regions in the system are in a competitive rather than in a complementary mode – this aspect was not considered by Richardson. From the policy perspective, recommendation is made to maximize the national growth as well as to find a suitable way of distributing it among the regions (the efficiency-equity trade-off). On the other hand, looking at regional growth as a generative process, the national level growth is seen as an aggregate of what happens in the regions. Regions form the nation, and status of the latter is largely determined by those of the former. In this sense, regions are not in a competing mode with one another, and growth of one is not seen as coming at a cost to the others. Rather, economic growth is seen as something attached to a particular location or region. Hence, economic growth of one region is seen as making a favorable contribution to national growth. Policy recommendations will center on how to maximize the growth at a particular location or region, as this will be identical to maximizing overall national growth.

Implicit in Richardson's view are two notions of interregional interaction: vertical and horizontal relationships. The vertical interregional relationship captures the spatial hierarchical ties between upper (nation) and lower (region) economies. In many instances, analysis within this

sphere has been extended toward the central-local, or federal-state, government relationship. On the other hand, the horizontal interregional relationship, the focus of this paper, explores relationships among the regions at the same level in the hierarchy of the economy. The relationship in question may take the form of competition or complementarity.

However, the term regional competition is not self-explanatory; a region does not literally compete one with another. Hence, a more elaborate definition is essential. Cheshire and Gordon (1998) define regional competition as the promotion of local economic development in competition with other regions. In the same spirit, Poot (2000:205) defines the term as the actions of economic agents that are taken to enhance the standard of living of their own territories, such as regions, cities, or countries. Implicit in the first definition, and explicit in the second, is the involvement of actors. Hence, it is the agent within a specific region who carries out the competition. The government is of course an important agent in regional economies. In most cases, the government may even become involved in a policy making process that would benefit other agents in the region in their competition with agents in the rest of the regions. Johansson (2000) calls this the ‘policy-supported competition.’

It is also important to identify the elements of competition. Funck (1995, 2000) categorizes the elements into two broad types: the hard factors and the soft factors. He outlines those factors as follows (Funck, 2000: p. 69, Figure 3.1.)

Hard location factors:

- (1) geographic situation, topographic specifications
- (2) position in the transport and communication networks
- (3) tie-in with utility supply and disposal systems
- (4) access to infrastructure establishments of various kinds (e.g., research and development, educational, cultural, health, jurisdictional, administrative institutions), their capacity and levels of quality
- (5) capacity, level of quality, and degree of diversity of human resources (or: structure of labour market)
- (6) sectoral, size, and control structure of existing economic activities
- (7) structure and levels of wages, prices, etc.
- (8) structure and levels of taxes, subsidies, etc.

Soft location factors:

- (1) intensity, diversity, and level of quality of cultural activities, and recreational offers
- (2) quality of natural and man-made environment
- (3) creative climate (as expressed in the degree of multiplicity of political and intellectual discussion, participation of citizens in public affairs, etc.
- (4) identification of local citizens with their location –city or region– based on historical, cultural motivation, and future aspirations
- (5) conditions that result in external benefits and diseconomies

- (6) conditions that result in internal benefits and diseconomies
- (7) pecuniary external effects (market imperfections)

These regional differentiating factors are, in principle, inputs to production processes. In a system of territorial interactions, the early tradition in trade economics refers to the Heckscher-Ohlin-Samuelson (HOS) theorem. It says that countries will produce and export goods that use intensively the locally available abundant factor(s). Another important feature of regional interaction is the assumption of free factor mobility. Factors are assumed to move to places offering higher payment. Further development in the field confronts the theorem with its inability to explain fairly significant amounts of intraregional trade, especially in the economic integration process in Europe. From the recent advances in trade theory, another explanation for trade relationship can be articulated. Krugman (1979) and Helpman and Krugman (1985) point out another important factor, namely economies of scale. Large markets enable firms to specialize and lower the costs of production. The explanation roots itself in the old policy perspective in the economics of development, dating back to the famous big-push theory (Rosenstein-Rodan, 1943) that also has the increasing return to scale as the main backbone.

Referring back to the hard and soft location factors outlined above, it is not surprising that the increasing return to scale would characterize any economy –both regional and national alike– which standard neoclassical economic literature will only argue to depend on capital and labor inputs. In addition, increasing returns to scale are also important in explaining the distribution of regional development. It is implicitly present in two forces of spatial allocation of economic activity, namely the growing centripetal and the diminishing centrifugal forces (Fujita and Thisse, 1996). The growing centripetal force takes its form from the growing agglomeration economies, while the diminishing centrifugal force is basically a result of decreasing transportation costs.

