INPRES' ROLE IN THE REDUCTION OF INTERREGIONAL DISPARITY

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I. INTRODUCTION

As in many other developing countries, abridging interregional disparity has always been an enigmatic challenge for policy makers. The quandary in each respective country differs considerably due to factors such as the vastness of its geography, the heterogeneity of its factor productivities, and the diversity of its culture. Furthermore, the heavy concentration of economic activities and the corresponding infrastructures in Jawa, the main island which is only less than 7% of the total area but with more than 60% of the nation's population, raises the urgency of the problem.

In the tradition of neoclassical structural analysis the degree of interregional disparity would be stronger at the early stage of development, softened at the transition period and markedly reduced at the latter stage. The problems with the hypothesis, like those suffered also by the more standard sectoral analysis, rest upon the criteria definition and the absence of clarity about whether the pattern is merely an historical incidence or a "normal" pattern that every single nation *must* take. Furthermore, it is not at all clear whether the current condition of a country like Indonesia falls under the category of "early" or "transition" stage. For the development policy purpose, however, the existing spatial configuration and the trend of regional concentration are more pressing of an issue.

Cognizant of those facts, this study will deal with the interregional distributive impact of the government program, called INPRES ("presidential instruction"), originally intended to generate balanced regional development. More specifically, the purpose of the paper is to analyze the role and impacts of the program upon interregional disparity and to explore the nature of the allocation criteria.

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II. BACKGROUND OF INPRES PROGRAM

The most important rationale of INPRES program is to nourish the financial capacity of the regional government. The average region-owned revenues amount only 17.2% of the total regional revenues with the following break-down: 20.7% in the case of routine revenues and 2.3% for the development accounts (1984/85 data). The birth of the program was made possible by the surplus of oil revenues following the oil-shock in the mid-70s, although two of the eight INPRES types had already been launched at the beginning of the first five-year development plan (early 70's). Table 1 shows different INPRES types and the corresponding allocation criteria. With the exception of INPRES for municipal government and for village areas (hereafter DATI-II and DESA respectively), in reality the adoption of these criteria is unclear. Notice also from the table that there are two broad categories of Inpres, the "block" and the "non-block". In this study the analysis will be concerned with the "block" INPRES. The component of INPRES for provincial government (hereafter DATI-I) is the largest within this INPRES category and is the result of a major revision in the interregional allocation of funds from the central government. The revision took place immediately after the completion of the first five-year development plan (1969/90-1973/74). The preceding system, known as ADO (*alokasi devisa otomatis*), was regarded as unfair to those regions with minimum export contribution since each would, under the ADO scheme, receive the amounts simply according to its export contribution.

In 1984/1985 the "block" INPRES constituted 37% of the total sum of all INPRES and out of that amount 47% was allocated through DATI-I (see table 2). One will notice the peculiar allocation system adopted in the DATI-I, in which each of the 18 regions had received exactly the same amount (Rp 9 billion) and each of the rest was also allocated the same (Rp 11 billion). In other words, regions of small area and population size in the first category (e.g. Bengkulu) received equal allocation as those with much larger (e.g. East Kalimantan) or more densely populated (e.g. Yogyakarta) areas. Such an odd allocation is also vague from the fact that the selection of five regions with largest allocation is subject to uncertain criteria.

Unlike DATI-I, the INPRES of DATI-II and DESA categories employed more transparent criteria; basically they are the population size and the number of villages located in the region. As clearly seen

TABLE 1
CRITERIA FOR INPRES ALLOCATION

	"Block" Inpres			"Non Block" Inpres		
	(DESA)	(DATI II)	(DATI I)			
	Rural Inpres	Municipal Inpres	Provincial Inpres	Inpres for Elementary Schools	Inpres for Health Dev'	Inpres for Environmental dev' and Reboitation	Inpres for road dev'
Criteria	Number of Villages Equal Amount Per Village Area Reward for "Lomba Desa"	- Population Size - Minimum Grants for Low Density DATI II - Performance of IPEDA Revenues	- Unclear - Equi-Principle (1988/89)	- Number of Children, age between 7-12 years old and the Availability of Elementary School Facilities	Availability of health facilities (1 PUSKESMAS with 3 to 4 PUSKESMAS PEMBANTU Per district) - Morbidity rate	- Priority according to land erosion in the downstream river basin - Forest Land area Per Province and Per Municipality	- Subjective Criteria

Notes: On top of the above there are two more Inpres-like grants,namely the Zero Interest Rate Credit for Market Restoration and Development and the Subsidized (12%) Interest rate Credit for Retail Stores Development."

Sources: Various Documents from Ministry of Home Affairs,Bappenas and Ministry of Information (see references)."

TABLE 2

TOTAL INPRES GRANTS BY BY REGIONS IN 1984/85 (IN MILLION RUPIAHS)

