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IIASA Research Memorandum
October 1977

FINANCING THE JAPANESE URBAN SYSTEM: LOCAL PUBLIC FINANCE AND INTERGOVERNMENTAL RELATIONS

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October 1977

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Preface

This paper reports on research undertaken within the context of the IIASA research task on Human Settlement Systems: Development Processes and Strategies. It is one of a series which examines the nature and significance of the Japanese urban system in a international context. Professor Glickman has written three other papers (RM-77-39, RM-77-46 and RM-77-47) and Professor Tatsuhiko Kawashima has written another (RM-77-25).

Papers in the IIASA Series on Human Settlement Systems: Development Processes and Strategies

1. Peter Hall, Niles Hansen and Harry Swain, *Urban Systems: A Comparative Analysis of Structure, Change and Public Policy*, RM-75-35, July 1975.

2. Niles Hansen, *A Critique of Economic Regionalizations of the United States*, RR-75-32, September 1975.

3. Niles Hansen, *International Cooperation and Regional Policies Within Nations*, RM-75-48, September 1975

4. Peter Hall, Niles Hansen and Harry Swain, *Status and Future Directions of the Comparative Urban Region Study: A Summary of Workshop Conclusions*, RM-75-59, November 1975.

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14. Koren Sherrill, *Functional Urban Regions in Austria*, RM-76-71, September 1976.

15. Niles Hansen, *Economic Aspects of Regional Separatism*, RM-77-10, Feburary 1977.

16. Koren Sherrill, *Functional Urban Regions and Central Place Regions in the Federal Republic of Germany and Switzerland*, RM-77-17, April 1977.

17. Tatsuhiko Kawashima, *Changes in the Spatial Population Structure of Japan*, RM-77-25, June 1977.

18. Norman J. Glickman, *Growth and Change in the Japanese Urban System: The Experience of the 1970s*, RM-77-39, July 1977.

Abstract

An empirical investigation into the financing of urban development in Japan is undertaken. Following a description of governmental structure, regression and other analyses are presented based on data for 336 cities and 46 prefectures for 1960-1970. It is found that attempts to achieve vertical financial equity among regions and cities is partly achieved, as poor cities and prefectures benefit from central government tax and subsidy programs.

Acknowledgments

Funds for this research were provided by the Ford Foundation. This paper draws on earlier research by Dr. Erhan Gencer and me and I am grateful to him and Yukio Oguri for help. Susan Arthur provided helpful editing advice. I am responsible for any errors, however.

1. INTRODUCTION

In Glickman [1977c], we discussed Japan's regional planning system and how it attempted to redistribute population and reduce interregional income inequalities. We concluded that the planing system had little to do with the relative decline in inmigration to the large cities which began in the early 1960s. Additionally, since the spatial distribution of central government investment was relatively centralized, we argued that public spending patterns did little to reduce income differences among regions. We further concluded that most of the decentralization which took place could be attributed to the normal workings of the market-place: firms sought locations where land prices were relatively low and where labor was cheap and available; families sought housing where jobs were located and where the environment was more congenial. This increasingly meant that people and firms were locating away from the three main metropolitan centers, primarily in middle-sized regions[1]. We also cited evidence that a reduction in interregional income differentials has lowered the propensity of families to migrate to the richer urban centers. However, not all of the narrowing differences[2] could be accounted for by the decentralization of industry to poorer regions. We noted the research of Sakashita [1976] which indicated that government tax and subsidy programs were responsible for some of the

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[1]We have discussed these trends in Glickman [1977a] and have shown that the metropolitan areas which form the Regional Economic Clusters (see Glickman [1977a, 1977b] grew more quickly than non-metropolitan areas, principally because of higher birth rates in the cities, and that there was evidence of lower levels of inmigration to the major metropolitan centers beginning in the late 1960s.

[2]For some evidence, see Mera [1976].

increased incomes, of both the people and the local governments, in poorer regions.

To better understand the Japanese method of income redistribution among regions, we analyze the revenue structure of the local governments in this essay. The two major questions we ask are:

(1) What are the revenue sources available to local government?

(2) What determines the amount of local revenue from each source?

The first question leads to a study of the institutional framework of the local governments (hereafter, LG) and the fiscal relations between various governmental levels. The second question requires finding socio-economic variables which help explain the amount of revenues which come from the various sources.

There are four additional parts to this paper. Section 2 outlines the institutional structure of the Japanese government and the fiscal relations of its several layers. Sections 3 and 4 are devoted to quantitative analysis of the revenue structure of municipal governments and is the major contribution of this paper. Sector 5 briefly discussess the role of prefectural governments and Section 6 presents some conclusions.

2. THE STRUCTURE OF LOCAL GOVERNMENT IN JAPAN

2.1 A Brief History of Local Government

The opposing themes of centralization and decentralization figure prominently in the development of local government in Japan. Decentralized systems of governance of the feudal era were replaced with centralized government institutions with the rise of

mercantilist and, later, industrial forces. The Meiji constitution, which symbolized the victory of the emerging bourgeois class in Japan, was the first movement towards centralization; on this subject, see Steiner [1965]. Japan is now politically subdivided into forty-seven prefectures (including Okinawa) which were first established following the Meiji restoration and the abolition of feudal fiefdoms in the 1870s. The Meiji Constitution and the Law Concerning the Organization of Urban and Rural Prefectures (1890) established a unitary system rather than a federal type of government such as the American one. The governor (chiji) of each prefecture was appointed by the Emperor on recommendation of the Minister of Home Affairs. The governor had the power to override decisions of the prefectural legislature, the ability to formulate prefectural budgets, and considerable control over the budgets of villages, towns, and cities.

As noted by McNelly [1972], centralization and bureaucracy rather than local autonomy were the prevailing principles of local government in prewar Japan. During the American Occupation period, a decentralized government system, which emphasized local home rule, was superimposed on the highly centralized and bureaucratic ruling heritage of Japan. After the war, localities were guaranteed home rule according to the new constitution. However, no precise functions and powers are anywhere enunciated in the Constitution, so that, despite the newly promulgated principle of local autonomy, the local governments were only able to exercise powers delegated to them by the Diet, as had been the case before the war, according to Steiner.

The three echelons of government in Japan are the central (national) government, prefectural government, and municipal government. Postwar legislation has encouraged the amalgamation of municipalities, and for reasons of economy and efficiency many chose to merge. This was particularly true during the 1950s[3].

2.2 Functions of Local Governments

The major institutional functions of local governments in Japan are: (1) to carry out certain central government (hereafter, CG) legislation and projects and (2) to enact and enforce the legislation of the LGs themselves. In carrying out the former group of functions, the LG agencies are supervised by the relevant departments of the CG, especially the Ministries of Home Affairs, Finance, Education, and Welfare. The powers of the local governments are delegated by legislation passed by the Diet. According to the Local Autonomy Law, the LGs have authority concerning general police work, social security and welfare, establishment and maintenance of urban infrastructure, urban planning, education,

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[3]To date, the amalgamation movement, so important at the municipal level, has not resulted in the merger of any of the prefectures, which have the same boundaries as they had before World War II. Much more radical are the proposals to abolish the prefectures completely, and to replace them with seven to nine districts or states. A controversial modification of the former proposition is that of interposing administrative units of the central government between the present prefectures and the central government. Most of such ideas are opposed by prefectural governors, who insist that the rights and the interests of the people in the prefectures must be preserved, and by the opposition parties, who accuse the Liberal Democratic Party advocates of these schemes of plotting to destroy the principle of local autonomy in favor of a centralized regime run by the conservatives. As McNelly notes, opportunities for Socialists to win prefectural governorships and assembly seats would be reduced by the proposals for amalgamations of prefectures.

and levying and collecting taxes. The CG may also deal with these matters when it wishes[4]. Governors of prefectures and mayors of municipalities are elected by the voters of their respective units for terms of four years, subject to recall by the voters. The Local Autonomy Law provides that local executives should carry out national laws and cabinet orders. National deliberative organs may sue a local chief executive for failing to carry out specified national laws or projects; eighty percent of all work handled by local government units consist of administrative affairs entrusted to them by agencies of the central government. Thus, local mayors and governors must serve two masters since the function as agents of the CG in national matters and officers of their local governments in local matters. Under present laws, 70 percent of the taxes are collected by the CG with 30 percent retained by the local administrations[5]. However, about 60 percent of the taxes assigned to the CG are subsequently returned to the local governments in various ways. As a result, only some 30 percent of all taxes are directly spent by the CG, while the rest is spent by the local governments. The professed policy is to collect the maximum revenue from the wealthier localities and to redistribute it to local entities with insufficient financial ability relative to need, according to the Ministry of Home Affairs [1972]. As we shall see, a large proportion of the CG disbursements are problem - or project-specific (i.e. earmarked), leaving little initiative to the LG over financial policies.

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[4]The overlapping of functional relationships among the three-levels of the government hierarchy concerning local problems may create organizational inefficiency and may render it quite difficult for a concerned citizen to pinpoint where government-related problems originate. The muddle of the functions makes it easy to pass the buck, and government, even at the local level, too often seems bureaucratic and unresponsive according to many observers.

[5]See Steiner on this subject. For other treatments of Japanese local government and politics see Ide [1965], Ike [1957], Mukherjee [1966], Tsuneishi [1966] and Ward and Rustow [1964].

3. LOCAL GOVERNMENT REVENUE SOURCES

3.1 The Local Finance System of Japan

In the remainder of this paper, we will concentrate on analyzing the methods of financing urban development through the complex system of intergovernmental relations. First, we describe the various revenue sources to LGs (Sections 3.11 to 3.16). Then we go on to look at our data base (Section 3.2) and to categorize LG revenue sources (Section 3.3). This section provides background for the empirical analysis of Section 4, where we highlight the relationship between the CG and the LGs.

3.1.1 Local Taxes

These taxes are levied by the municipality in accordance with the Local Tax Law enacted by the Diet in 1950. The same law "provides the taxes to be levied by the local public entities and describes the basis of tax computation and methods of collection of respective taxes"; see Ministry of Home Affairs [1972]. The Local Tax Law provides standard tax rates and assessment methods. However, local governments may levy taxes at rates higher than the standard ones, when they consider it necessary, but not exceeding the limit set forth by the law.

There are two types of local taxes: (a) Ordinary (or "standard") taxes such as the Municipal Inhabitant, Fixed Assets, Electricity and Gas, and the Mineral Product Tax; and (b) Special Purpose taxes such as the Spa, City Planning, Water Utility and Land Profit Tax. The latter levies are determined by the locality according to its assessment of its needs.

3.1.2 Local Transferred Taxes

The CG levies and collects these taxes on goods relating to transportation and related consumption. They are transferred to municipalities and prefectures on the basis of decisions by the CG when transportation and related facilities are located within the municipality. The basic forms of such taxes are Local Road, Special Tonnage, Liquified Petroleum Gas, Aviation Fuel, and Motor Vehicle Tonnage Taxes.

3.1.3 Local Allocation Taxes

This is the revenue-sharing system under which 32 percent of the sum of the three basic national taxes (Corporation Tax, Liquor Tax, and Income Tax) is collected by the CG and then allocated to the municipalities. The Local Allocation Tax is divided into two parts, ordinary and special. The ordinary allocation tax is given by the CG to local public authorities in accordance with the calculated difference between the amount of standard financial needs and the standard financial revenue as computed by the CG, through a rather rigid, complicated formula. Distribution of the special allocation tax is designated by the CG.

3.1.4 Treasury Disbursements

Such revenues are earmarked by the CG for specific purposes and programs and are then allocated to the LGs. There are three components to the treasury disbursements:

(a) programs in which the LGs share financial responsibility with the CG. In this case, the share of the CG is governed by the Local Finance.

(b) expenses related to projects for which only the CG is financially responsible and execution of which is entrusted to the LG. For instance, the election of Diet members and the collection of national statistics are included in this category, which is known as "money in trust".