A more intensive regional interaction, therefore, is unavoidable for two important reasons. First, it is part of the production agent's strategy to enlarge the market, thus gaining further from the increasing returns to scale. In other words, it is greater trade intensity. However, increasing trade is also induced by the regional concentration that is induced by the agglomeration economies in the first place. This second driving factor stems from the fact that a regional

concentration is not a self-sufficient entity, enhancing the interregional trade further. This process of interaction raises a number of questions; however, the present paper focuses only on the extent of competition and complementarity in the interregional interaction. More specifically we will see the case of Indonesia.

3. Regional Economic Development

Tradition in the line of research addressing the horizontal interactions among regions in Indonesia is somewhat limited, unfortunately. Two specific reasons account for that. First is the fact that regional economies are dominated by the public sector. It is simply a fact that, in most cases, the public sector is the main engine of regional and local economies. What makes the analysis of horizontal interaction somewhat limited is that regional and local governments are highly dependent on the upper (central level) government. Studies in interregional interaction in the Indonesian case are more focused toward the vertical interaction rather than its horizontal counterpart. The second reason is the limited data. Clearly, studies regarding the horizontal interaction mechanism require the horizontal interaction data. Flows of input and output, horizontal, spatial interregional transfers, and horizontal spatial spillover effects or externalities are the types of essential data for such studies. Needless to say that the system of regional data system is still a major problem in Indonesian regional analysis.

The notion whether regions within a country are in a competitive or complement fashion is very relevant to countries like Indonesia. The country has, up to now, 32 provinces covering more than 13,000 islands. Six major regions are identified for this analysis. They are Sumatra, Java, Kalimantan, Sulawesi, Bali and Nusa Tenggara, and Maluku and Papua. Naturally regions follow the administrative, provincial boundaries. It has been a general fact that the western part of Indonesia is much more prosperous than the eastern counterpart. The former, comprising of Sumatra, Java and Kalimantan, is believed to have received a more favorable share of national development.

After thirty years of active government intervention, a logical question to ask would be whether convergence in regional welfare has taken place in Indonesia. Rooted in the neoclassical exposition on growth theory, the empirical studies do confirm evidence of convergence. Garcia

and Soelistianingsih (1997) find evidence of σ and β convergence for the period of 1975-1993. The former, σ convergence, refers to a decrease in the dispersion of provincial per capita Gross Domestic Regional Product (GDRP) over time. The latter, β convergence, refers to the test of absolute and conditional convergence in the annual growth rate of regional GDP. Several time periods are chosen and the annual regional growth rate is regressed on the income of the initial year. In all three periods, i.e., 1975-93, 1980-93, and 1983-93, there is a convincing evidence of convergence. In the same spirit, Nazara (1999) takes suggestions made by Mankiw *et al.* (1992) on the correct specification of the Solow growth model, and using the fixed effect model for pooled provincial and time series data, again confirms the evidence of convergence among provincial per capita income in Indonesia.¹

As mentioned in the introduction, another importance of this study stems from the fact that Indonesia is now rethinking regional policy, with the decentralization initiatives dominating more traditional, fiscal policies. Although the decentralization principle is not altogether new in Indonesian regional policy, the contents of the current scheme are considerably different from the previous ones in certain aspects. The new decentralization scheme provides much greater degrees of freedom for the local governments especially on the expenditure side of the budget. The central government has less control over the expenditure pattern of the local government, although it still maintains sovereignty in tax collection. The new scheme is scheduled to be in a full effect by 2001, making this analysis appropriate as a contribution to the evaluation of past regional development policy in Indonesia.

To highlight the regional development in Indonesia for the last quarter of a century, refer to figure 2 depicting the share of regional income in the total national income.² There are two observations that need to be highlighted. First, the figure illustrates the hegemony of the western part of Indonesian within the regional economies. Figure 2 suggests an uneven distribution of income among regions in Indonesia. Java and Sumatra, which comprise the bulk of western part

¹ Some other studies have also confirmed the existence of regional convergence within a country. Barro and Sala-i-Martin (1995) for the case of US states and Japanese prefectures. For the case of developing countries look at Cashin and Sahay (1996) for the convergence among 20 states in India. From the theoretical point of view, the convergence among sub-nations is sparked by the relatively homogenous conditions of exogenous variables. In terms of the Solow growth model, the exogenous variables may be the saving rates, population or labor supply growth, depreciation, or rate of technical progress.