Provinces	"Block" Inpres			"Non Block" Inpres						
	(DASA) Rural Inpres	(DATI II) Municipal Inpres	(DATI I) Provincial Inpres	Total "Block" Inpres	Inpres for Elementary Schools	Inpres for Health development	Inpres for Environmental Dev' sector & Reboitation	Inpres for Road Dev.	Total "Non Block" Inpres	Total Inpres Grants
1. Aceh	7,106.70	3,808.45	9,000.00	19,915.15	13,508.05	1,989.58	896.95	3,700.00	20,094.58	40,009.74
2. North Sumatera	7,473.95	11,515.83	11,000.00	29,989.78	39,598.14	3,519.23	4,023.28	5,178.01	52,318.66	82,308.44
3. Riau	1,555.30	3,068.07	9,000.00	13,623.37	12,694.12	1,761.16	759.00	4,331.54	19,545.82	33,169.19
4. Jambi	1,788.65	1,947.99	9,000.00	12,736.64	11,859.17	1,312.42	123.21	2,342.43	15,637.23	28,373.87
5. Bengkulu	1,413.25	1,083.55	9,000.00	11,496.80	7,094.43	1,215.10	435.22	1,593.12	10,337.87	21,834.67
6. Lampung	2,063.20	6,502.78	9,000.00	17,565.98	23,660.98	2,734.96	3,183.27	1,829.40	31,408.62	48,974.60
7. West Jawa	9,806.50	35,374.94	11,000.00	56,181.44	65,683.52	11,583.45	5,683.63	3,694.53	86,645.13	142,826.57
8. Central Jawa	11,576.30	31,988.30	11,000.00	54,564.60	58,053.56	11,545.91	3,403.25	3,363.00	76,365.71	130,930.31
9. Yogyakarta	1,031.50	3,535.46	9,000.00	13,566.96	4,701.11	1,580.41	568.09	750.00	7,599.61	21,166.57
10. East Jawa	11,658.50	37,516.07	11,000.00	60,174.57	63,285.52	12,543.69	3,390.44	3,410.00	82,629.65	142,804.22
11. West Kalimantan	6,138.75	3,059.45	9,000.00	18,198.20	19,383.06	2,065.00	1,293.71	3,500.00	26,241.77	44,439.97
12. Central Kalimantan	1,625.45	1,445.49	9,000.00	12,070.94	12,085.39	1,161.80	0.00	3,450.00	16,697.19	28,768.12
13. South Kalimantan	3,184.25	2,682.46	9,000.00	14,866.71	15,939.64	1,687.70	1,306.66	3,600.00	22,534.00	37,400.71
14. East Kalimantan	1,536.05	1,994.27	9,000.00	12,530.32	13,568.69	1,553.29	0.00	3,200.00	18,321.98	30,852.30
15. North Sulawesi	1,769.95	2,684.24	9,000.00	13,454.19	10,050.03	1,538.31	630.44	2,099.30	14,318.08	27,772.27
16. South Sulawesi	1,923.85	7,914.83	9,000.00	18,838.68	32,353.98	3,326.98	2,650.76	5,410.10	43,741.82	62,580.50
17. South East Sulawesi	1,010.85	1,224.05	9,000.00	11,234.90	7,085.62	850.69	710.65	2,039.30	10,686.26	21,921.16
18. Bali	888.05	3,094.68	9,000.00	12,982.73	10,082.30	1,461.09	470.51	1,250.00	13,263.91	26,246.64
19. West Nusa Tenggara	858.90	3,436.18	9,000.00	13,295.08	15,566.39	1,688.72	1,737.04	2,200.00	21,192.15	34,487.23
20. East Nusa Tenggara	2,397.55	3,486.55	9,000.00	14,884.10	17,022.00	2,207.63	1,685.59	3,036.10	23,951.32	38,835.42
21. Maluku	2,238.00	1,869.95	9,000.00	13,107.95	9,990.41	1,577.53	0.00	2,700.00	142,673.94	27,375.89
22. Irian Jaya	1,394.70	1,842.47	9,000.00	12,237.17	190,889.20	2,409.70	0.00	4,000.00	197,298.90	209,536.06
TOTAL	80,440.20	171,076.05	206,000.00	457,516.25	654,155.31	71,314.36	32,951.69	66,676.83	825,098.19	1,282,614.44

Source: Recapitulation of Regional Development Grants, BAPPENAS (unpublished)"

from table 2, the allocation of these two INPRES types is much more varied interregionally; thus at least from the outset it is seemingly based on a better plan. The basic goals of DATI-II and DESA are to generate employment, be it direct or indirect, and to improve the necessary infrastructures (Ministry of Home Affairs, 1983 and 1988).

Table 2A (available from author) displays the allocation of Inpres grants in 1980/81. In this system the DATI-I was seemingly well-allocated for practically no equal amounts were received by the two same provinces. Whether it is optimal, however, is another question. Therefore, the 1980/81 allocation is selected for the quantitative test in this paper. Being the largest and most important within the "block" INPRES, the objective of DATI-I is among others to reduce the interregional disparity (Ministry of Home Affairs, 1984). Thus, when the allocation criteria are in question, it will then become necessary to examine the extent to which the DATI-I program has met the above stated goal. Along with the issue of determining the criteria to be used, there are actually other problems involved in the mechanism of fund disbursement. Most of the complaints (e.g. less than stated amount received, fictitious INPRES financed projects) are in connection with "too many hands" controlling the INPRES program. Such a case is already expected since the variety of INPRES being launched is also too numerous. Further discussion of of this matter will expand the analysis, but goes beyond the scope of this paper.

The importance of the INPRES program can also be seen from the composition of regional government revenues as shown in the provincial budget. Of the total development expenditures at the regional level, only 2.3% are financed by the region-own revenues. In some regions even part of the routine expenditures are financed by INPRES funds allocated from the central government, implying the full finance of development expenditures by the INPRES funds. It is therefore not too difficult to imagine that many development projects beneficial to the middle and lower income groups taking place in the regions (infrastructures and other social-overhead capital) rely heavily upon this single most important government program.

Considering the importance of the program it is rather unfortunate that there are only very few quantitative analysis ever made on the issue, one of which is the study done by Ravallion (1989) which put the emphasis on the examination of implicit preferences of the central government in the 1985/86 INPRES allocation[1]. Having selected the Kolm-Pollak welfare-function, the study revealed the presence of "mild

absolute-inequality aversion" on the part of the central government. Despite the use of an attractive model and the intuitively acceptable conclusion, the generalization of all types of INPRES is a major drawback of Ravallion's study.

III. APPROACH AND THE MODEL

There are various difficulties encountered in studying the interregional income disparity and the distributive impact of INPRES program. The selection of the welfare indicator is one such problem. The most widely used, but at the same time a misleading indicator, is the gross regional domestic product (GRDP), be it total or per-capita. That the resource-rich regions have higher GRDP, one can easily attribute the fact not only to the disregard of unequal population distribution but also to the use of a 'production originated' approach in the measure. The approach obviously implies the neglect of ownership of activities and production factors. Even with the more refined per-capita GRDP, excluding one of the major resource endowments, namely oil and gas, the true income indicator is still distant. Better guides are perhaps the estimates of per-capita household consumption expenditure taken from SUSENAS (the national economic and social survey). The two indicators may give different pictures regarding the intensity of interregional disparity. In 1984, for example, the highest per-capita GRDP excluding oil and gas (in East Kalimantan) was almost five times of that of the lowest (in East Nusa Tenggara), but in terms of the SUSENAS per-capita consumption the deviation is observed only by a factor of 2.4.