(c) treasury subsidies and grants-in-aids are allocated by the CG (i) to subsidize special financial needs of the LGs concerning local or public corporations located in the municipality, (ii) to encourage special projects, usually for stimulating economic growth, and (iii) as grants-in-aid for municipalities where national institutions are located.

3.1.5 Prefectural Disbursements

This fund is allocated by the prefectural governments to municipalities. This type of revenue has two components: a) those funds that accompany treasury disbursements of the CG and are earmarked for special projects to which the municipalities contribute as well; and (b) those that are allocated by the prefecture alone, again earmarked by use category but for which the prefectural government alone is financially responsible.

3.1.6 Local Bonds

Every fiscal year LGs sell local bonds. However, the control over the total value of the local bonds that can be issued by a LG, and the amount of those bonds bought by the CG, rests with the Ministry of Home Affairs. Sixty-five percent of all local bonds issued each year is purchased by CG agencies, while the rest is bought by private individuals and various financial institutions. Local bonds are issued for financing public housing,

compulsory education, acquisition of public land, public and quasi-public corporations, and welfare projects.

Table 1 shows the relative importance of each revenue item to local government finance. Note that the largest item, local taxes, is still only 33 percent of all LG revenues. The rest comes from either the central government or from prefectural governments. Figure 1 indicates the revenue structure of local government.

3.2 The Data Base used in the Analysis of the Japanese Local Public Finance System

We have gathered and organized a data bank for three hundred and thirty six cities for 1960, 1965 and 1970 which we call the "City Data Bank". It consists of a set of data which are constant through time, such as a city's distance from Tokyo or whether or not it is a prefectural capital; these are in File #1, as listed in Appendix 1. There are four remaining data files having over 100 other variables for demographic, social, economic, political and governmental, and environmental characteristics. These variables were used in this study and in Glickman and McHone [1977] to supplement the Regional Data Bank outlined in Appendix 2 of Glickman [1977b].

3.3 Identification of the Types of Revenues

Our discussion of the LG revenue structure suggests decision-points for revenue allocations. National and prefectural policies directed to specific problems and programs are the first category of decision points. There certain funds are earmarked for use by the CG; hence, they are dictated by the CG's perception of the locality's

Table 1: Level and Percent Distribution of Revenues for Cities, Towns and Villlages, 1970

	(billions of Yen)	(percent)
Total Revenue	4,535	100.0
Local Taxes	1,485	32.74
Transferred Tax for Local Government	14	0.30
Local Allocation Tax	835	18.41
Treasury Disbursements	529	11.67
Prefectural Disbursements	245	5.41
Local Bonds	431	9.51
Rents, Fees and changes	169	3.73
Miscellaneous	827	18.24

Source: Japan Bureau of Statistics Office of the Prime Minister [1973].

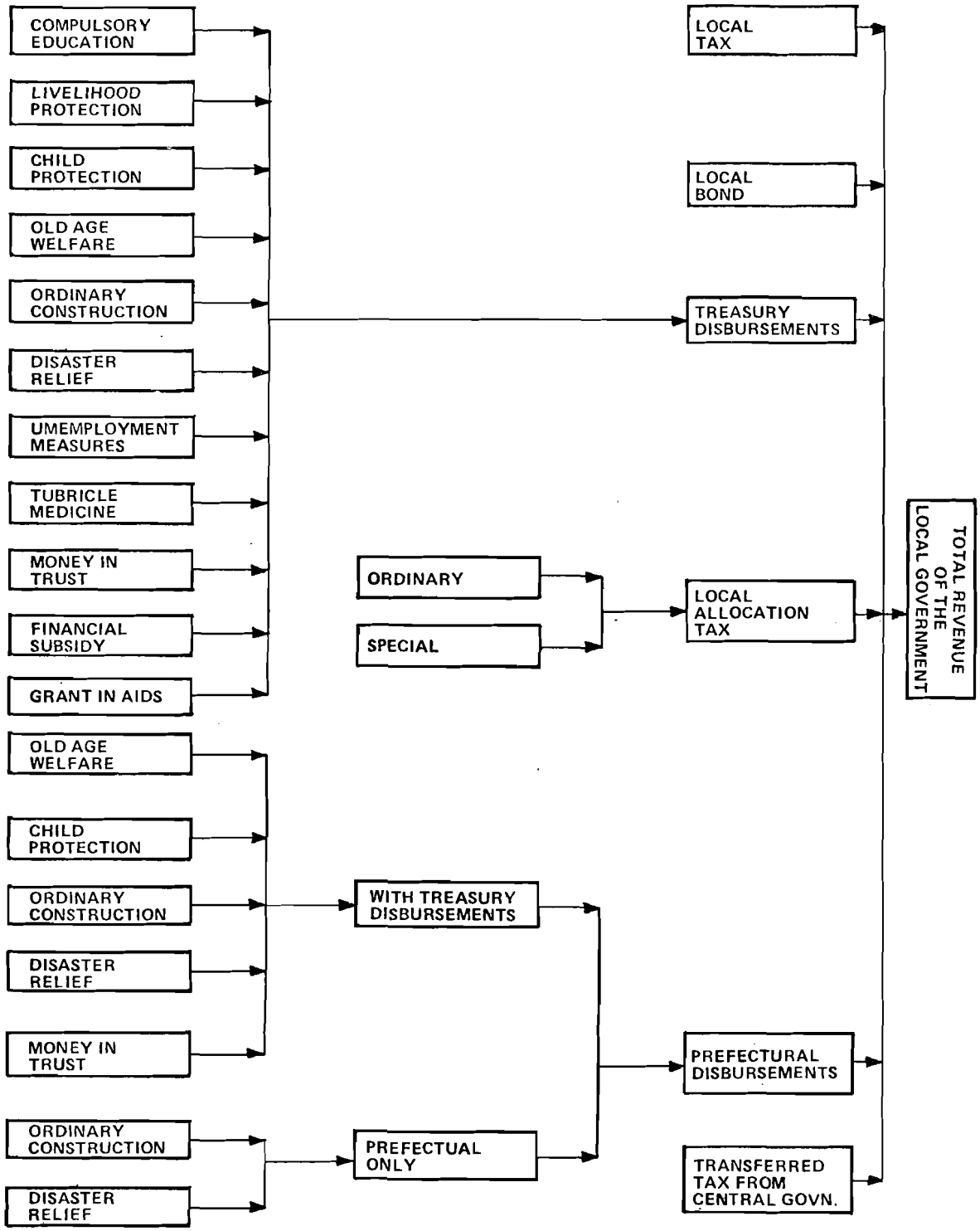
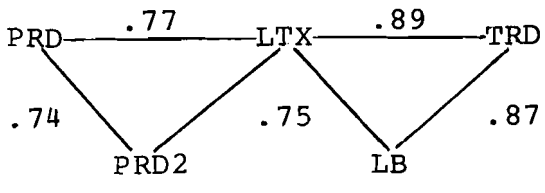


Figure 1: Revenue Structure of a Typical Local Government Unit

needs and the city's relative position in the national economic structure. Prefectural disbursements are another type of earmarked revenue, reflecting prefectural governmental priorities. For non-earmarked CG disbursements, the second category, it is claimed by the CG that such funds are directed at establishing vertical financial equity between the poor and wealthy cities, i.e. reducing interregional income disparities. This category includes the local allocating tax and local transferred taxes. The third category, locally-based revenues, depends on the political and socio-economic structure of the city itself in that its components, local taxes and local bonds, are determined by the characteristics of the locality and the decisions of their administrators, subject to dictums of the centralized hierarchic system.

To see whether the data would support such a grouping of revenue sources, and to test this initial set of hypotheses, correlation matrices for eight revenue items were obtained for three different formulations: a) 1970 revenues (in million yen), b) percent change in revenues between 1965-1970, and c) percent share of the revenue items in total revenue in 1970. By looking at the correlation coefficients, we saw that formulation a) had high coefficients while the other two formulations showed no statistically significant relationships. The correlation matrix of a) is given in Table 2.

By using the linkage method of factor analysis we obtained the following groupings of the revenue items:



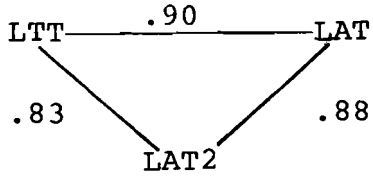


Table 2: Correlation Coefficients of the Eight Revenue Items for All Cities, 1970

	LTX	LTT	LAT1	LAT2	TRD	PRD1	PRD2	LB
LTX	1.000	.687	.560	.601	.894	.747	.768	.749
LTT	.687	1.000	.831	.882	.754	.313	.139	.789
LAT1	.560	.831	1.000	.901	.725	.438	.080	.761
LAT2	.601	.882	.901	1.000	.762	.353	.082	.779
TRD	.894	.754	.725	.762	1.000	.667	.521	.870
PRD1	.747	.313	.438	.353	.667	1.000	.744	.450
PRD2	.768	.139	.080	.082	.521	.744	1.000	.247
LB	.749	.789	.761	.779	.870	.450	.247	1.000

where:

LTX: Local taxes,

LTT: Local Transferred Taxes,

LAT1: Local Allocated taxes (Ordinary),

LAT2: Local Allocated taxes (Special),

TRD: Treasury Disbursements,

PRD1: Prefectural Disbursements (with TRD),

PRD2: Prefectural Disbursements only,

LB: Local Bonds.

The figures give the correlation coefficients between the variables. The linkage method verifies our selection of a second group, non-earmarked revenues (NEMR). On the other hand, it shows that the local and the earmarked revenues (EMR) vary together to a considerable degree. Prefectural disbursements, despite its division into two items as those accompanying EMR and those allocated by the prefectural alone, show a positive correlation with the direction of variation local taxes.

Another interesting observation is that local bonds vary positively with treasury disbursements. Recall that 65 percent of local bonds issued by the LGs are purchased by the CG in order to finance public corporations and debt. We believe that local bond purchases by the CG are not used as a substitute for treasury disbursements, but as a complement to it. Concerning the relation of the NEMR to other revenue types, we see that NEMR is highly correlated to both treasury disbursement (on the average, $r \cong .74$), and to local bonds ($r \cong .77$). Having made these observations, we decided to keep our initial revenue groupings, and proceeded to analyze what factors affect the amounts of revenue in each catagory.

Even though the R^2s were high, the results of these preliminary regressions gave us little insight into the question of how urbanization was financed, due to the aggregate nature of the analysis. Therefore, we decided to make a more disaggregated analysis. Since the LDP and its conservative power is most significant in rural areas and small towns, while more liberal bodies tend to be elected to LGs in larger localities where the economies are relatively more developed, we decided to study revenue structures in two subgroups of cities. One subgroup contains cities which are small and less developed in terms of the secondary sector of the economy; the other contains larger, more developed urban areas. We chose two criteria for dividing the data set: (1) the mean population of Japanese cities, and (2) overall mean value added (VA) per worker in the manufacturing sector. We observed that the set of cities with populations less than the national average corresponded to cities with VA/worker lower than the national average, and the same relation exists for the set of large and developed cities. The correspondence between the cities divided according to the two criteria was 93.4 percent. Since the set of large cities thus obtained closely corresponds with the central cities of the Regional Economic Clusters (REC) outlined in Glickman [1977b), we delineated 65 cities as "large" according to the two criteria mentioned above; these 65 cities are all included in the 80 RECs. Therefore, to ensure consistency and continuity with the related research, we decided to adopt the central cities of the 80 RECs as the set of "large cities" and the rest as the set of "small cities", and to pursue research on two different sets of data.