² We use the Gross Domestic Regional Product for the 1975-1999 period, deflated by the 1993 constant price.

of Indonesia, account for about 80 per cent of total Indonesian income. Kalimantan accounts for about ten per cent of the total income. The rest of Indonesia, i.e., Bali and Nusa Tenggara, Maluku and Papua, and Sulawesi, account for the other 10 per cent of income. It should be noted that the rest of Indonesia comprises nine provinces³ in the eastern part of Indonesia. Another comparison between Java and outer-islands reinforces Java's dominance in the regional system. This is not a very surprising result since it has been the government policy in the 1990s to look at the east.⁴ It is so noted that the policy has no significant effect on the regional income distribution.

The second more important insight one could get from the figure is the fact that there seems to have been no significant change in the regional proportion of income during the past quarter century especially for the outer regions, i.e., Kalimantan, Bali and Nusa Tenggara, Sulawesi, and Maluku and Papua. Kalimantan recorded some increment in the proportion at the end of 1970s, but kept steady afterward at about 10 per cent of total income. On the other hand Java seems to have a slightly increasing trend until the mid-1980s. Sumatra has a decreasing pattern, although it is basically stable after the mid-1980s. In general there seems to be some stability in the distribution of regional income during the last quarter century. One would expect to see a continuing pattern should there be no significant policy intervention.

³ The nine provinces are based on the 26 province system, i.e., the 27 provinces minus East Timor. They are Bali, West and East Nusa Tenggara, North Sulawesi, Central Sulawesi, South Sulawesi, Southeast Sulawesi, Maluku, and Papua.

⁴ The call to pay more attention to the eastern part of Indonesia was made in the annual Presidential speech in front of the Parliament in January 1990.