Despite the inherent drawbacks of using per-capita GRDP, however, one should not discard the indicator since it still is a useful guide for approximating the level of development in the region. In fact, the use of the measure may provide some useful insights when applied to the cross-section (interregional) comparison. The correlation coefficient between per-capita GRDP and the per-capita consumption from SUSENAS is slightly less than 0.8. A strong correlation between per-capita GRDP and other regional indicators, however, is absent. A brief discussion on the comparison of various regional indicators in Indonesia can be found in Azis (1989).

Another difficulty to be encountered lies in the methodology itself. Changes in the regional welfare indicators, whichever they are, work through a rather complicated mechanism and unfortunately are affected by so many variables. Even in the case of INPRES program its impacts

upon regional welfare implicate through a quite long process before it affects the values of welfare variables. As an illustration, the population size needed for the per-capita indicator, although seemingly unrelated to INPRES expenditures, it actually is related by the following mechanism. There are two factors affecting population growth, the natural growth rate and the net-migration in the respective region. The latter, at least conceptually, is affected by some economic variables such as per-capita product, income or consumption as well as by the more exogenously-determined transmigration program. The regional production is in turn determined by factor inputs, one of which is the regional investments and capital stocks. Changes in regional capital stocks are precisely the target of INPRES variable. Hence, INPRES will indirectly affect the net migration, and therefore the population growth, in each region. With such a premise it would be inevitable to have most variables and the mechanism captured through a model framework before the model is used to examine the impacts of the INPRES program. It is desirable that the model should also have the capability of simulating over future periods in order to entangle the dynamic implication of the existing and alternative scenario.

Finally there are more standard problems apropos the availability of reliable data at the regional level. Relatively good time-series data on GRDP by expenditures at 1975-prices are so far available only for 22 regions. Yet, despite the cross-section nature of the model estimation, some fairly long series data are still required not only due to the presence of lagged variables but also because of the requirement to have series of investment data if one wishes, as we do, to apply a model to estimate regional capital stocks (see later discussions). It is precisely for this reason the present study covers only 22 regions, the list of which is found in table 2.

The model used is meant to meet the above factors. It is basically a standard Keynesian model spurred for an impact analysis with a simultaneous equations system employing some 36 variables including those with a certain time-lag (15 endogenous and 21 exogenous). We shall first allude some features of the model.

The model is a ramification of an attempt to integrate the demand and supply sides of the regional economies. Despite the fact that in some countries either a "demand-oriented" or "supply-oriented" model is capable of explaining a significant portion of the observed interregional variations in the growth rates of output, neither model offers a complete regional growth model. Stating that the growth of

inputs plays a significant role in the determination of output growth in the neoclassical tradition, should not necessarily mean accepting the assumption that it is the sole determinant of growth. Differential growth rates of demand for the region's output will certainly also affect the interregional differences in output growth. Demand factors are believed to have a strong influence for example on the relative movements of capital and on the increase in wages in different regions. A strong correlation between per-capita GRDP and the regional export share in Indonesia is only one example citable to support the "demand-oriented" model.[2] While the "demand-oriented" model ignores entirely the possible roles played by supply conditions (e.g. nature of production function, determinants of factor prices and thus of factor mobility), the "supply-oriented" group of models tends to ignore the possible effects of aggregate demand and its components on the determination of regional growth paths. An integrated supply-demand model is therefore in demand (see Azis,1985).[3]

The regional private consumption, CP, is modeled as a function of GRDP (Y) and population size (POP). Based on the availability of regional data, all variables in monetary terms are measured in constant 1975 prices. The inclusion of population size is the consequence of the allowed interregional mobility of labor. The interaction between GRDP growth and population growth is therefore captured in the model,

$$CP_t = a_0 + a_1 Y_t + a_2 POP_t .$$

In the neoclassical framework the growth of capital stock KD in a region is expressed as a function of interregional differential in rental price, RG, with a predetermined time-lag. However, presuming that in a developing country like Indonesia the factor markets are far from perfect, the rental price of capital cannot be singled-out as the only explanatory variable of capital growth in the region. It may even be, as revealed later, that the rental price of capital or the standard rate of returns does not explain the investment behavior in the region. It is therefore necessary to include other attraction factors to capture phenomenon such as agglomeration economies and other spatial-juxtaposition. An alternative proxy for this factor is the growth of per-labor GRDP with a certain time lag YD_{t-1}. Finally, the capital stock growth is expected to be also affected by the interregional allocation of "block" INPRES, BI. This allocation is measured in terms of the percentage distribution between regions. Thus,

$$KD_{t-1} = b0 + b1\, RG_{t-4} + b2\, Yd_{t-2} + b3\, BI_{t-4} .$$

The absence of regional capital stocks data, let alone at the national level, is common in most countries. Indonesia is no exception. There is no other practical way to estimate the data except by using some models. The use of the *perpetual inventory model* (PIM) with a predetermined depreciation period (average 5 years) is assumed in this study. Therefore, the stocks data, measured in net term, are very sensitive not only to regional investments data but also to the assumption on the average depreciation period being used. Meanwhile, the capital growth KD_{t-1} will affect the capital stocks K_{t-1}, given the value in the initial period, K_0. K_{t-1} will in turn determine the capital stocks in year t given the investment in t-1.