We retained the three categories of revenues (local revenues, non-earmarked revenues and earmarked revenues) in working with the set of small cities because they gave better statistical estimations than when we worked with more disaggregated categories. However, we were able to obtain a more detailed revenue classification for the large cities. First, local revenues are divided between local taxes and local bonds, since local taxes are determined by the characteristics of the locality while local bonds are affected primarily by the purchase plans of the CG. Second, earmarked revenues were divided into two components, treasury and prefectural disbursements. In this way, we hoped to more clearly trace the role of CG in relation to the municipalities.

4. EMPIRICAL ANALYSIS OF THE LOCAL GOVERNMENT FINANCE SYSTEM

4.1 Introduction

We undertook a regression analysis of local government finance in order to try to explain how local revenues, non-earmarked revenues and earmarked revenues are determined within the Japanese local public finance system. In Section 4.2 we observe the behavior of our set of small cities. We then turn our attention to the large cities in Section 4.3 where we do a more detailed analysis, first in a descriptive mode, and then using regressions.

4.2 Regression Analysis of the Set of Small Cities

The best regression estimates were obtained with three revenue categories, estimated for two time periods, 1960-1965, and 1965-1970. In each time period there are three equations, (1) local revenues, comprising local taxes and local bonds,

bonds, (2) non-earmarked revenues, consisting of local transferred taxes and local allocation taxes, and (3) earmarked revenues, which are treasury and prefectural disbursements. The dependent variable is expressed in millions of yen at the end of the period, and all independent variables that are not expressed in percent change terms are calculated for the end of the time period.

We list and describe the variables used in these regressions in Table 3 (these variables are also used in the analysis of large cities in Section 4.3 below). Table 4 presents the results of the best fitting regressions for the two time periods, where each cell contains the sign and the t-value of the regression coefficient if the respective independent variables were significant at the 95 percent confidence level. Next, we examine these results.

4.2.1 Local Revenues

Local revenues are positively related to socio-economic variables showing growth and development; that is, cities with high productivity and greater percentage of employment in manufacturing, a high percent of population at adult age and college graduates, a high index of infrastructure development, and more population, all show higher local revenue levels[6]. The relationships seem quite stable over the two time periods.

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[6] Interestingly enough, the independent variables SALES (wholesale plus retail sales) is negatively related in both periods with high levels of confidence, even though its simple correlation to local revenues is positive (+0.66). This paradox can best be understood when the positive correlation between population (POP) and wholesale and retail sales (SALES) is considered. Since, in the first period, POP enters the regression equation with a positive sign, the positive covariance of SALES with the dependent variables is taken care of, and only the negative contribution of SALES remains. A similar effect comes from the rather strong positive relation of inmigration (INMGR) to local revenues in the second period. In both time periods, the R^2s are high, approximately 0.96.

Table 3: Description of the Independent Variables Used in Regression Analysis

MFPRD .... Value added per worker in secondary sector.

SALES .... Total retail and wholesale sales (millions of yen).

INMGR .... Ratio of daytime to nighttime population.

DEPR .... Ratio of population to employed persons.

Δ POP .... Percent change in population.

ADULT .... Percent of population between the ages 15-64.

INFRA .... Index of infrastructure and social overhead capital:

$$\sum_{n} \frac{X_{in}}{\bar{X}_n}$$ where X_i is a vector of 'n' infrastructure variables in city i:

X_{i1} - Tatami per household member (one Tatami = meters squared)

X_{i2} - telephones per 1000 persons

X_{i3} - percent of households with water supply

X_{i4} - number of books in the libraries

X_{i5} - number of households living in dwelling units

and $\bar{X}_n$ is the mean of nth variable for the 80 central cities.

LDPV .... Percent of total votes received by LDP candidates.

COLGE .... Percent of population with college degrees.

INC .... Average monthly family income.

REMP .... Ratio of the employment in mining, fishing, construction and secondary sectors to employment in tertiary and government sectors.

SPDIST ... Dummy variable, assigning value 1 if the city is part of a new industrial city or other development district.

POP .... Total nighttime population of the city.

CTYAGE ... Age index of cities, where the year 1868 is equal to 1.

Δ TEMP ... Percent change in the total employment.

Δ SRVE ... Percent change in tertiary and government sector employment

Δ SECE ... Percent change in the secondary sector employment.

Table 4: Regression Estimates for the Set of Small Cities, 1960-1965 and 1965-1970

1965 - 1970			1960 - 1965			
Earmarked Revenues	Non-earmarked Revenues	Local Revenues	Earmarked Revenues	Non-earmarked Revenues	Local Revenues	
0.85	0.40	0.96	0.77	0.53	0.97	R^2
102.0 sign	12.0 sign	491.0 sign	86.0 sign	25.0 sign	5.98 sign	F-value
+	-			-	+	MFPRD
	+	-		+	-	SALES
+		+	+		+	INMGR
+	+					DEPR
						ΔPOP
	-	+		-		ADULT
					+	INFRA
						LDPV
-				-	+	COLGE
	-	+				INC.
-	-		-	-	+	REMP
						SPDIST
			+		+	POP
		-				CITYAGE
			-	-		ΔTEMP
						ΔSERVE
-			+	+		ΔSEC

4.2.2 Non-earmarked Revenues (NEMR)

Here we have low R^2s for botn periods. NEMR are negatively related to the socio-economic variables that were positively related to local revenues. In fact, local taxes and non-earmarked revenues are negatively correlated within the set of small cities. Obviously, in the calculation of the standard financial needs and revenues, the CG considers the more populated small cities (i.e. 100,000 - 175,000 population group) better able to handle their own financial needs. Since many of these cities are New Industrial Cities (Ministry of Home Affairs [1969]) labor productivity is high, resulting in a less skewed income distribution with high wages, and thus, a richer local tax base. This reduces their need for NEMR.

4.2.3 Earmarked Revenues (EMR)

This category gives satisfactory R^2s in both time periods. EMR varies directly with NEMR in cities that are more populated, having relatively little manufacturing employment, and low rates total employment growth; it is also higher in regional centers in the less developed regions (Kyushu and Shikoku, for instance), with high population and low industrial growth. Also, a positive relation of EMR to local revenues occurs in cities in which there is a high volume of business activity.

4.2.4 Summary of Analysis of Small Cities

Overall, the behavior of the system of small cities does not change significantly over the two time periods as shown by stable regression equations. In short, local revenues are higher in economically well-established cities with growth potential; NEMR due to the manner by which it is calculated by CG, goes to cities with low local revenue bases, independent of population size. EMR plays an intermediary role between LR and NEMR, in that it favors poor, highly populated cities with little growth in less developed regions, and also helps further stimulate growth in cities that are relatively well-to-do.

4.3 The Set of Large Cities: A Descriptive and Regression Analysis of the Geographic Distribution of Local Government Revenues

4.3.1 Introduction

Our study of the set of large cities is more interesting because, at this level of urbanization, we see the agglomeration effects and externalities offered by urban areas. Such externalities are positive in terms of more vibrant economic development, and negative with respect to congestion and pollution. Two levels of analysis are used in this section. First, we describe the spatial distribution of LG revenues to the large cities and their patterns of change. Second, we try to statistically associate the revenues of a LG with factors that summarize its relative status in terms of social, economic, and physical aspects.

4.3.2 Descriptive Analysis of the Financial System in large cities

4.3.2.1 Measures for Descriptive Analysis

We have constructed five measures used in the descriptive analysis of the spatial distribution of revenues.

(a) Percent Distribution of Total Revenues to Cities. Here, the percent shares of the cities in national totals are given. The shares are computed over three points in time (1960, 1965, and 1970) for five revenue categories and total revenues of the locality; see Gencer and Glickman, [1976; Appendix III. Table I] for detailed data for individual cities.

(b) Per Capita Revenues. The percent share of cities in national total (in (a) above) should be correlated with the size of the urban areas. Also, we want to know which areas are being stimulated for growth by the CG or where growth can be locally-supported. One measure used to discern these effects is per capita revenues. Later in this section, measures (a) and (b) are used to observe whether larger tax bases also enabled higher per capita revenues (i.e., polarization of tax bases in which richer cities receive revenues at the expense of poorer cities) or if there is an explicit CG intervention towards vertical equity in revenue sharing as commonly hypothesized[7]. Per capita revenues are also calculated over the three time periods and five revenue items plus total revenues; see Gencer and Glickman [Appendix III, Table II] for detailed data.

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[7] See Steiner.

(c) Percent Change in Per Capita Revenue. The percent change in the five revenue items and total revenues is computed for the time periods 1960-1965 and 1965-1970. The direction and the magnitude of changes indicates whether the system of revenue sharing is moving towards vertical equity, growth stimulation through polarization, or some other relationship. Gencer and Glickman, [Appendix III, Table II] give detailed data for individual cities.

(d) Shift Index. This measure was devised in order to understand changes in the shares of cities in the five revenue items. The index is computed as:

$$SI_{i,k} = \frac{R^{o}_{ik}/R^{o}_{.k}}{R^{1}_{ik}/R^{1}_{.k}} = \frac{\text{(Share of city } i \text{ at time 'o')}}{\text{(Share of city } i \text{ at time '1')}}$$

where

$R^{o}_{ik}, R^{1}_{.k}$ = Revenue of type k (in millions of yen) in city i, for the beginning and end of the time period, respectively;

$$R^{o}_{.k} = \sum_{i=1}^{80} R^{o}_{ik}$$

$$R^{1}_{.k} = \sum_{i=1}^{80} R^{1}_{ik}$$

Thus, if:

$SI_{ik} > 1.$: city i has decreased its share in revenue k

$SI_{ik} \cong 1.$: no change in city i's share in revenue k

$SI_{ik} < 1.$: city i has increased its share in revenue k.

See Gencer and Glickman [Appendix III, Table IV] for individual calculations of shift indices.

(e) Share Quotients. The purpose of share quotients is to measure whether municipality i has a relative advantage over others in revenue sharing in terms of a specific revenue type, say k. In other words, we want to account for the size--i.e., population--of the municipality (which affects the magnitude of its revenues), as well as the economic importance of that municipality vis-à-vis the national system, in order to see if the city is being favored in terms of a revenue type by the CG. Two possible formulation for this are:

$$\frac{\text{percent share of revenue } k \text{ in total revenues of city } i}{\text{percent share of revenue } k \text{ in total national revenue}}$$

$$\frac{\text{percent share of city } i \text{ in national total for revenue } k}{\text{percent share of city } i \text{ in national total for total revenues}}$$

These formulations are in fact the two interpretations of the same thing and we define share quotients as:

$$SH_{ik} = \frac{R_{ik}/R_{.k}}{R_{i.}/R_{..}}$$

where each dot represents summation over that subscript; see Gencer and Glickman [Appendix III, Table V] for each city's share quotient.

Share quotients are used with per capita revenues and percent share of cities in looking at the geographic distribution, both

in terms of regional and metropolitan versus non-metropolitan cities. Also percent changes in revenues and shift indices will help us trace the patterns of change in these distributions.

4.3.2.2 Descriptive Analysis of the Spatial Distribution of Revenues of Large Cities

The percent share of cities in total revenues are mapped in Figure 2 for 1970. As one would expect, large metropolitan centers constitute the areas where the total revenues are highest. One can also observe that the suburban cities in a major metropolitan region or Standard Consolidated Area (the SCA is a region of three or more contigious RECs as we have noted in Glickman [1977b][8] have percent shares far below the mean share of the 80 cities. This contrast between the suburban cities and the central cities in a SCA does not significantly change when we speak of revenues in per capita terms; this is shown in Figures 3 and 4. With the exception of Tokyo for 1960 and 1970, central cities in all SCAs have higher per capita revenues than suburban cities. When we look at per capita revenues for non-SCA cities versus the cities within the SCAs, we observe that the former have per capita revenues near or below the mean per capita revenue of the SCA cities (with the exception of the four cities in Hokkaido region in our data bank).

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[8] For a definition of the SCAs see Glickman [1977b; Section 2].

Figure 2: Percent Share of Total Revenue, 1970.