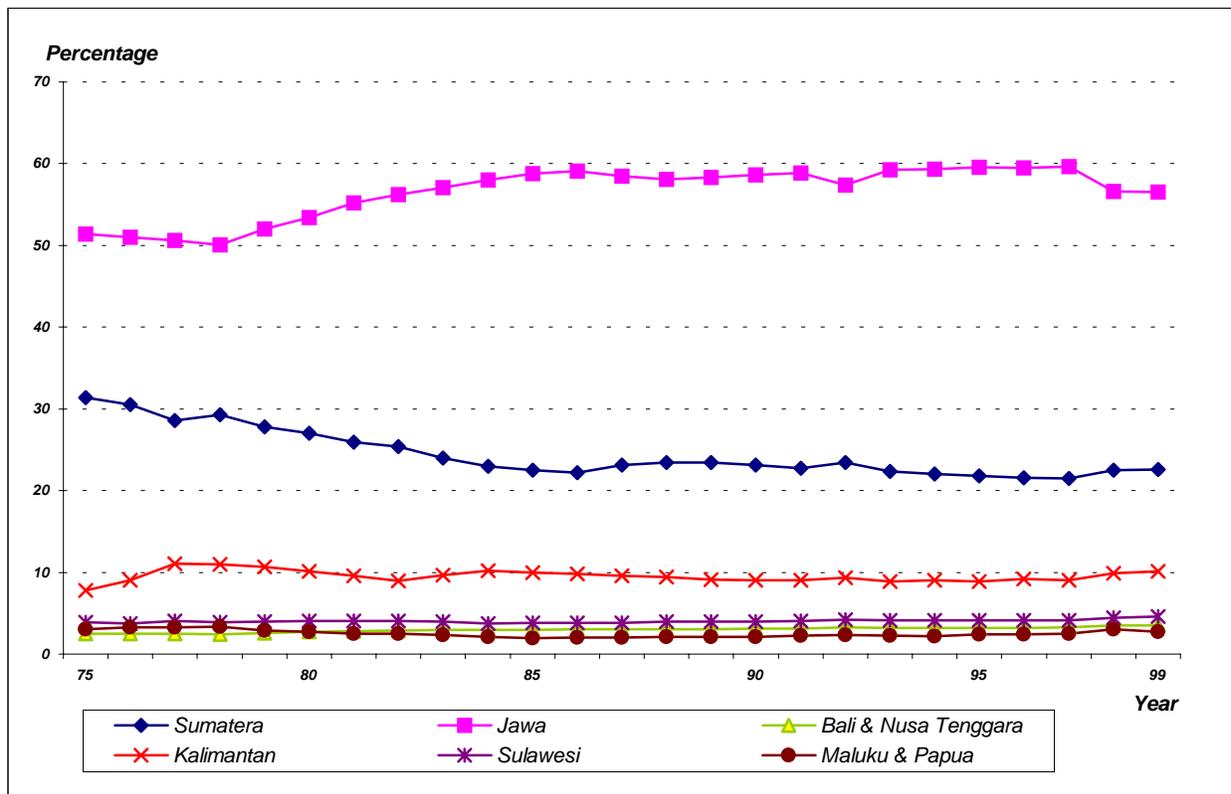


Figure 2: Regional share of income in Indonesia, 1975-1999

The above exposition about Indonesian regional development may suggest some contradiction. On the one hand, one finds evidence of convergence while on the other hand, a relatively constant distribution of regional income over time is evident. At first glance, one may infer that convergence may be associated with a more even distribution of regional income over time, but apparently this is not necessarily the case in Indonesia. An important caveat in the matter is the unit of analysis. To clarify this, refer to figure 3 depicting the dispersion, as measured by the standard deviation, of the regional incomes during the 1975-1999 period. Using the *provincial* data, the convergence is confirmed by the decline in the standard deviation. The pattern is comparably similar to that shown in Garcia and Soelistianingsih (1998) using the per capita provincial income. However, the *regional* data show that convergence is hardly the case. The levels of dispersion in the end of 1970s compared to that in mid-1990s are almost the same. A divergence, in fact, is apparent during the end-1970s to mid-1980s period, and a regional convergence is significantly the case during the mid-1980s to mid-1990s period.

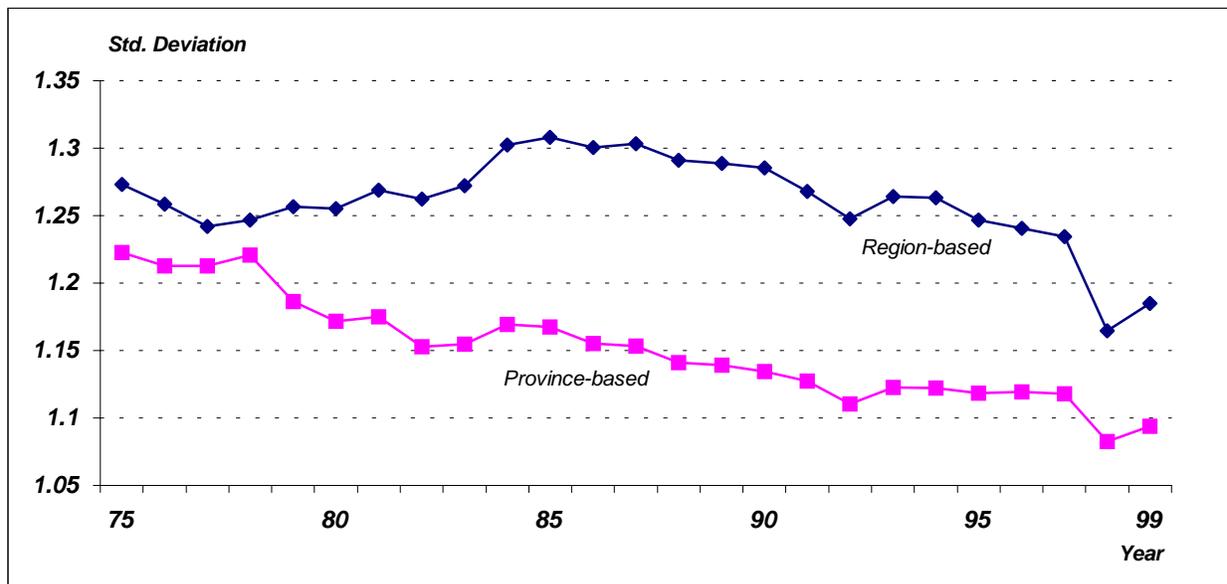


Figure 3: Dispersion of regional incomes, 1975-1999

In the growth terms, the regional convergence can also be confirmed; refer to table 1 below depicting the average of annual income growth for the six regions. One can immediately note that before the 1990s, the average annual income growth rates in the eastern islands, i.e., Sulawesi, Maluku and Papua, were always below that of Indonesia. On the other hand Java and Kalimantan were on the higher tier, which for the latter was mainly due to the oil price hike in the mid 1970s. Sumatra was catching up the ladder. After the 1990s, however, it was also evident that the eastern islands had higher income growth than the average for Indonesia. More interestingly, in the crisis period after 1997, it is evident that the eastern islands are in better shape than the rest of the country. Sumatra and Java are on the negative side, but the rest of Indonesia records positive rates of growth. The eastern regions, i.e., Bali and Nusa Tenggara, Sulawesi, Maluku and Papua, still grow by more than one per cent while Indonesia on average records a decline by two per cent per year. These facts reflect the catching up process and are the backbone of the regional convergence phenomenon as suggested by previous studies.

Clearly enough, differences in units of analysis, as well as whether the data are in level or in per capita terms, inspire some significant distinctions. A careful examination on the context of the problem at hand is duly necessary.