Following Ghali (1981) the regional investment is expressed as a function of total aggregate demand (including the net-exports). In this particular case, the inclusion of the net-exports variable into the aggregate demand is required by the fact that exports have a crucial role in explaining the changes of many regions' GRDP in Indonesia. Thus, the use of GRDP (denoted by Y_{t-1} in the equation) can replace the aggregate demand variable (AD_{t-1}). The inclusion of total earnings of capital (EC), the proxy variable of which is the regional average interest rates (unpublished figures from the Central Bank), is also attempted in the investment function. Therefore,

$$I_t = c_0 + c_1 EC_{t-1} + c_2 Y_{t-1} .$$

The regional government consumption, CG, is assumed to be determined by GRDP and population size. Some may argue that INPRES (BI) may induce directly the regional government consumption. The regional routine expenditures (consumption) are not funded by INPRES funds, but by the specially designed item 'subsidi-daerah otonom' (SDO). The argument, however, could be relevant when some development expenditures by definition cannot be categorized as investments. It is almost impossible to detect and split the item in each region if such a practice indeed occurs. The inclusion of population size in the model is based on the premise that some components of the expenditures such as wages and salaries are related to the population size,

$$CG_t = d_0 + d_1 Y_t + d_2 POP_t.$$

As discussed above, the number of population in a particular year is determined by the population size in the preceding period, the natural growth, N, and the net-migration, NM,

$$POP_t = (1 + N_t + NM_t) POP_{t-4}.$$

The net-migration is expressed as a function of per-labor GRDP gap, YLGP, the incremental per-capita household consumption, CCHD, and the interregional transmigration allocation, TR,

$$MM_t + e_0 + e_1 YLGP_{t-3} + e_2 CCHD_t + e_3 TR_t.$$

The per-labor GRDP gap is

$$YLGP_t + (YL_{1t} - YL) / YL,$$

where YL_{t1} is the per-labor GRDP in region i and YL is the average ("national") per-labor GRDP. The transmigration allocation is measured by the interregional percentage of allocated transmigrants. In this way the population is treated endogenously where its growth is indirectly determined by the INPRES allocation.

We come now to the supply side of the model. The general Cobb-Douglas production function is assumed,

$$Y_t = K^{k_1}{}_t L^{k_2}{}_t.$$

Notice that unlike the usual form of Cobb-Douglas function, the element of technological progress is not included in the model. Such an approach is inevitable in order to avoid the adoption of the too restrictive assumption regarding the constancy (overtime) of the parameter in a cross-sectional estimation. In other words, one cannot introduce a term that depends on the passage of time for there is practically only a point in time. There is, however, a price one has to pay. Ignoring the technological progress term when such a phenomenon really occurred would result in an underestimation of the production level of GRDP. In regions that encountered dynamic growth (e.g. those in which the use of modern technologies are inevitable), the term would certainly have played an important role.

Table 3 presents the model structure that consists of six behavioral equations.

The simultaneity of the model is evident from the model structure where the indirect impacts of INPRES upon the seemingly unaffected population size is observed from equations 6, 4, 5 and identity 1. With the assumed constant labor-participation rate (but very interregionally) the impacts can be extended to also affect the employed labor size as indicated by identity 2. Notice also that the endogenous treatment of population has made it possible to link the demographic variables with some target variables, namely per-capita GRDP, per-capita regional consumption (from the regional account), per-labor GRDP and per-capita household consumption (from SUSENAS). In other words, there will be simultaneous repercussions of demographic and economic variables (including INPRES allocation) upon the selected impact indicators.

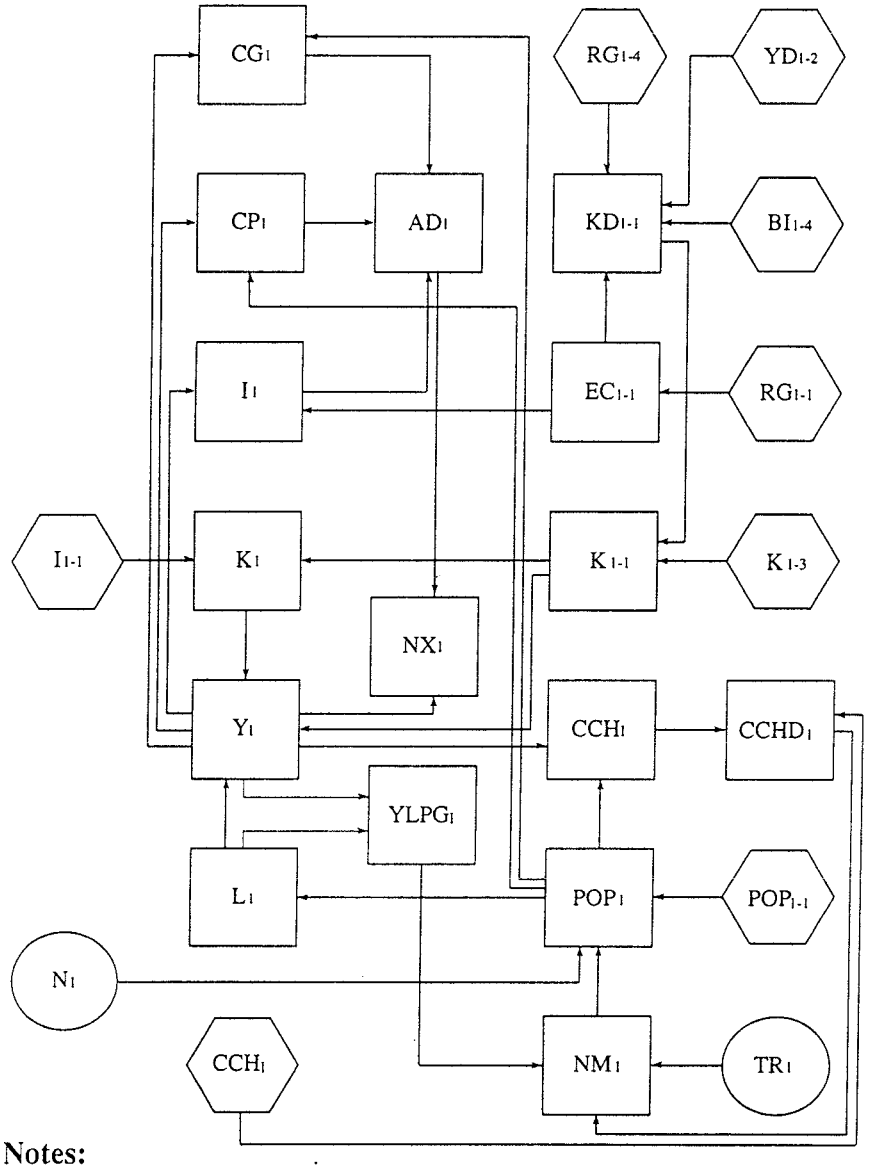
In the aggregate demand components, the exclusion of net-exports (identity 3) implies its role as the equilibrating force to reconcile aggregate supply and demand. In other words, the gap between the two is filled-in by the net exports. In this sense the net exports variable is endogenously determined. With this treatment we can also analyze the extent to which the net-export of each region is affected by the timepath (divergence or convergence) of interregional disparity.