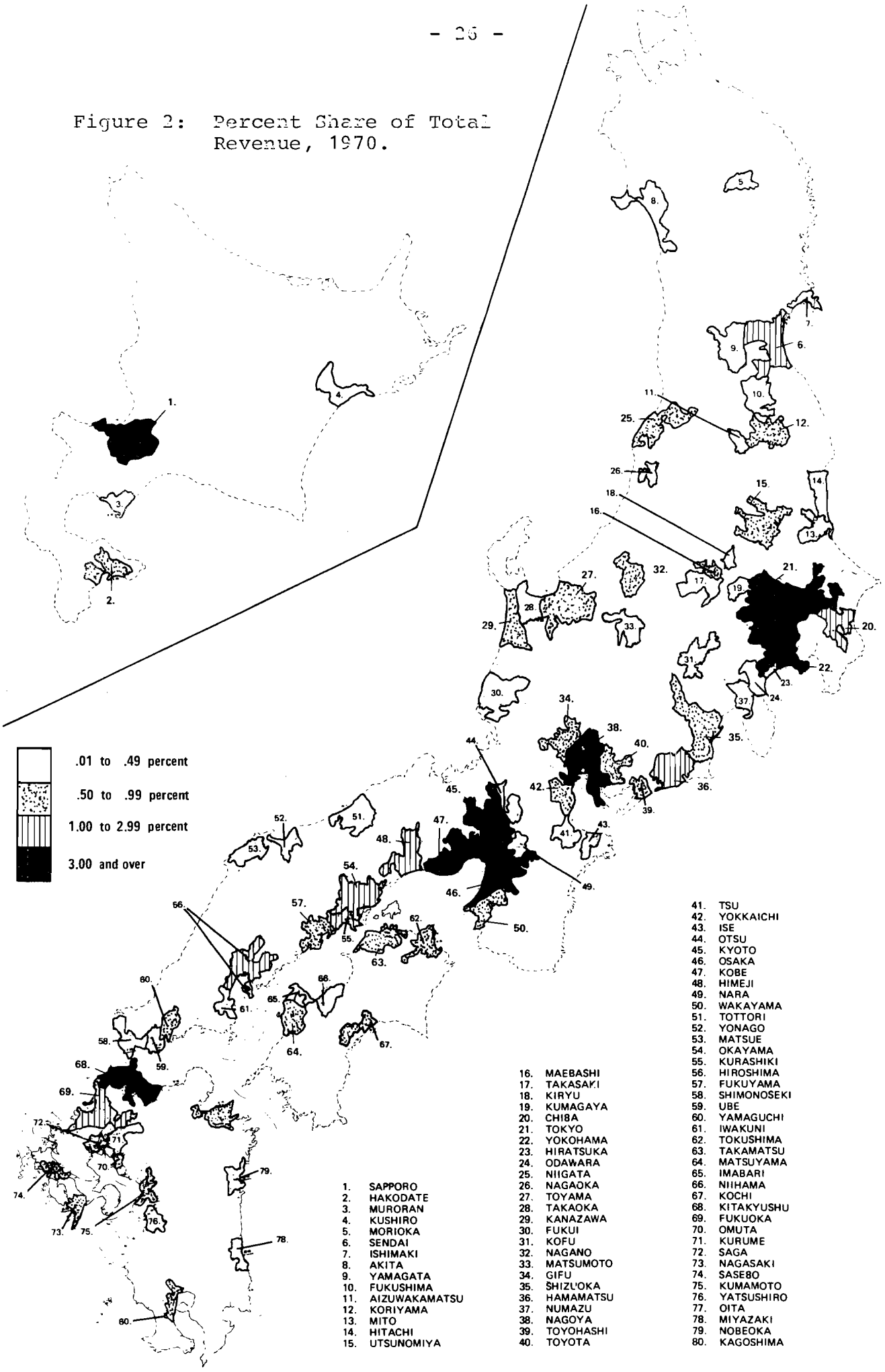


Figure 3: Per Capita Total Revenue, 1960.

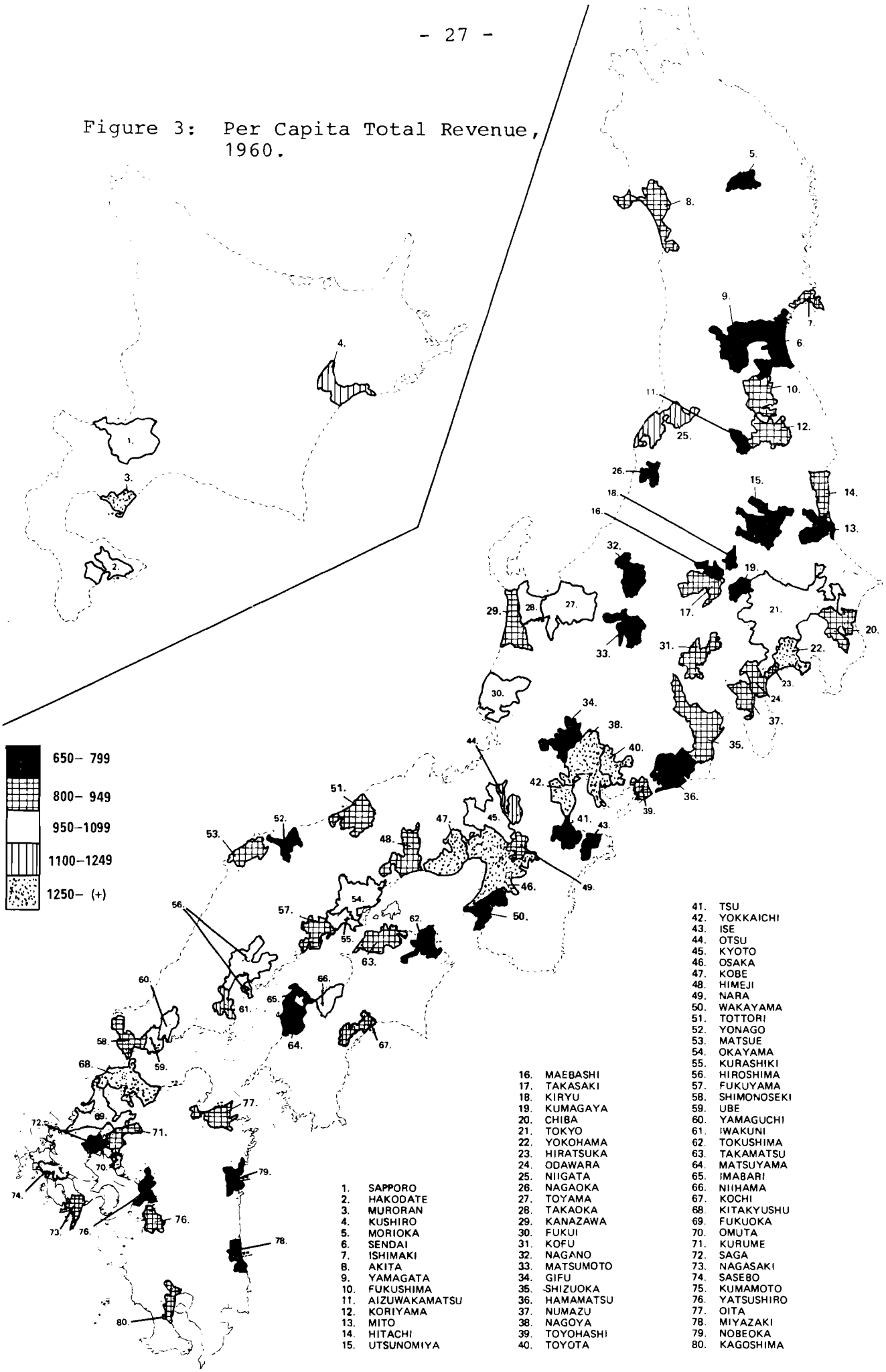
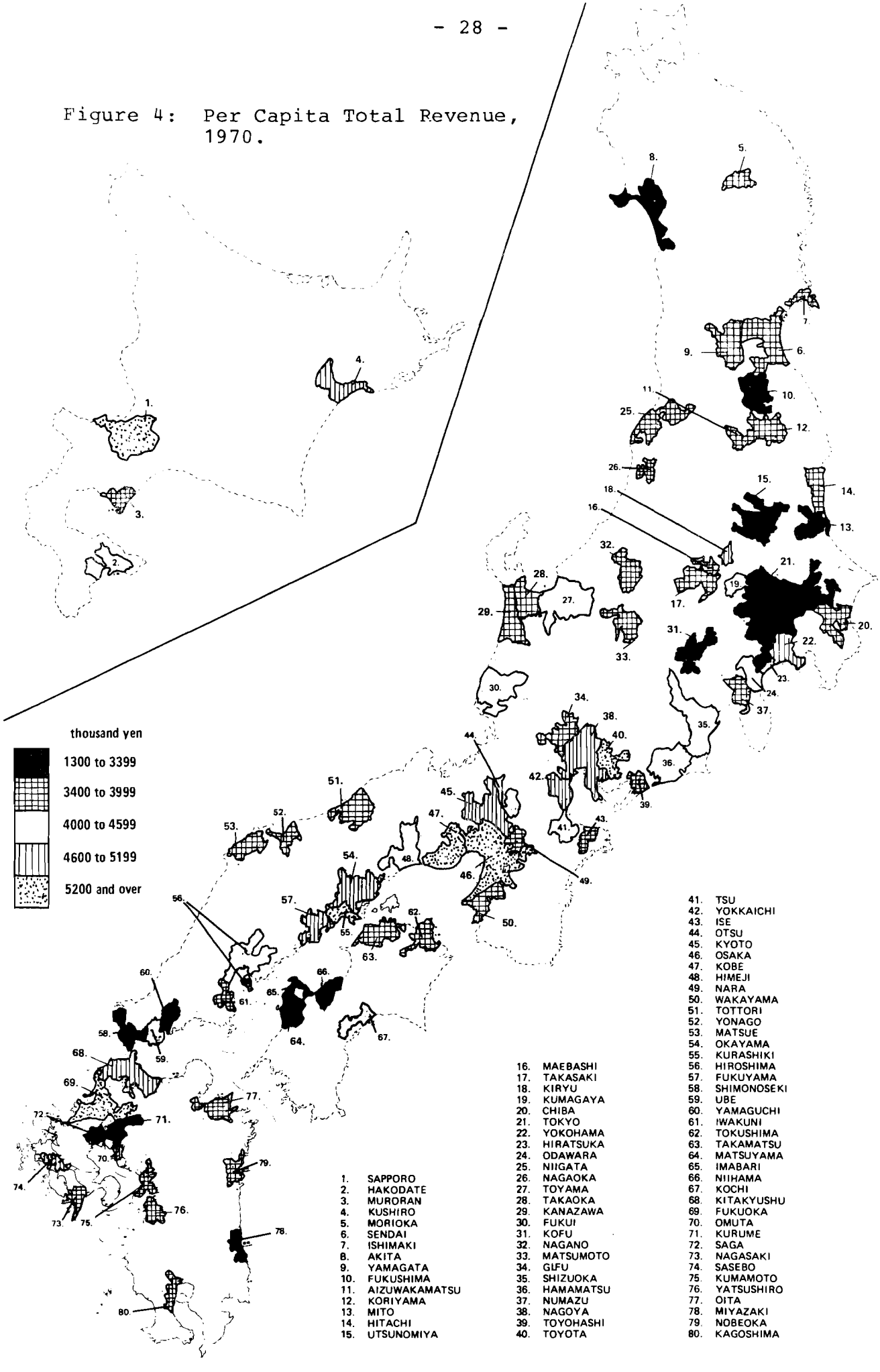


Figure 4: Per Capita Total Revenue, 1970.



These observations suggest that per capita revenue, an important indicator of vertical equity in revenue sharing systems, increases from non-SCA cities to SCA cities, and within the SCAs, from suburban cities to central cities.