Table 1. The average annual growth of major regions in Indonesia

	<i>Sumatra</i>	<i>Java</i>	<i>Bali & Nusa Tenggara</i>	<i>Kalimantan</i>	<i>Sulawesi</i>	<i>Maluku & Papua</i>	<i>Indonesia</i>
1976-1982	4.74	9.28	10.26	10.74	8.51	5.17	7.90
1983-1988	5.09	7.05	7.26	7.61	6.05	3.46	6.47
1989-1996	6.39	7.84	8.11	7.14	8.06	9.63	7.49
1997-1999	-0.59	-3.45	1.18	0.92	1.22	1.34	-1.99

An important closing note to this section is due. The understanding of regional analysis in Indonesia requires one to distinguish the origin of resources and the ultimate beneficiary of income. This is especially true for provinces with oil, gas, and other major mining incomes. The impact of these incomes, statistically part of the regional GDP, is greater for the national than the local economy. In the past, this is a logical consequence of the central-local financial relationship, where local governments are explicitly dependent on the center's subsidy. In practice major local taxes go to the central government budget, and the local government will receive whatever is allocated by the central budget. This is the reason why such a distinction has to be made.

4. The Model and Estimation Procedures

The model to be used was first proposed by Dendrinis and Sonis (1988, 1990), and has been applied to economic variables by Hewings *et al.* (1996). A more recent application compared the Northeast of Brazil and the US Midwest regional economies (Magalhães *et al.*, 2001). The basic model, as applied to the case of regional income, is as follows.

Denote $x_i(t)$ as the relative income of province i , i.e., its share of the whole national income at time t . Let us say that there are n provinces in the economy, and the relative income distribution can be written as

$$X(t) = [x_1(t), \dots, x_i(t), \dots, x_n(t)] \quad i = 1, \dots, n \quad t = 1, \dots, T.$$

The relative discrete socio-spatial dynamics is given by

$$x_i(t+1) = \left(\frac{F_i[x(t)]}{\sum_{j=1}^n F_j[x(t)]} \right) \quad i, j = 1, \dots, n; \quad t = 1, \dots, T \quad \dots(1)$$

where $0 < x_i(0) < 1$, $F_i[x(t)] > 0$, and $\sum_i x_i(0) = 1$. Note that the function $F_i(\cdot)$ can take any arbitrary form as long as it satisfies the positive value property.

The expression, $F_i[x(t)]$ presents the locational and temporal comparative advantages enjoyed by the population at (i, t) (Sonis and Hewings, 2000:141). If the first province is considered as the numeraire or reference region, then

$$G_j[x(0)] = \frac{F_j[x(0)]}{F_1[x(0)]} \quad \forall j = 2, 3, \dots, n.$$

Then equation (1) can be more explicitly stated as the following system of equations

$$\begin{cases} x_1(t+1) = \frac{1}{1 + \sum_{j=2}^n G_j[x(t)]} & \text{where } j = 2, 3, \dots, n. \\ x_j(t+1) = x_1(t+1)G_j[x(t)] \end{cases} \quad \dots(2)$$

The numeraire has a significant role in the model. It ensures that the sum of the shares of all regions in the system is one. This may seem trivial but is essentially important, implying that a region's economic growth (in terms of competing for the national share) is not independent of the shares of other regions. Recalling Richardson's competitive-generative model of economic growth, the Dendinos-Sonis model can be seen as a working framework of the competitive model in terms of proportions, i.e., regions are in competition mode to obtain the maximum possible share. In terms of the absolute number, a region's income may grow without formal constraints; but in terms of the proportion, incomes from all regions must sum to unity.

We will adopt a log-linear specification of $G_j[x(0)]$ as suggested by Dendinos and Sonis (1988). That is,

$$G_j[x(0)] = A_j \prod_k x_{kt}^{a_{jk}} \quad \text{where} \quad j = 2, \dots, n; \quad k = 1, \dots, n. \quad \dots(3)$$

Coefficient $A_j > 0$ represents the locational advantages of province $j = 2, \dots, n$. The coefficient a_{jk} can be written as the following:

$$a_{jk} = \frac{\partial \ln G_j[x(0)]}{\partial \ln x_{kt}}$$

As its form suggests, these coefficients can be interpreted the percentage change of income, i.e., percentage growth, in region j relative to that in region 1, the numeraire, with respect to one percentage change of income in region k . In essence, they are elasticities. The assumed explicit form of the log-linear function would look like the following:

$$\ln x_j(t+1) - \ln x_1(t+1) = \ln A_j + \sum_{k=1}^n a_{jk} \ln x_k(t) \quad \text{where } j = 2, \dots, n; \quad k = 1, \dots, n. \quad \dots(4)$$

The regional system at hand will involve as many as $n-1$ equations. The coefficient a_{jk} is central to the competition and complementarity analysis, both in terms of its sign as well as its magnitude. A positive value would indicate complementarity growth between the two regions j and k . That is, every one per cent income growth in region k would correspond to an a_{jk} per cent income growth in region j . On the other hand, a negative value of a_{jk} would indicate a competitive relationship between the two regions. If the share in one region grows, the other's share will decline.