IV. RESULTS OF ESTIMATION

In view of the simultaneous nature of the model, the method of two-stage least squares is used for the estimation. The econometric package being used is "SORITEC" (see Kuncoro, 1989). Table 4 presents the results.

There are some coefficients with a very low degree of significance. In the investment function, for example, the earning of capital with one-year lag (EC_{t-1}) which has an unexpected sign, is not at all significant. This, however, should not be surprising because the non-oil and gas investments in a region, either by the private or government, are determined by factors other than capital earnings or rates of returns. There are too many non-market factors and distortions affecting the decision on investment location. One important factor is the presence of conducive infrastructures. This factor, in many cases even defeats the more standard conditions related to transport costs such as the resource base location (for resource oriented industries) and the market location (for consumer oriented industries). The far better infrastructure

Table 3
Model Scheme



Notes:

= Endogenous Variables

= Exogenous Variables

= Lagged Exogenous Variables

VARIABLE NAMES

I	=	Regional Investments
RG	=	Interregional Gap in the Rates of Returns
TD	=	Incremental GRDP
KD	=	Incremental Regional Net Capital Stock
BI	=	Interregional Allocation of "block" INPRES
N	=	Natural Rate of Average Yearly Population Growth in the Region
POP	=	Population Size of the Region
CCH	=	Per-Capita Household Consumption in the Region
CCHD	=	Incremental Per-Capita Household Consumption
TR	=	Interregional Allocation of Transmigration
MM	=	Regional Net Migration Rate
YLGP	=	Interregional Gap of Per-Labor GRDP
K	=	Regional Capital Stocks
R	=	Regional Rates of Returns
EC	=	Regional Earnings of Capital
CG	=	Regional Government Consumption
CP	=	Regional Private Consumption
AD	=	Regional Aggregate Demand Minus Net-Exports
Y	=	GRDP
NX	=	Regional Net-Exports
L	=	Regional Man-Year Labor
S	=	A Vector with constant parameters

Contrary to the standard exogenous variables, the yearly values of lagged exogenous variables alter as a result of model simulation.

TABLE 4
RESULT OF THE MODEL ESTIMATION

Model Estimation

A. Original Model

1. CP_t	=	20.1338	+ 0.3262 Y_t	+0.0334 POP_t
		(1.0321)	(2.5681)	(2.3483)
R^2	=	0.98879		
DW	=	2.4056		
LLF	=	124.50		
2. I_t	=	-39.4559	-0.0054 EC_{t-1}	+ 0.4006 Y_{t-1}
		(-1.6769)	(-0.8819)	(3.4209)
R^2	=	0.9448		
DW	=	2.5012		
LLF	=	124.43		
3. CG_t	=	-13.2143	+ 0.0816 Y_t	+ 0.012 POP_t
		(-2.3188)	(2.1979)	(2.8944)
R^2	=	0.9896		
DW	=	1.4373		
LLF	=	-97.433		
4. Y_t	=	(K_t) 0.3506	+ (L_t) 0.5581	
		(2.6572)	(5.2447)	
R^2	=	0.9135		
DW	=	1.7535		
LLF	=	-4.4096		
5. NM_t	=	0.0131 $YLPG_{t-3}$	+ 0.875E-07 $CCHD_t$	+0.2164 TR_t
		(2.0757)	(-0.1692)	(3.636)
R^2	=	0.5561		
DW	=	2.1972		
LLF	=	64.1217		
6. KD_{t-1}	=	-175.286	+ 11.0349 RG_{t-4}	+ 33.4083 YD_{t-2} + 7134.86 BI_{t-4}
		(-2.0004)	(0.0213)	(0.0685) (7.7339)
R^2	=	0.7704		
DW	=	2.1001		
LLF	=	139.24		

B. Revised Model

1. CP_t	=	20.6308	+ 0.2937 Y_t	+0.037 POP_t
		(1.0836)	(2.0769)	(2.3412)
R^2	=	0.9894		
DW	=	2.3034		
LLF	=	-123.93		
2. I_t	=	-28.5406	+ 0.4006 Y_{t-1}	
		(-1.5303)	(19.0275)	
R^2	=	0.9466		
DW	=	2.6231		
LLF	=	-124.05		
3. CG_t	=	-13.2968	+ 0.0866 Y_t	+ 0.0115 POP_t
		(-2.3298)	(2.0422)	(2.4208)
R^2	=	0.9896		
DW	=	1.4433		
LLF	=	-97.428		
4. Y_t	=	(K_t) 0.3546	+ (L_t) 0.555	
		(2.2942)	(4.5304)	
R^2	=	0.9136		
DW	=	1.7503		
LLF	=	-4.4089		
5. NM_t	=	0.0126 $YLPG_{t-3}$	+0.2104 TR_t	
		(2.2942)	(4.5526)	
R^2	=	0.5681		
DW	=	2.1797		
LLF	=	64.423		
6. KD_{t-1}	=	-170.457	+ 7137.28 BI_{t-4}	
		(-3.4164)	(8.1907)	
R^2	=	0.7704		
DW	=	2.1088		
LLF	=	-139.24		

Identities:

1. POPt = (1+Nt + NMt) * POPt-4
2. Lt = 1 * POPt
3. ADt = Ct + It + Gt
4. NXt = Yt - ADt
5. Kt = Kt-3 + KDt-1 + It-1
   = Kt-1 + It-1
6. CCHDt= CCHt - CCHt-3
7. ECt-1 = Kt-1 * RGt-1
8. CCHt = S * (Yt/POPt)

conditions in Jawa bringing about the heavy concentration of economic activities including those even of the resource base type, is a clear example of how transport costs of raw materials are overpowered by better soft infrastructures (e.g. banking services) and hardware (e.g. ports, road and telecommunication) in Jawa. The insignificance of EC_{t-1} coefficient is consistent with the estimated result of equation 6, where the coefficient for interregional gap of capital earnings (RG_{t-4}) is also insignificant[4]. Different periods for RG are also attempted but none of them improve the significance of the coefficient. Indeed, even when the regional interest rate is being used as a proxy of capital earnings, it is not necessary that the rate which is applicable in a province determines the capital inflows into that respective region. It is not seldom that investments taking place in regions outside Jawa are actually financed and owned by some capitalists from Jawa. Other cases of cross-region investment finance can also be observed among provinces in the outer islands. Hence, to use a region's interest rate for capital growth prediction would, as the model estimation has showed, generate unsatisfactory results.

The proxy variable for agglomeration economies, namely GRDP growth (YD_{t-2}), turns out to be also unsatisfactory with an extremely low t-ratio.

Although it has the expected sign, the coefficient for per-capita household consumption ($CCHD_t$) in equation 5 is also insignificant. However, the inclusion of the economic variable is conceptually important in order to endogenize net-migration NM , and hence POPt. Nevertheless, another economic variable ($YLGP_{t-3}$) has a relatively high degree of significance suggesting its important role in determining the interregional in-and-out migration. As is also expected, the interregional allocation of transmigration program (TR_t) has the most significant coefficient in equation 5. Indeed, since the early launch of the transmigration program, the interregional allocation of population has been significantly affected in spite of some unsuccessful stories of the program. At any rate, what equation 5 implies is consistent with the evidence found by many studies on migration in some Asian countries, in which generally non-economic factors have far better explanatory power than the standard economic variables (see Hause, Suits & Ogawa (1985) and Azis (1989)[5]).

Notice also that in equation 6 the most significant coefficient is the one that belongs to the interregional allocation of "block" INPRES variable (BI). This allocated fund is indeed targeted, among others, to

raise the production capacity of the region through the development of various types of infrastructures. It is therefore not surprising that the positive coefficient of BI is highly significant. The impact analysis will depart from manipulation of the exogenous variable.

The production function of the Cobb-Douglas type generates a less-than-unity sum of input parameters, indicating the presence of decreasing returns to scale. Both coefficients are significant with the labor parameter being not only larger but also more significant than the capital input parameter. The coverage of only 22 regions, however, implies that such a conclusion be interpreted carefully when applied to the overall Indonesian case.

As discussed earlier, the cross-section nature of the estimation makes use of the technological progress factor difficult to interpret. It is therefore omitted from the production function. Since the aggregate demand AD does not contain net-exports of the region, the difference between Y and AD can be treated algebraically as the regional net-exports (see identity 4).

The lower part of table 4 shows the results of reestimation of the model by omitting those variables that have insignificant coefficients (thus, it can be considered a revised model). Basically no significant changes of coefficients are observed. Some standard statistics to demonstrate the predictive power of each equation are presented in table 5 for both models.

Five impact variables are selected as measures of regional income, based upon which the static simulation for the analysis of interregional disparity is made.[6] Those variables are: regional per-capita private consumption (CPCAP), per-capita GRDP (YCAP), per-capita household consumption taken from SUSENAS (CCH), per-labor GRDP (YL) and the size of GRDP itself (Y). The CCHD data in real terms are calculated by using the average regional cost of living index as the deflator.

The choice of indicators turns out to be crucial, for each will generate different outcomes. In the simulation the exogenous variables TR and N are assumed to remain constant throughout the period of projection.

A hypothetical scheme of "block" INPRES allocation, in which the equi-size principle is adopted, appears to generate interregional divergent patterns in terms of all ratio variables (YCAP, CPCAP, CCH and YL) but a convergent path for Y (see table 6). Since the model treats the net exports element as endogenous, one may deduce

TABLE 5

SOME MEASUEES FOR THE MODEL'S PREDICTIVE POWER

	CC		RMSE		MAE		ME		TIE	
	M1	M2	M1	M2	M1	M2	M1	M2	M1	M2
CP84	0.995	0.995	62.815	62.854	46.8036	47.3455	.-4.38672	.-5.574	0.0385	0.0385
I84	0.977	0.973	62.784	68.0166	41.8979	43.3957	0.9258	.-.28E-13	0.0918	0.0993
CG84	0.992	0.992	24.75	250797	16.1303	16.3152	.-1.1749	.-1.6563	0.0525	0.053
NH84	0.749	0.759	0.0131	0.013	0.0099	0.0099	.-0.0012	.-0.0014	0.3271	0.323
K8183	0.877	0.878	135.673	135.691	78.3002	78.3611	.0.28E-13	0	0.2207	0.22
POP84	0.999	0.999	85919	86.608	48.7607	49.2073	.-21.2614	.-23.6113	0.0038	0.038
L84	0.999	0.999	33.222	33.6767	18.0397	18.2252	.-8.7213	.-9.5468	0.0038	0.0039
AD84	0.998	0.997	66.174	79.5114	51.679	57.5528	.-4.6358	.-7.2308	0.0238	0.0286
Y84	0.978	0.997	221.511	226.511	111.674	111.405	.-11.2746	.-16.0068	0.0855	0.0871
K84	0.993	0.993	208.625	208.612	107.509	107.709	.-79.6191	.-79.6191	0.0698	0.0698
K83	0.992	0.992	135.673	135.691	78.3002	78.3611	.0.11E-12	0	.0.0542	0.0542