We also observe the disribution in terms of the contrast among the SCAs. Table 5 contains the percent shares of the eight SCAs in total revenues. The Tokyo, Osaka, and Nagoya SCAs taken together dominate the others in the northwest and southeast parts of Japan with respect to shares of per capita revenues. The Tokyo SCA, however, has different characteristics from the rest of the metropolitan regions in terms of revenue sharing: the central city the Tokyo ku area, has less per capita revenue than its surrounding cities, (as shown by Gencer and Glickman) and the SCA as a whole has a remarkably low per capita revenue when compared to the other SCAs[9]. Since the Tokyo region is relatively older and more developed, the metropolitan decentralization process has set in (like in U.S. metropolitan areas) while the other metropolies showed less decentralization (this has been shown by Glickman [1977b]); political considerations (i.e. socialist local government in Tokyo facing a conservative LDP central government) may be another possible cause for the lower per capita revenues. The difference between the Tokyo SCA and the other SCAs is also observable when the changes in percent shares are considered in Table 5. While all SCAs have declining shares in the 1965-1970 period, the Tokyo SCA increases its share in both periods.

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[9]Note that Table 5 gives data for the total share of revenues. If these data are calculated on a per capita basis, Tokyo's share is low.

Table 5: Percent Share of National Total Revenues for SCAs, 1960-1970

(percent)

	1960	1965	1970
Sendai	2.32	2.52	2.80
Tokyo	23.28	23.82	23.97
Kanazawa	2.16	1.76	1.79
Nagoya	10.69	8.71	9.39
Osaka	28.04	24.35	26.62
Okayama	1.74	1.50	2.97
Fukuoka	2.34	5.59	7.08
Matsuyama	1.33	1.03	1.10

To get a more comprehensive idea of revenue sharing, we looked at the manner by which individual revenue items are distributed. However, we wanted to analyze their distribution to cities in relative terms. Here we made use of the "share quotient," a measure which expresses the relative advantage of a city in receiving a specific type of revenue.

First we examine local taxes. In this category there is great uniformity in the relative ability of cities to raise local taxes as most of the indices are close to 1.0.[10] This is consistent with our expectations because local taxes are regulated by Diet laws and standards. Levying a local tax higher than the national standard rates requires special action from the central government.

We consider local bonds in Figure 5 where share quotients for 1965 are mapped. We discern three patterns by examining share quotients for local bonds in all three points in time. First, almost all metropolitan cities outside of the SCAs have indices of 1.05 or greater. That is, their revenue sharing relies heavily on local bonds (which are purchased by the CG). As a matter of fact, the Ministry of Home Affairs allows New Industrial Cities to issue local bonds at higher than standard levels. Since some of the non-SCA cities in our data set are designated industrial and growth areas, we find them issuing relatively more bonds. Second, in the highly developed municipalities within the Tokyo, Nagoya, and Fukuoka SCAs, relatively small amounts of local bonds were issued.

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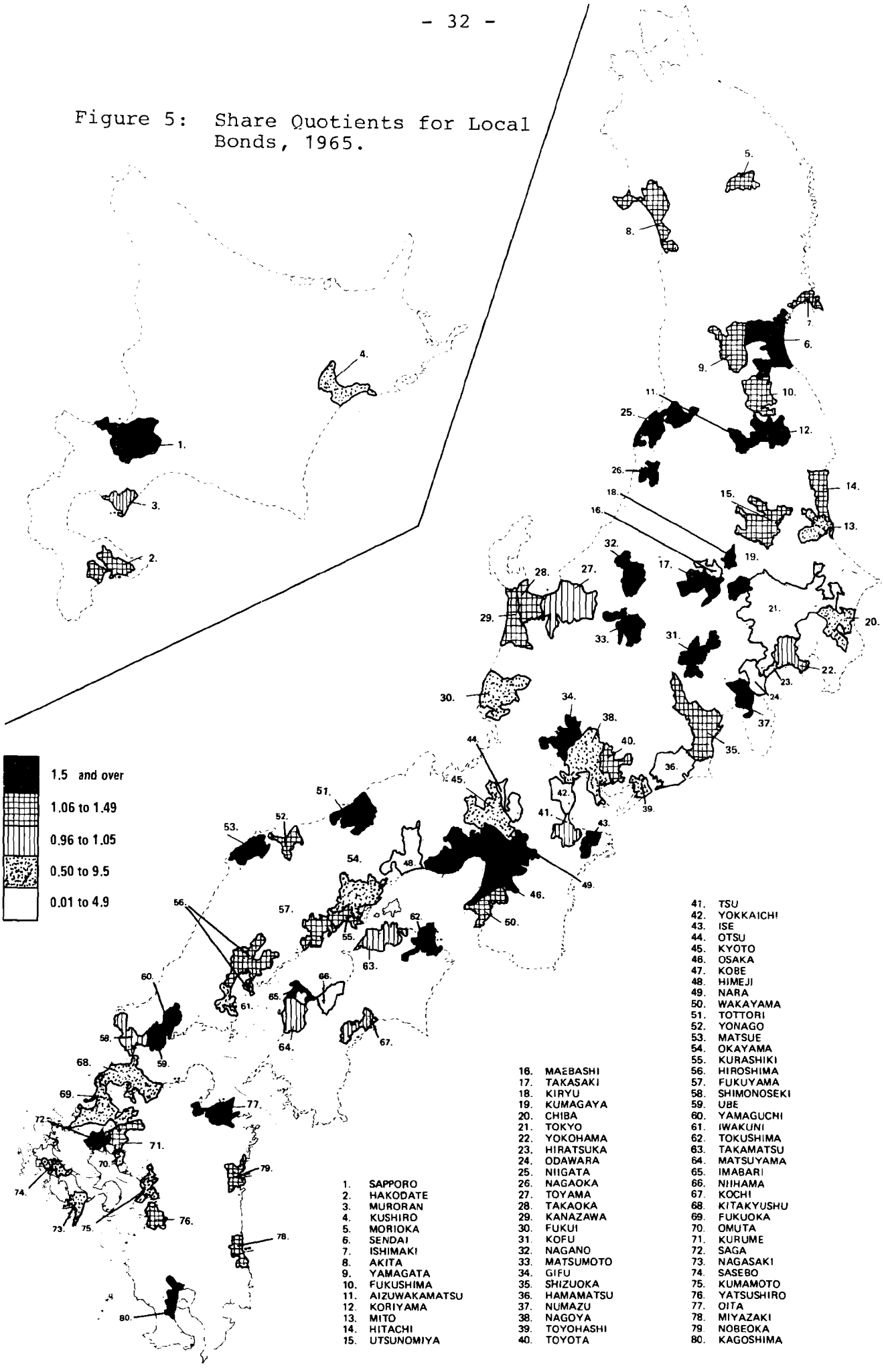
[10] This is also consistent without regression analyses of local taxes where the variables relating to the size of the city and its economic activities explain the variations in local taxes at a magnitude of $R^2 = 0.97$, as noted in Section 4.3.3 below.

Figure 5: Share Quotients for Local Bonds, 1965.



The third revenue item which we explored is treasury disbursements. As we discussed in Section 3.1, they are earmarked by the central government for specific projects. The share quotients for treasury disbursements for 1965 is given in Figure 6. The share quotients for treasury disbursements shows a changing pattern between the year 1960 and the two years 1965 and 1970: a shift from a priority for subsidizing already-developed cities in 1960 to one favoring the development of urban areas in less developed regions in 1965-1970. This change in the priority of distributing treasury disbursements, of course is consistent with the change in national policies towards promoting national economic growth through developing the lagging regions. This is being discussed by Glickman [1977c] and the Japan Ministry of Home Affairs [1969].

Finally, let us look at the share pattern for the nonearmarked revenues which we have depicted in Figure 7. The distribution of NEMR revenues is relatively simple to interpret if we recall that a city's Local Allocation Tax (the largest component of NEMR) is computed by the CG as the difference between the former's standard financial needs and standard revenues. In general, three elements seem to affect the priority given to a city in receiving NEMR revenues: first, the national and/or regional growth policies for urban areas (which roughly determine the magnitude of necessary expenditures); second, the ability of the locality to issue local bonds; and third, the proportion local needs met by treasury allocations. In other words, in cities designated for growth and development by national policies (even though such areas have priority in receiving treasury disbursements and in issuing local

Figure 6: Share Quotient for Treasury Disbursements, 1965.