A supporting argument for this model is the fact that it does not require the so-called spatial weight matrix, i.e., an *a priori* structure of regional interrelationship imposed on the regional interaction. This suits the Indonesian case perfectly due to difficulties in determining what kind of structures might be appropriate for the archipelago country.⁵

Equation (4) will be estimated using a least squares estimator. This method is appropriate for the problem at hand for the following reason. Although the discrete socio-spatial dynamics outlined in equation (1) may envision some non-linear processes, the explicit form assumed by equation (4) is completely linear in parameters. Since we are dealing with a system of equations, the Seemingly Unrelated Regression (SUR) estimator will be used. As a side note, it is

⁵ For further exposition on the spatial econometrics technique involving the use of spatial weight matrix, look at Anselin (1988).

acknowledged that in the system as depicted by equation (4) the generalized least square of the SUR will give exactly similar estimates with the Ordinary Least Square (OLS) estimator (Judge *et al.*, 1988). The reason is the fact that each equation in (4) has exactly the same explanatory variables. Subsequently after the first estimate of elasticity coefficients are obtained, then we will try to re-estimate the system by removing the insignificant explanatory variables. In this step, the SUR method will certainly generate higher efficiency of the estimates. The SUR technique employed would also make sure that the solution achieves the maximum log of the likelihood function.

This model will be fitted using Indonesian Gross Domestic Regional Product data at the provincial level for the 1975-1999 period, published by the Indonesian Central Bureau of Statistics. The 1993 constant price is used to deflate the current price data. Six regions, as shown earlier, are identified: Sumatra, Java, Bali and Nusa Tenggara, Kalimantan, Sulawesi, Maluku and Papua. For the Dendrinos-Sonis model, the region with the lowest regional proportion, i.e., Maluku and Papua, is used as the numeraire.⁶

5. Results and Analysis

As outlined previously, the analysis will be carried out in two steps. In the first step, the actual regression results involving the various estimated coefficients along with their statistical properties will be used, and in the second step, qualitative analysis of the results will be displayed. The latter involves the analysis of the signs of the interactions among regions in the system.

Table 2a and 2b generate many interesting insights about regional development in Indonesia. Java turns out to be a “patron” for all other regions in the sense that this region is a complement to all others in the system. Kalimantan benefits most from every one percent of economic growth in Java by increasing as much as 11 per cent, followed by eight per cent by Bali & Nusa

⁶ In the estimation process we have also tried to use region with the highest regional income proportion, i.e., Java, as the numeraire. Results of the latter, however, are not thoroughly clear both in terms of statistical properties and the substance. We have also tried to include the second lagged dependent variables into the system. The number of available observations, however, is not sufficient for the inclusion of all second lagged of all regions. An attempt only to include the second lagged dependent variables for Java region does not produce statistically plausible results.

Table 3a. Results Using Selected Variables

	<i>Sumatra</i>	<i>Java</i>	<i>Bali & Nusa Tenggara</i>	<i>Kalimantan</i>	<i>Sulawesi</i>	<i>Maluku & Papua</i>	<i>Constant</i>	<i>R</i> ²
<i>Sumatra</i>	1.778 (6.09)	NS --	0.854 (2.98)	0.674 (5.21)	NS --	-1.096 (-12.44)	-4.844 (-3.59)	0.861
<i>Java</i>	2.889 (2.48)	4.259 (1.64)	1.478 (3.39)	1.347 (3.18)	NS --	-0.986 (-4.04)	-26.998 (-1.78)	0.913
<i>Bali & Nusa Tenggara</i>	3.167 (3.18)	5.665 (2.47)	1.968 (5.54)	1.496 (4.12)	NS --	-0.592 (-2.65)	-37.713 (-2.84)	0.951
<i>Kalimantan</i>	3.773 (4.73)	6.812 (5.17)	1.796 (4.38)	2.083 (7.36)	-1.724 (-6.107)	NS --	-42.386 (-4.94)	0.860
<i>Sulawesi</i>	3.279 (3.50)	5.545 (2.51)	1.628 (5.56)	1.496 (4.41)	NS --	-0.397 (-1.89)	-37.099 (-2.91)	0.927

Note: t-statistics in parentheses; NS = not significant in the previous regression.