Notes: CC = Correlation Coefficient
RESE = Root Mean Squared Error
MAE = Mean Absolute Error
ME = Mean Error
TIE = Theil's Inequality Index
M1 = Original Model
M2 = Revised Model

TABLE 6

RESULTS OF STATIC SIMULATION: INTERREGIONAL DISPARITY UNDER TWO SCENARIOS

	Scenario 1	Scenario 2
	With 1980/81 "Block" Inpres Allocation	With Hypothetical Equi-size Principle For "Block" Inpres Allocation
I. Coefficients of Variation for :		
1. Per Capita Private Consumption (CPCAP)	0.1335	0.1867
2. Per Capita GRDP (YCAP)	0.2039	0.2651
3. Per Labor GRDP (YL)	0.1452	0.2048
4. Per Capita Household Consumption (CCH)	0.24	0.3234
5. Total GRDP (Y)	1.4514	1.3248
II. Total Sum of GRDP (Rp Trillion)	16.6200	16.8400

Source: Result of Simulation

that in terms of the GRDP indicator the interregional convergent path will take place given the endogenously determined level of regional exports. This finding has more value, in particular, within the current efforts of the government to boost non-oil and gas exports.

Earlier it was stated that judged from the proximity to the welfare indicator of the region, CCHD seems to be a better guide particularly in terms of data sources and variable definition. The coefficient of variation calculated for this variable has increased quite considerably from 0.24 to 0.32. Meanwhile, notice that the simultaneous occurrence of greater disparity and the convergence of Y demonstrates how misleading the model would be if the demographic variables (population and labor) are not treated endogenously.

From the use of a hypothetical INPRES allocation with the equi-size principle above one may deduce that such an alternative scheme is not preferred should attaining more balanced interregional income in the nation be the prime objective of the program. The 1980/81 allocation, however, is also not guaranteed the most preferred as it may generate larger disparity in Repelita V.

It is quite interesting to observe that the sum of GRDP (it should be the counterpart for GDP when applied to all 27 provinces) under the equi-size principle scheme is larger than that under the 1980/81 allocation criteria (Rp 16.8 compared to Rp 16.6 trillion). Thus, there seems to be a classical trade-off between the disparity reduction goal and the objective of maximizing total output. A further check on the presence of trade-off will be discussed in the simulation for projection (see the next section).

It is important to note once again that the CPCAP (to be distinguished from CCH), YCAP, YL and Y are all taken from the regional accounts based on production-originated concepts and not the actual income accrued to people in the region. The CCH variable, however, suffers from the use of an assumption that consumption data are good proxy for income and the fact that there are relatively large interregional variances of sample size covered in SUSENAS.

V. SIMULATION FOR REPELITA V

From the simultaneity of the model and the presence of lagged variables one can simulate the estimated model into a future period ending in 1993 (dynamic simulation throughout the end of Repelita V). Notice once again that given a predetermined allocation system of INPRES program, the repercussions are not only embracing upon

GRDP or regional consumption but eventually also effective upon population size (hence labor size too, see particularly the dotted arrows in table 3).

In terms of total GRDP, the interregional variation in 1993 is expected to be lower than that in the base year 1984 (1.42 compared to 1.45), observed from the year-to-year simulated values. The declining trend can be detected as not occuring in a consistent manner during 1984-1993. An increase in the coefficient of variation, for example, which takes place in 1992 after a persistent decline from 1984 to 1991, may then be followed by another decline in 1993. Therefore, it is evident that the complex nature of the interconnection among variables does not guarantee monotonicity in the direction of movement of impact variables.[7] This suggests an important policy implication; there is no single optimal INPRES allocation criterion pertinent from time to time. Review of criteria is therefore necessary after a certain period. The regional classification based on some selected prosperity indicators may alter overtime as a consequence of the effective role of INPRES and perhaps of other supportive factors as well.

In terms of per-capita and per-labor indicators, divergent patterns are observed except for the CPCAP. At a much slower pace, trends in this per-capita private consumption show a convergent path. In all cases the trends are once again far from monotonic.

The more representative indicator, CCH, is assumed to be in direct relation with per-capita GRDP. It is therefore not surprising that measured in terms of these two indicators divergent patterns are observed. While the coefficient of variation for per-capita GRDP has increased by 37% (from 0.20 in 1984 to 0.28 in 1993), that for CCH has climbed by 27%, from 0.24 to 0.31 (see table 7).

The projected coefficients of variation from simulating the original model (not the revised one) are also generated. Interestingly, a similar pattern for each variable is obtained except that in all cases the deviations of the coefficients between 1984 and 1993 are larger compared to those in the previous case. Therefore, even if all four indicators are assumed equally weighted one may still confirm the presence of non-optimality of "block" INPRES allocation criteria. Should such a non-optimal system of interregional allocation be maintained throughout the end of Repelita V, *ceteris-paribus* the interregional income paths will not tend to converge. In other words, the disparity of income among regions in Indonesia will be worse-off.

In view of the endogenous treatment of net-exports in the present

model, the question whether the path could be reversed if the regional exports and imports are no longer endogenous, (e.g. they expand dramatically due to the strong external-oriented strategy adopted by the government) remains open to question. The issue is unquestionably more befitting under the current export-drive policy.

Akin to the previous hypothetical case, an equi-size principle is tested. The results show that in all cases of per-capita and per-labor indicators, greater disparities will be induced. In fact, the degree of disparity measured in terms of variation size is even larger than in the preceding case (see table 7). If such findings are matched with the projected absolute size of GRDP, a further confirmation on the presence of trade-off between maximizing total GDP and reducing interregional disparity will obviously be the outcome. In every single year from 1984 to 1993 the size of total GRDP (of 22 regions) is greater in the hypothetical case, suggesting a higher GRDP growth rate. During that period the average annual GDP (excluding oil and gas) growth rates under scenarios 1 and 2 are 3.12% and 3.14% respectively.