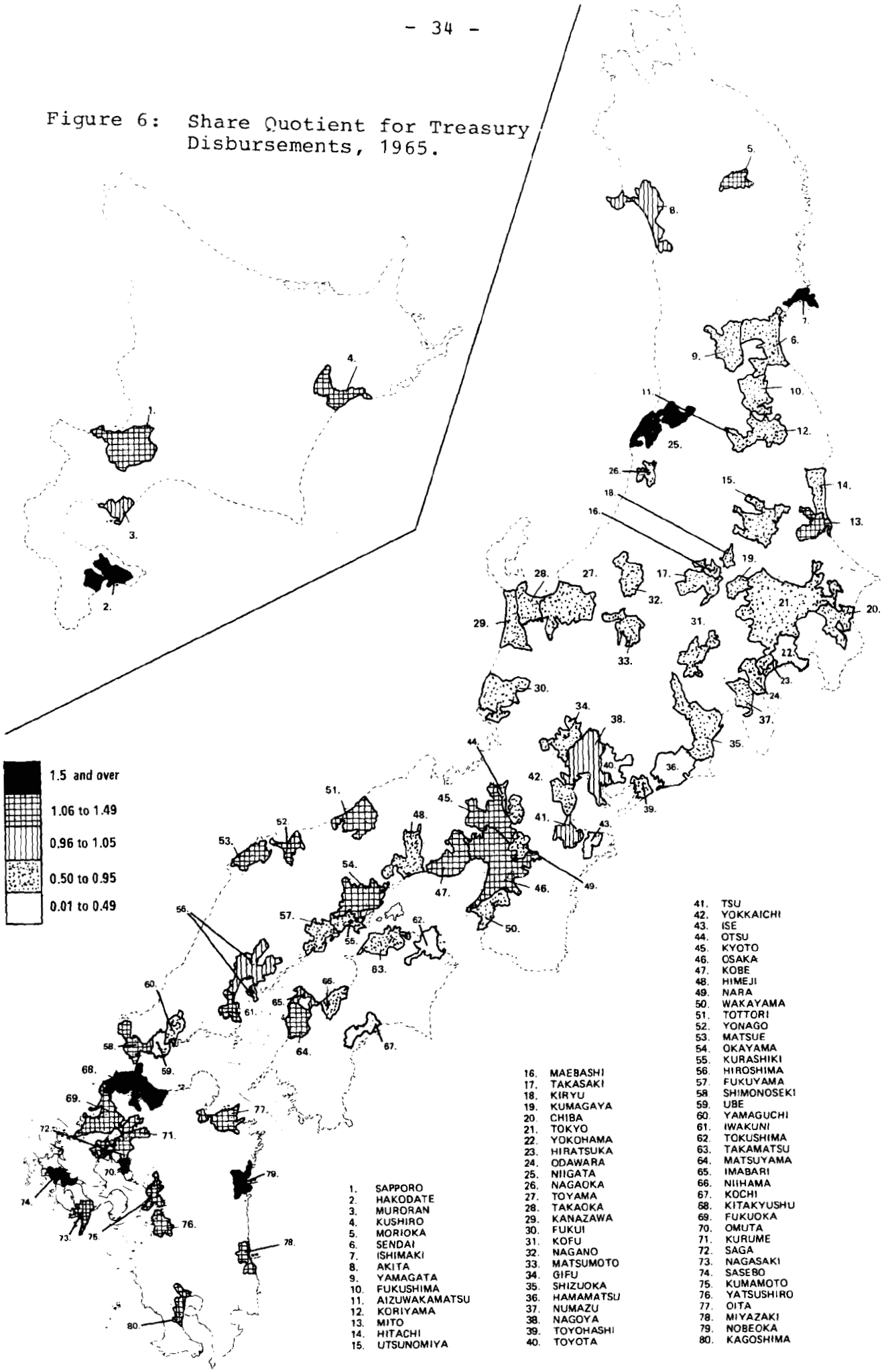
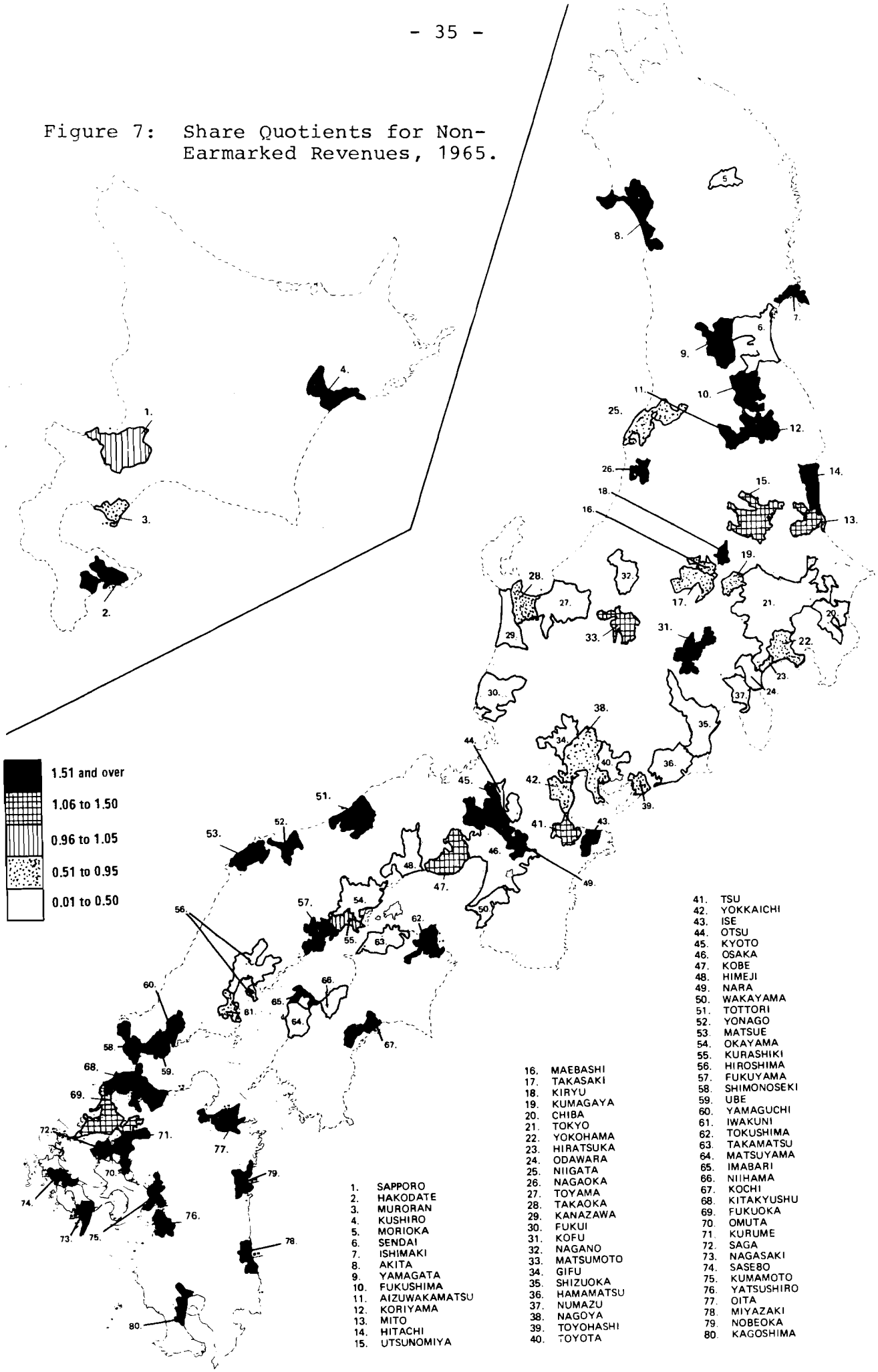


Figure 7: Share Quotients for Non-Earmarked Revenues, 1965.



bonds) NEMR share quotients are higher than the average. Cases in point are cities in the Kyushu and the Hokkaido regions. In such areas NEM revenues should have high positive correlations with both local bonds and treasury disbursements. A positive correlation between treasury disbursements and NEM revenues can also be observed in well-developed urban areas, such as the metropolitan regions of Tokyo, Nagoya and Osaka, where both revenue types have low scores. These were growth areas both in terms of population and economic activities during the 1960s and they had less priority for treasury disbursements and less need for NEM revenues. In Fukuoka and the Tohoku region in general, however, a negative relation holds between these two types of revenues. While these areas had low priority for treasury disbursements, they received higher NEM revenues to meet their financial needs because they were slow-growing.

4.3.2.3 Changes in the Spatial Patterns of Revenue Sharing

In this section we describe general changes in revenue sharing and then proceed to offer some detail, particularly to observe these changes in spatial terms.

We first compare percent changes in total revenues and percent changes in per capita total revenues (see Figure 8 and 9). In general, there is a high correlation between the two measures of total revenue changes. The corollary to this observation, then, is that there is a positive correlation between changes in population and changes in revenues. In fact,

Figure 8: Percent Change in Per Capita Total Revenues, 1965-1970.

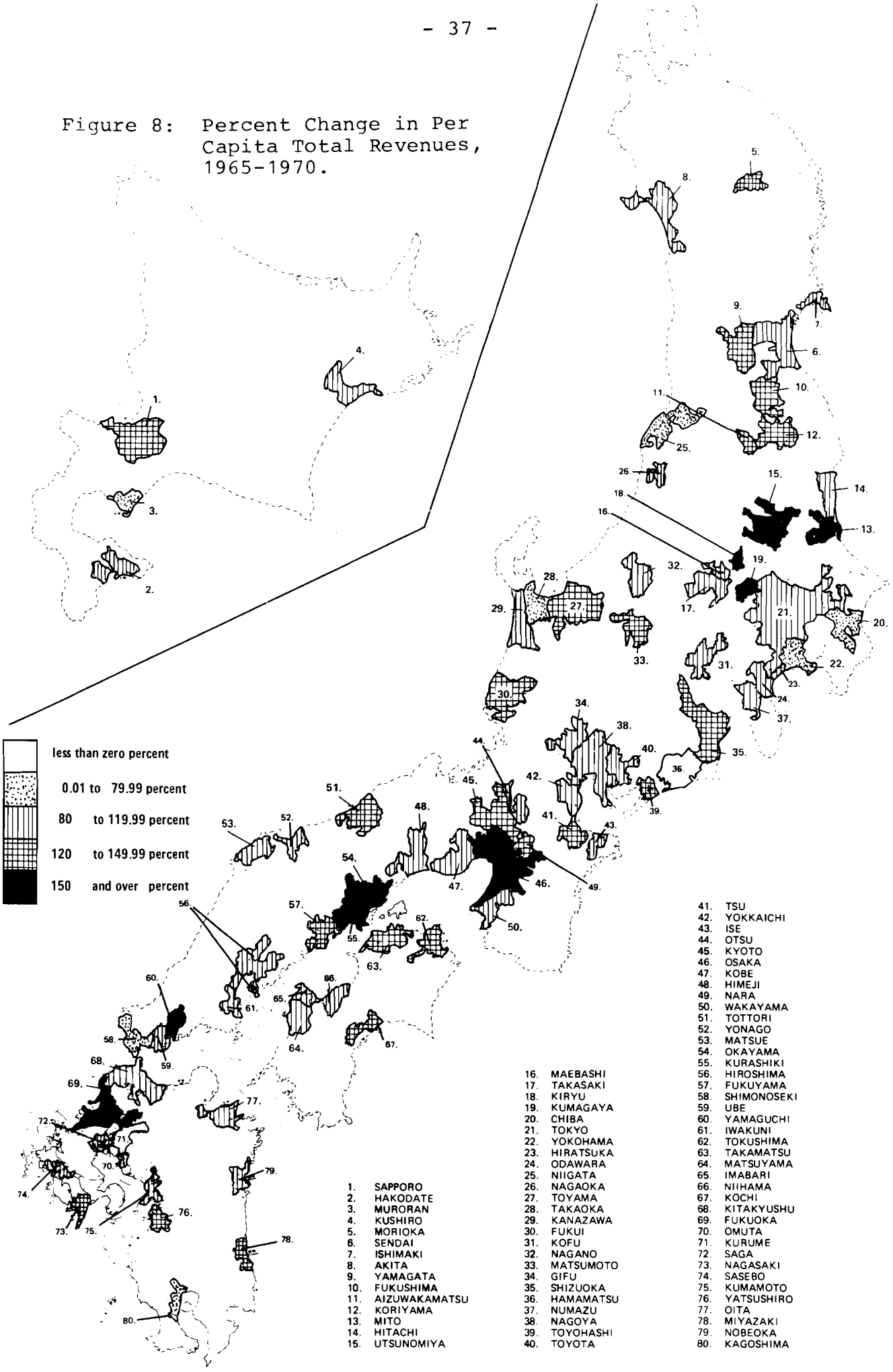
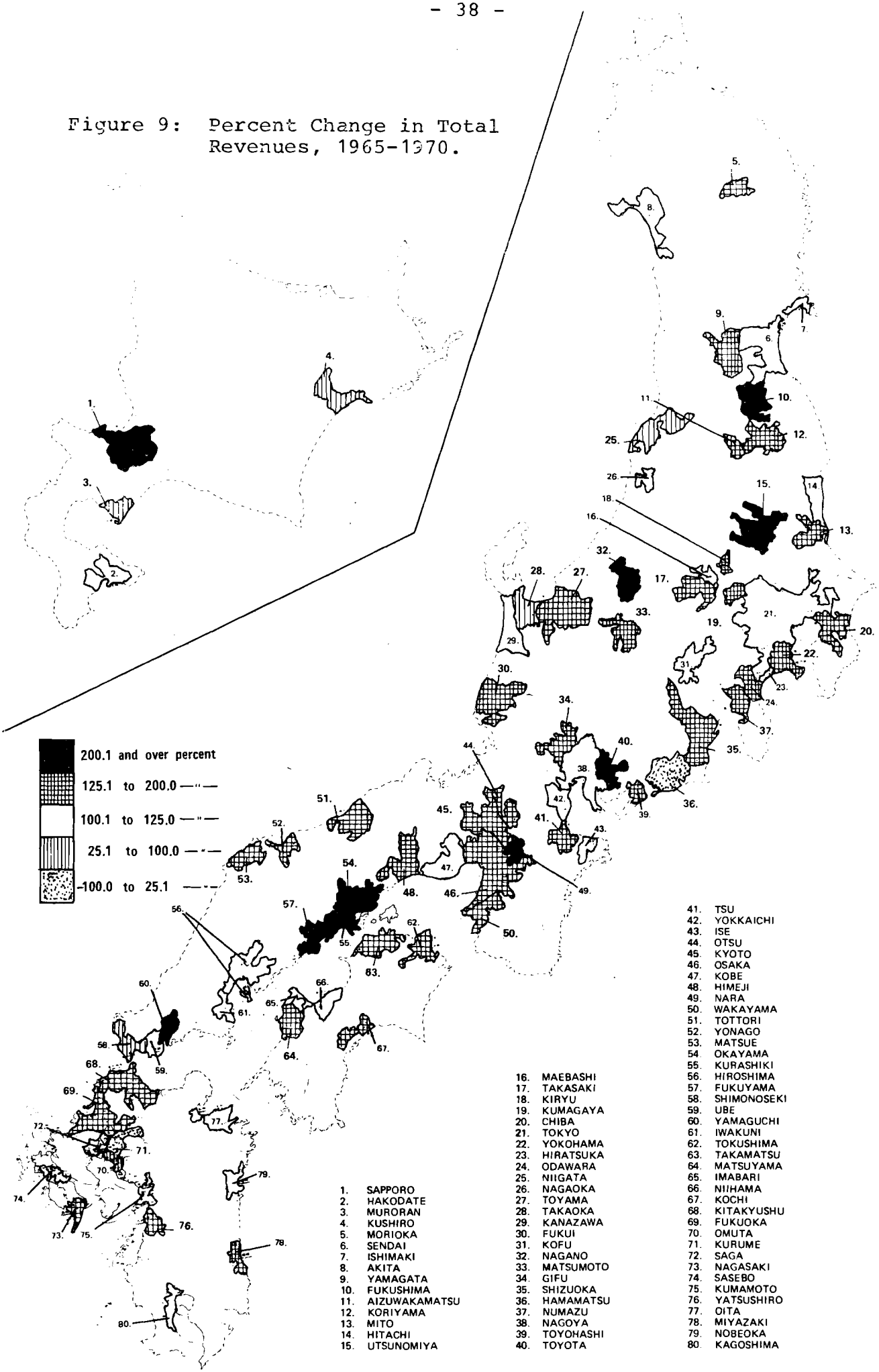


Figure 9: Percent Change in Total Revenues, 1965-1970.



population becomes one of the major independent variables in forecasting the revenues in our regression analyses reported in Section 4.3.3 below.