All statistics are significant at $\alpha = 5\%$, except $a_{java, java}$ significant at $\alpha = 10\%$.

Table 3b. The Qualitative Analysis Using Selected Variables

	<i>Java</i>	<i>Sumatra</i>	<i>Bali & Nusa Tenggara</i>	<i>Kalimantan</i>	<i>Sulawesi</i>	<i>Maluku & Papua</i>
<i>Java</i>	+	+	+	+	NS	-
<i>Sumatra</i>	NS	+	+	+	NS	-
<i>Bali & Nusa Tenggara</i>	+	+	+	+	NS	-
<i>Kalimantan</i>	+	+	+	+	-	NS
<i>Sulawesi</i>	+	+	+	+	NS	-

Note: NS = not significant in the previous regression.

Competition \leftarrow \longrightarrow *Complement*

Table 2b provides the sign analysis of results in the previous table. Ignoring the statistical significance of each estimate, the table is meant to provide an overview about the form of competition and complementarity among regions in the system. It is clear from this table that regions within the western part of Indonesia are complements one to another. However, it is not the case in the eastern part of Indonesia.

These two tables substantiate the hegemonic role of the Javanese economy in Indonesia. The rest of the country benefits from its economic growth. However, one could also observe that Java is the most self-sufficient region, in a sense that the highest economic impact to the region is obtained by its own economic growth. This is in agreement with observations made in Sonis *et al.* (1997).

It should be noted that when it comes to the effect of Sulawesi and Maluku & Papua to growth of other regions in the country, table 2a shows quite a substantial amount of insignificance. The two significant elasticity coefficients, i.e., the effect of Sulawesi on Kalimantan and the effect of Maluku & Papua on Sumatra, are of negative signs. Statistically suggesting some degree of competitions between the regions in the pairs, but the substantial explanation is not immediately clear. Another possible explanation is that the results reflect the inadequate data quality that may create some statistical difficulties in a systemic estimation. This is partly the rationale why we try to re-fit the model excluding the statistically insignificant coefficients. In so doing, we try as much as possible to maintain variables representing the eastern regions. The results are presented in table 3a.

The coefficients of determination shown in table 3a shows that the omitted variables in each equation do not significantly affect the goodness-of-fit of the model. One can note immediately that the magnitude of the elasticity coefficient in general drops, but all remain statistically significant. The pattern found in table 2a is again apparent in table 3a. Java's economic growth is benefiting to those of others. The eastern region, now consists only of Maluku and Papua; and Sulawesi in the case affecting Kalimantan, is negatively affecting the western region. However, just as is the case of the previous specification, Sulawesi benefits from economic growth of all other regions except Maluku and Papua.

Note also that we present tables 2b and 3b in the same format. It can be seen that qualitatively, taking aside the dropped variables, there are no changes in the signs. This confirms the 'consistency' of our estimates, as well as the true insignificance of the dropped variables.

Another specification that may also be of interest is the straight categorization to analyze the western and eastern part of Indonesia. To do so, we divide Indonesia into three regions: Sumatra, Java, the Rest of Indonesia. As the numeraire this time, we use Sumatra so as to show

how Java and the Rest of Indonesia relate one to another. We exclude one variable from the full model for non-significance, and obtain the following results.

Table 4. Results of alternative specification

	<i>Sumatra</i>	<i>Java</i>	<i>Non Java-Sumatra</i>	<i>Constant</i>	<i>R²</i>
<i>Java</i>	2.174 (2.35)	7.339 (3.76)	2.169 (3.26)	-42.058 (-3.30)	0.950
<i>Non Java-Sumatra</i>	-1.541 (-6.50)	-1.611 (-3.47)	NS	11.188 (4.29)	0.867

Note: t-statistics in parentheses; NS = not significant; all coefficients are significant for $\alpha = 3\%$.

Java's economy is shown to benefit from the economic growth of the rest of the country, Sumatra and other provinces alike. The economic growth of Java is, however, self-generated, i.e., a major portion of Java's economic growth is produced domestically. A similar observation is made by Sonis *et al.* (1997) through the use of the feedback loop analysis on the interregional social accounting matrix. The non Java-Sumatra region is actually in competition with Java-Sumatra. The former is actually losing as a result of any economic growth in the western part of Indonesia. This result substantiates prevailing claims of outer regions in Indonesia that the majority of economic growth in those regions is actually transferred back into the western part of Indonesia.