The average annual growth rate of employed labor during the Repelita V period, using the assumption of constant labor-force participation rate, is expected to reach only 2.38% under both scenarios. The difference between the two by 1993 is only one thousand man-year employed labor. That is, there will be more employment creation under the scenario of equi-size principle. But judging from the trend, should we use longer projection periods the gap would be definitely greater. Assuming that the annual GDP growth rate of total 22 regions during Repelita V is in the neighborhood of 3.12%, the increase of the size of employed labor from 53.6 to 66.3 million implies an employment elasticity of around 0.7 during Repelita V. The predicted interregional variation of labor is slightly larger under the 1980/81 allocation system (1.4475 compared to 1.4422), suggesting better results of the equi-size principle, notwithstanding that both scenarios produce a decreasing interregional variation from 1984 to 1993. Therefore, viewed from the employment objective, the non-optimality of the 1980/81 allocation system is further confirmed.

Notice that at least conceptually two other exogenous variables from the original model can be assumed to alter, namely the transmigration pattern, TR, and the interest rate RG (hence EC too). However, in the revised model RG and EC are dropped for the insignificance of their coefficients. Inspite of difficulties in predicting the government's intention of transmigration allocation, one can still

TABLE 7

RESULTS OF DYNAMIC SIMULATION: SOME INDICATORS OF INTERREGIONAL DISPARITY UNDER TWO SCENARIOS FOR THE PERIOD OF 1984 TO 1993 (END OF REPELITA V)

	Scenario 1		Scenario 2	
	With 1980/81 "Block" Inpres Allocation		With Hypothetical Equi-size Principle For "Block" Inpres Allocation	
	1984	1993	1984	1993
I. Coefficients of Variation for:				
1.Per Capita Private Consumption (CPCAP)	0.1335	0.1315	0.1867	0.2153
2.Per Capita GRDP (YCAP)	0.2039	0.2789	0.2651	0.3246
3.Per Labor GRDP (YL)	0.1452	0.2174	0.2048	0.2551
4.Per Capita Household Consumption (CCH)	0.24	0.3058	0.3234	0.3864
5.Total GRDP (Y)	1.4514	1.4227	1.3248	1.1143
II.Average Annual Growth Rate of Total GRDP 1984-1993	3.12%		3.14%	
Year Employed Labor (000)	53616	66257	53616	66258

attempt to use some proxy determinants such as regional population densities, potential land resources as well as other economic variables representing the conditions of originating regions (push factor) and regions of destination (pull factor). While it is feasible, such a step is not carried out since the approach we would like to take is to confine the analysis to the distributive impacts of changes in *only one factor*, namely the INPRES allocation scheme.

VI. CONCLUSION

This study basically attempts to demonstrate the non-optimality of the 1980/81 INPRES allocation and the equi-size principle particularly in the efforts to reduce the interregional disparity.

The INPRES program, specifically those in the category of "block" INPRES, has been proven to be crucial for regional development. From the model estimation it was indeed revealed that the regional capital growth, and hence the regional productive capacity, had been significantly affected by the interregional allocation of "block" INPRES. The process will in turn impact various facets of *intra-region* economy by way of employment creation, poverty alleviation and the inducement of self-sufficiency.

Glimpsed from the *inter-regional* distributive aspect, the performance of "block" INPRES allocation, at least during the early 80s, had been generating a slightly better outcome but only in comparison to the "equi-size principle". It is perhaps equivalent to "mild absolute inequality aversion of the center", a term used by Revallion (1989). A more affirmative answer yet to be found is whether the interregional distributive role of the program will be effective throughout Repelita V. From dynamic simulation, the results are not too encouraging. The 1980/81 allocation criteria, notwithstanding its superiority to the equi-size principle, are far from optimal. The optimality in this case alludes to a condition, under certain criteria, that will generate smaller interregional disparity. Should they be maintained throughout 1993, the interregional disparity will be worse-off by the end of Repelita V. For the period has begun and since the 1987/88 and 1988/89 allocation criteria for DATI I (the largest component in "block" INPRES) has been based on the equi-size principle, an immediate adjustment is necessary.

In terms of employment creation, although the differential in the magnitude is not too significant (1000 man-year employment) by the end of Repelita V, the 1980/81 allocation is not better than the equi-size principle. With the assumption of 3.12% GDP growth rate (for only 22 regions), the expected employment elasticity would be in the neighborhood of 0.7.

The simulation results also show the presence of trade-off between the objective of maximizing total sum of GRDP (efficiency) and the goal to abridge interregional disparity (equity). Hence, a more careful plan with transparent criteria of INPRES allocation is in even greater demand. A non-monotonicity of changes in the impact variables is also revealed, suggesting the requirement to review the allocation criteria in a rather regular manner.

The model being used has other capabilities beyond just being able to evaluate the impact of some exogenous variables. The interregional economic structure induced by the model is also capable of indicating, for example, the insignificance of standard capital earnings to elucidate interregional capital movements, implying a detour from the neo-classical equilibrium tradition. Another finding suggested by the model has been the significant role of interregional allocation of migrants, through the transmigration program, in affecting net-migration, and hence distribution, of population.

Finally, room for improvement. The coverage of all 27 provinces, the experiment of using various allocation criteria and the use of further breakdown of INPRES category, are instances one may attribute to the weaknesses of the present study. They are tasks for a future study.

NOTES

1. Another study on the central government funding of regional development can be found in A. Booth, *Central Government Funding of Regional Government Development Expenditures in Indonesia: Past Achievements and Future Prospects*, mimeo, Department of Economics, RSPacs, ANU, 1987.
2. See Azis, Iwan J, "Key Issues in Indonesian Regional Development," in Hill, Hal, *Unity and Diversity: Regional Economic Development in Indonesia Since 1970*, Oxford University Press, 1989
3. Ideally, the sectoral breakdown of regional production function should be made to reflect the supply-side better.
4. The capital earnings data are from the Central Bank (unpublished).
5. If the transmigration is excluded, however, economic factors do play important roles in explaining the interprovincial movement. This was a strong conclusion of the author's 1989 study (see Azis (1989b))
6. The Gauss-Seidel algorithm is used for the simulation process.
7. The year-to-year and region by region simulated results are available upon request.

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