We also offer several observations about percent changes of both per capita revenues and absolute revenues.

Increases in both absolute and per capita revenues were substantial, averaging about 100-150 percent, for the 1960-1965 and 1965-1970 time periods.[11] This reflects the growth of the Japanese economy (as noted in Glickman [1977c]) and the fact that expenditures (both in absolute and per capita terms) were increasing in urban areas. This can be attributed to somewhat more emphasis on social welfare and to coping with problems arising from congestion and high density development in urban areas. As the GNP per person rose, public spending could be afforded more easily.

In the first period, changes in local bonds were highly skewed: there were increases of more than 500 percent for twenty-three of the eighty cities, while nine cities declined. A similar picture, although with smaller magnitudes, holds for treasury disbursements. Also, during the first period, total local bonds and total treasury disbursements are higher than those in the latter period. These changes can be interpreted as responses to smaller increases in the local taxes in the first period. First, the larger amounts of local bonds and treasury disbursements were allocated by the CG to compensate for the lower- than-expected levels of locally-raised revenues and non-earmarked revenues; we discuss this in the following paragraph. Second, the rather

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[11] During the first period, local taxes increased more in SCAs than in the non-SCA cities, reflecting greater SCA economic growth. In the second period, both non-SCA cities and SCAs had large increases. The total local tax increase in the first period was much smaller than that in the period of 1965-1970.

uneven distribution observed for local bonds and treasury disbursements in the first period can be explained as increasing the revenue levels of those cities involved in special development programs.

Regarding NEMR, the 1960-1965 period witnessed a general fall in the amount of per capita NEMR distributed. Conservative policies of the Ministry of Finance in setting tax policy led to a relatively small volume of national taxes collected; this, in turn, contracted the size of NEMR that was allocated. Again, in the first period, the distribution was highly skewed. The cut-backs fell upon suburban cities of the SCAs and fast-growing non-SCA cities on Honshu. Great increases, on the other hand, were seen in the SCAs' central cities and in regions designated for development.

The second period (1965-1970) showed a less skewed distribution. Actually, one can compare 1960 and 1970 total revenue shares and observe the striking correspondence between them, while the 1965 shares were different. However, one cannot establish whether the 1960 distribution was more equitable than that of 1965. Descriptively, we see that the polarization observed in percent change during the period 1960-1965 did not continue into the second period. Local taxes showed uniform increases for all cities, and the total increases were higher than the first period. Local bonds, however, showed a decline in the rate of increase in the second period: nine cities show negative changes. Treasury disbursements also displayed a smaller increase, and the peaks and troughs of the early period were smoothed out. NEM revenues, on the other hand, more than doubled for 65 of the 80 cities.

Next, we observe the shift indices to trace the patterns of change. The shift indices confirm the interpretations made above (see Figures 10 and 11 for the maps of shift indices for the two time periods). Given the percent change trends as described in the preceding paragraphs, we can look at the shifts in shares of cities in the national total. The 1960-1965 shift scores for local taxes for many cities are quite low. The areas that did badly were non-SCA cities in less developed regions, and the metropolitan centers (except for Tokyo and Sendai). The same situation that produced low local taxes also underlined the relatively small amounts of NEM revenues that were distributed during the first period.

To offset these declines, two mechanisms were employed by the CG: local bond purchasing and treasury disbursements. The shift analysis (see Gencer and Glickman [Appendix IV, Table IV]) indicates large increases in local bonds and treasury disbursements for certain urban areas with heavy losses for others. First, there was the redistribution from urban areas in the SCAs and old urban areas on Honshu to non-SCA cities in developing regions. Second, there was a shift from suburban to central cities within the SCAs. The reasons are that SCA metropolitan centers (and some non-SCA cities) had low levels of local tax revenues, and cities in designated development areas were consciously being subsidized by the CG. In both cases, local taxes fell short of expected expenditures. Even though NEM revenues were limited, their distribution followed a similar pattern to that of local bonds and treasury disbursements. That is, the reductions occurred in urban areas on Honshu while the increases were observed in SCA

Figure 10: Shift Indices for Total Revenues, 1960-1965.

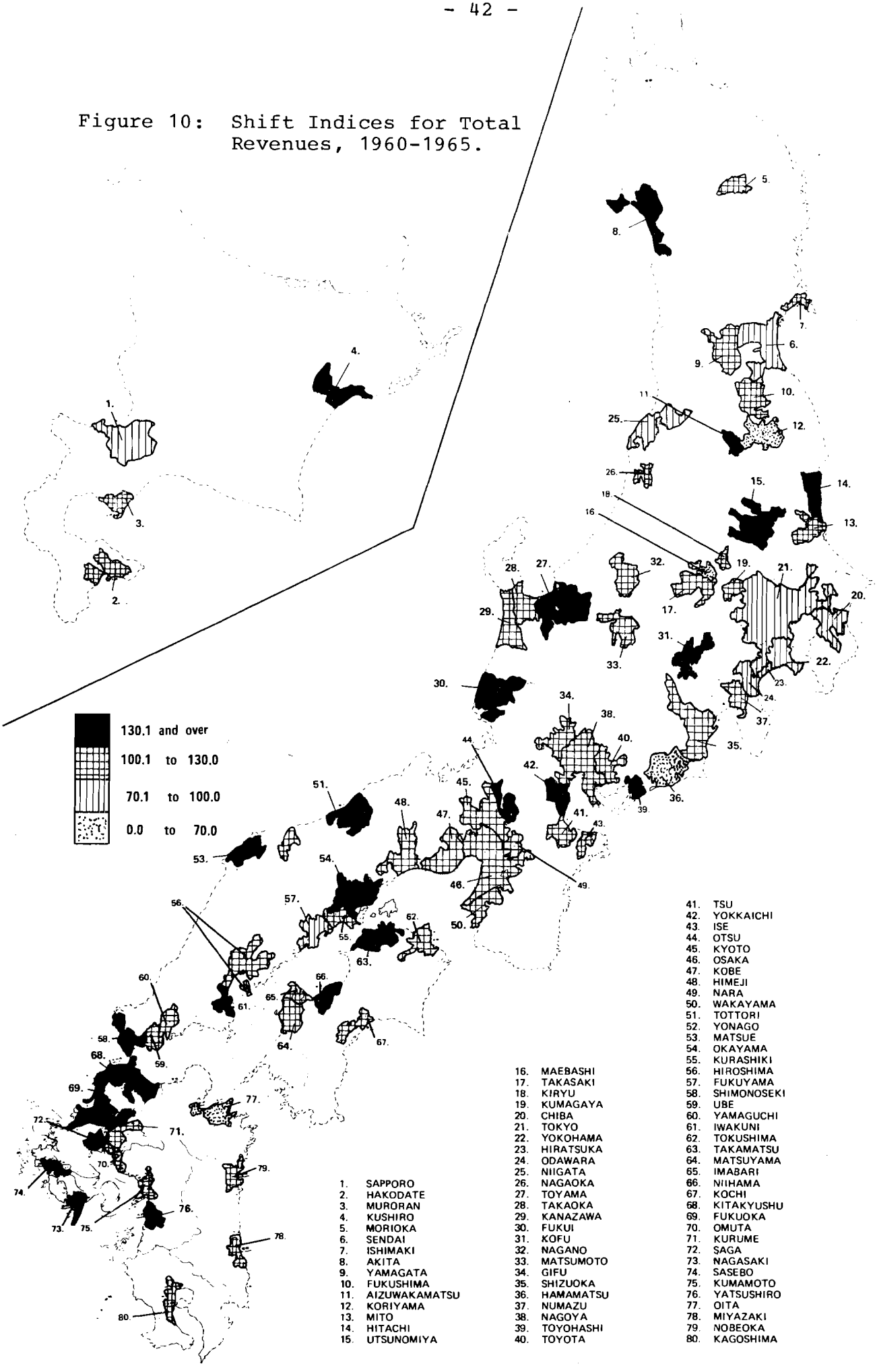
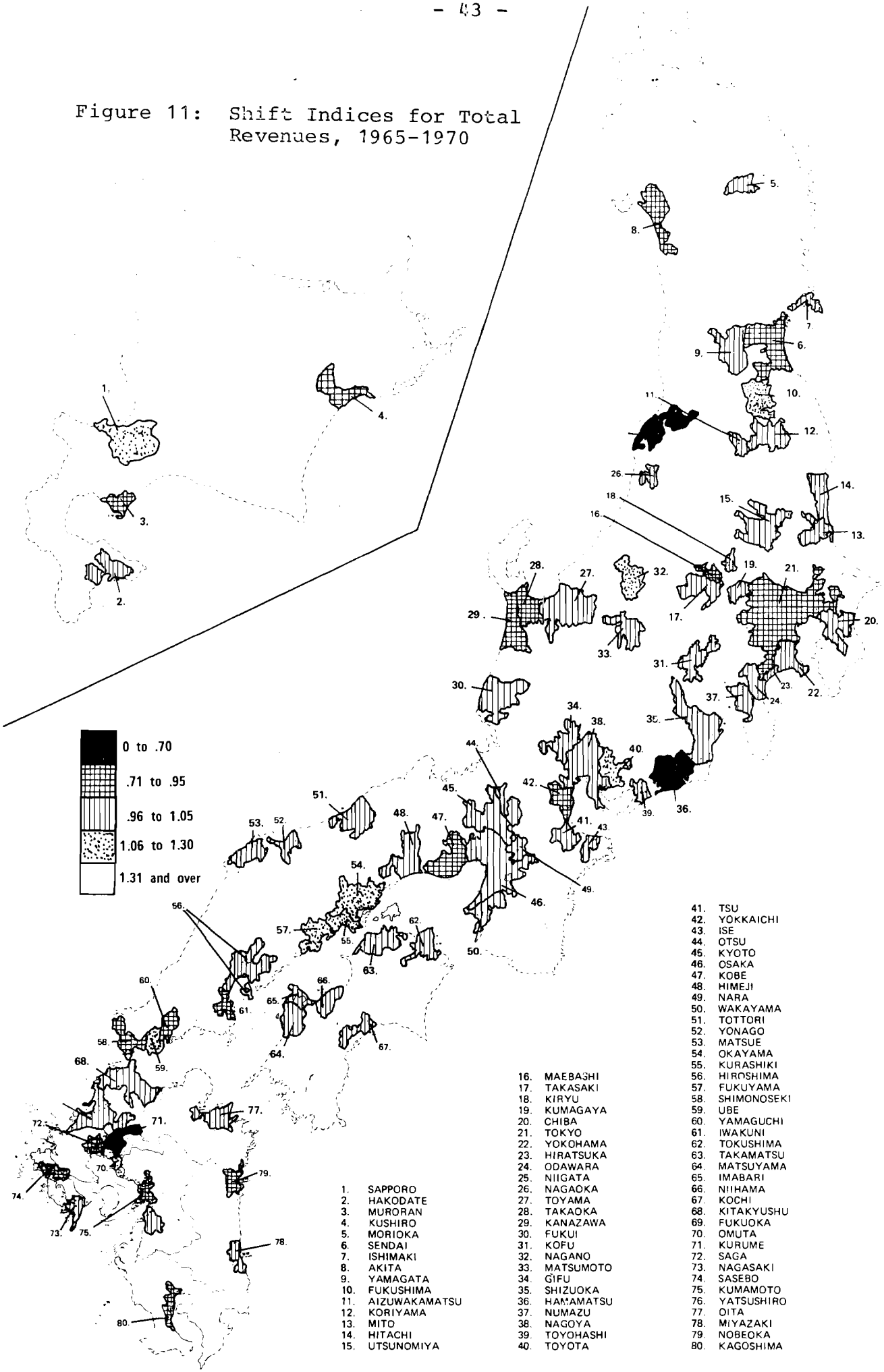


Figure 11: Shift Indices for Total Revenues, 1965-1970



metropolitan centers as well as the Kyushu and Hokkaido regions.