6. Policy Perspectives

The regionally uneven economic distribution has long been a prominent issue in Indonesian regional development policy. That includes disparities between the western and eastern part of Indonesia, Java and outer islands, or other geographical divisions of the economy. The hegemony of the western part, and Java in particular, in the Indonesian regional system is acknowledged and confirmed by this study. More than that, this study has also shown that there is convincing evidence of regional competition between the western and eastern part of Indonesia. These findings need to be included in the policy making process. The awareness of

the existence, and subsequently the understanding of the determinants, of the phenomena are important in formulating the necessary policy recommendations.

The decentralization scheme, as is mentioned in the beginning of this paper, will bring a significant impact to the regional economic distribution. Clearly the last thing one would like to see is a greater degree of disparity ignited by the new scheme. The diminishing role of upper level government, especially in the redistribution function, is a potential source of greater disparity. Adding to the problem, the fact that certain regions are in a competition rather than in complementarity mode, as is suggested by this paper, should be seen as a warning that such fear may just take place. Regions with rich natural endowment will have more advantages to start with; however, the redistribution function is still needed in Indonesian regional development policy, but it must be acknowledged that the formulation of such function would involve a delicate process.

Another policy perspective of the interregional competition or complementarity are the questions that include but are not limited to the following themes. Is it necessary to reduce or eliminate existing interregional competition? Or, do the regions need some degree of competition to encourage innovation and invention? Likewise, is any complementarity good for regions such that it should be enhanced further? These are not trivial questions as their answers will go directly to policy formulation. One thing is clear, however, that a micro level of study is needed. As elaborated before, regional competition takes place not among the regions, but rather among agents between regions. Interaction among agents, furthermore, is not only limited to those between regions but more importantly also among those within the region. The policy-supported competition is a clear example of interaction among agents within a region. A careful study is needed to examine in what aspects does the competition take place, and how competition in that particular aspect affects regional economic growth.

Another important aspect of interregional competition and complementarity is the type of bi-directional interaction. There are three possible cases as follows. The first case is that two regions *A* and *B* may be in a (+/+) pair of impact signs. That means economic growth in *A* affects economic growth in *B* positively, and vice versa. These two regions are complements one to another, i.e., *A* is complement to *B* as well as *B* is complement to *A*. The second case, the

two regions, however, may also be in a (-/-) pair of impact signs. In this case the economic growth in one region negatively affects the economic growth of the other region. Both are mutually competing for economic growth, i.e., A is a competition of B as well as B is a competition of A . In both cases there must be a two-way relationship such as trade, investment, etc. between the two regions. In its simplest explanation one may think the first possibility as the case where the two regions are engaged in an extensive exchange in production inputs or activities, and the second possibility as the case where the two regions are involved in an extensive exchange of consumption goods. The third case is the possibility of an asymmetry, i.e., the two regions engage in a (+/-) pair of impact signs. In this case, A may be positively affected by economic growth in B , but B is negatively impacted by an economic growth in A . This third possibility is a very unfortunate situation to take place, yet conceiving lots of theoretical obscurity. This situation may be sparked by the existence of one-way transaction between the two regions. A possible scenario for this possibility to take place is when there is a massive flow of capital (or other factors) from the negatively impacted region and or a massive flow of consumption goods from the positively impacted region. One would likely see this phenomenon when the hinterland is used nothing but for market serving the core regions. Our analysis in the previous sections does not touch this issue directly, as it would need an $n \times n$ interregional-impact matrix. Such a matrix should be produced with other type of models as ours relies heavily on the use of numeraire.

7. Concluding Remarks

This paper has discussed issues in the interregional competition and complementarity both from the theoretical standpoint as well as in its application to the Indonesian case. Regional competition should not be literally understood as regions competing one with another. Rather, it is a result of agents within a region trying to behave so as to enhance their own regional development. In that sense, central to the concept is the interaction of agents both within the region as well as across the boundaries. Central also to the term ‘regional competition’ is a notion of regions competing one with another for the share of regional income. In this sense, higher share of income received by one region must be at the cost of others.

Applying the Dendrinis-Sonis model to the relative distribution of regional income in Indonesia, this paper has also pointed to several important observations. Central to the empirical result is the evidence of complementarity among regions within the western part of Indonesia, and competition between the western and eastern part. These results confirm the on going belief about the dominant role of the western part of Indonesia, especially Java in particular, in the Indonesian regional economic system. This result appears not only in a particular specification but is evident in several alternative specifications, verifying that the finding as somewhat independent of the model adopted.

Finally, some policy issues require further elaboration, analysis and exploration. What is the role of competition and complementarity in the regional economies. Clearly competition is not always bad as well as complementarity is not always good. Further studies are needed to clarify circumstances under which the competition is bad and complementary is good. Another important aspect to examine is the existence of asymmetrical interregional interaction in a bi-directional relationship. That is the case where region *A* brings positive effect to *B* while *B* brings negative impact to *A*.

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