Despite the efforts by CG to offset the relative decrease in local taxes in older and well-developed urban areas, metropolitan regions (SCAs) lost some of their share to non-SCA cities, especially to those in Kyushu and Hokkaido. Between 1965 and 1970, however, we see a reversal of the situation. Local taxes and NEM revenues, at the national level, increased as the Japanese economy grew more rapidly. As these revenues increased, fewer local bonds were purchased; this is particularly true in the Kyushu and Chugoku, regions where cities were more likely to be financed through treasury disbursements and prefectural disbursements. Those areas which were supported by local bonds were the SCAs so that they could reattain their 1960 levels in their share of the national revenues.

Overall, the second period is governed by two tendencies. First, regional development, particularly for Kyushu and Hokkaido regions, and second, increasing SCA cities to their 1960 shares. Both of these tendencies were helped by the increase in local taxes and an enormous increment in NEM revenues coupled with a steady and uniform increase in treasury disbursements.

4.3.3 Multilinear Regression Analysis of the Large Cities

4.3.3.1 Introduction

In this section we summarize the multilinear regression analysis undertaken to further the understanding of the spatial distribution of revenues and changes in this distribution over time. Here we try to associate local revenues with social, economic, and political aspects of urban areas. We have five

regression equations, each corresponding to one of the five revenue types.[12] The dependent variables are the revenue catagories and the independent variables are the same as used in the previous regressions (see Table 3 for variable definitions).[13] In the regressions, summarized in Section 4.3.3.2 through 4.3.3.6, each independent variable and the R^2 is significant at a 95 percent confidence level.

4.3.3.2 Local Bonds

The regression equations for local bonds in the two time periods are:

$$LB = -371.700 + 0.05\ SALES + 146.50\ INFRA - 1028.30\ LPDV + 248.50\ SPDIST + 5.34\ CTYAGE \quad (1965) \quad (1)$$

$$R^2 = 0.80$$

$$LB = -3086.10 + 0.12\ SALES + 346.90\ INFRA - 1798.10\ LPDV + 10.22.20\ SPDIST + 2313.80\ \Delta TEMP \quad (1970) \quad (2)$$

$$R^2 = 0.93$$

Clearly, the equations do not change significantly between periods. Two points can be made about Equations (1) and (2). First, in both periods, the variables in Appendix 2's Group I (SALES, INFRA, and LDPV) account for most of the explained variance with expected

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[12] To repeat, these are Local bonds, Local taxes, Treasury disbursements, Non-earmarked revenues, and Prefectural disbursements.

[13] Appendix 2 examines the interrelationships among the independent variables. This was necessitated by the high multi-collinearities observed among the variables. Keeping in mind the interrelationships among the independent variables that are explained in Appendix 2 will be helpful in analyzing the results of the regressions in the discussion below. In Appendix 2 we show certain groups of interrelated variables which we refer to in the body of the text in Section 4.3.3.2 to 4.3.3.6.

signs. This suggests that revenues from local bonds are higher in big metropolitan centers. Also, the remaining variance in the dependent variables is explained by variables relating to designated growth areas. SPDST is a dummy variable showing either a New Industrial City or Special Area (both of which are designated under regional development programs). Note the large change in the coefficient attached to SPDIST, from 248.5 to 1022.2 indicating the increasing importance of the governments regional development programs in the late 1960s. The positive sign on CTYAGE (which shows how recently the city was constituted) also conform with this assertion. In the second period, the positive sign on ΔTEMP also indicates that a portion of local bonds go to cities which were growing quickly in the 1965-1970 period. These two inferences are consistent with our descriptive analysis of Section 4.3.2 where we observed that the revenues from local bonds were relatively higher in the non-SCA cities of Kyushu, Hokkaido, and Chigoku major regions, in fast-growing metropolitan centers in 1965, and in all metropolitan centers in 1970.

4.3.3.3 Local Taxes

The regression equations for local taxes are as follows:

$$\text{LTX}_{(1965)} = 14519.00 + 0.20\ \text{SALES} + 880.80\ \text{INFRA} - 19429.00\ \text{ADULT} + 39556.00\ \text{COLGE} - 9.10\ \text{INMGR} + 7866.00\ \text{REMP} + 79.90\ \text{MFPRD} \qquad R^2 = 0.98 \qquad (3)$$

$$\text{LTX}_{(1970)} = 33415.00 + 0.07\ \text{SALES} + 358.30\ \text{INFRA} - 48909.00\ \text{ADULT} - 2624.00\ \text{DEPR} + 2.20\ \text{INMGR} + 1498.00\ \text{REMP} + 96.10\ \text{MFPRD} \qquad R^2 = 0.99 \qquad (4)$$

The basic change between the two years is the change of sign and explanatory power of INMGR. But this is expected because we have seen that INMGR enters into Group I of the independent variables, those variables relating to general economic activity. As with the local bonds equations, the major part of the explanation is given by Group I variables (SALES, INFRA, and JNMGR in 1970). This is so since larger metropolitan areas (with high population and labor force levels, large local markets and well-developed public facilities) were able to levy a multiplicity of local taxes and increases their tax base. It is also interesting to see the positive relationship of Group IV variables (REMP in 1965 and MFPRD) to LTX. This suggests that cities with heavy concentrations of secondary industrial production with high value added per worker raise more local taxes. It has been suggested that such cities are small, with flat income distributions (due to the occupation structures of such cities, i.e. heavy concentration in blue collar jobs), so that the income tax revenues are high. The negative sign on ADULT, which seems contradictory at first glance can be explained by the fact that smaller cities that are slow-growing tended to have older work forces. Such economically stagnant areas also were less capable of raising local taxes; these cities are found in underdeveloped regions of Japan. The positive sign on COLGE is something we expected and the minus sign on DEPR indicates that the higher the dependency rate of population on the employed labor force, the less revenue from local taxes. This, too, is plausible on a priori grounds.

4.3.3.4 Treasury Disbursements

We have estimated the following equations:

$$\underset{(1965)}{TRD} = -9999.00 + .09\ SALES + 0.33\ POP + 5054.00\ DEPR + 28967.00\ ADULT - 37610.00\ COLGE - 53.40\ MFPRD \quad (5)$$

$$R^2 = 0.83$$

$$\underset{(1970)}{TRD} = -2509.00 + 0.19\ SALES + 632.20\ INFRA - 3286.00\ LDPV + 2715.00\ DEPR - 8.00\ INC + 633.90\ SPDIST + 2569.00\ \Delta\ TEMP \quad (6)$$

$$R^2 = 0.96$$

Here, the Group I variables (i.e., SALES, POP, LDPV, INFRA) explain most of the variation in 1970 while their contribution in 1965 is less important. In the 1965 period, treasury disbursements vary positively with Group I and negatively with Group II variables. The first group indicates that TRD was higher in cities with high population and volume of market transactions; the second component suggests lower TRD allocations in urban areas where the population was highly educated and where there was a high ratio value added to employment in the secondary sector. The latter two inverse relations suggest that growing, high production urban areas and big metropolitan centers received less TRD. These interpretations are consistent with the analysis of the previous section where we found that in the first period, metropolitan areas and non-SCA cities of lesser-developed regions on the one hand, and

Northern Honshu metropolitan areas on the other, had priority in receiving TRD.

In 1970, Group I variables dominate and the R^2 of the regression increases as well. However, the negative relation to INC and positive relation to SPDIST and ΔTEMP are consistent with the continuing national policy of stimulating and sustaining growth in lesser developed regions of Japan. Thus cities with lower average incomes received more treasury disbursements. We reinforce this conclusion in Section 5.2.

4.3.3.5 Non-earmarked Revenues

This set of regressions yielded quite different regression equations from those of the three preceding revenue types:

$$\text{NEMR} = -1808.00 - 0.04\ \text{SALES} + 0.21\ \text{POP} + 992.00\ \text{DEPR} - 6588.00\ \text{COLGE} + 3.10\ \text{CTYAGE} - 24.70\ \text{MFPRD} \quad (1965)$$

$$R^2 = 0.74 \qquad (7)$$

$$\text{NEMR} = -5224.00 - 0.04\ \text{SALES} + 0.33\ \text{POP} + 506.00\ \text{INFRA} + 3146.00\ \text{DEPR} + 15963.00\ \text{COLGE} - 5.31\ \text{INC} - 2450\ \text{REMP} + 2759.00\ \Delta\text{SECE} \quad (1970)$$

$$R^2 = 0.95 \qquad (8)$$

First we observe the inconsistency between the signs of SALES and POP (and INFRA in 1970) and those of REMP and ΔSECE in 1970. In both cases, one would expect the signs to be the same because the simple correlation coefficients (with regard to NEMR) in each group are positive and greater than 0.75. However, it must be

remembered that NEMR is calculated as a residual of the estimated financial needs after the estimated of local taxes are subtracted. Also, the financial need of a LG is very sensitive to national or local public projects that the LG must participate in financially. Therefore, in cities located in designated development regions, the tax base could be high, a large amount of TRD could be received and LB floated, but still a substantial residual could remain due to national growth policies and their consequent financial resource demands.

NEMR, increases its correlation with LB and LTX from first period to the second; it, therefore, can be better explained by the attributes of the urban areas. This is reflected in the higher R^2 of the latter time period.

4.3.3.6 Prefectural Disbursements

We have the following regression equations:

$$\underset{(1965)}{PRD} = -161.00 + 0.01\ SALES + 33.10\ INFRA + 194.80\ REMP \qquad R^2 = 0.88 \qquad (9)$$

$$\underset{(1970)}{PRD} = -2547.00 + 0.38\ POP - 110.90\ INFRA - 0.18\ INMGR + 4689.00\ ADULT - 5401.00\ COLGE + 0.97\ INC - 611.70\ \Delta TEMP \qquad R^2 = 0.87 \qquad (10)$$

The equation for 1960-1965 is dominated by INFRA and SALES. REMP is also positively related, though not as strongly. In this period, there was a relatively small amount of PRD to be distributed and most RECs received very little from this source; however, cities in the metropolitan regions of Tokyo, Kanazawa, Osaka, and Nagoya were exceptions, i.e. they received a substantial amount of PRD. Thus, we have the dominance of SALES and INFRA.

The distribution of PRD changed significantly by 1970. There was a much more uniform distribution with a larger amount of total PRD to be allocated. However, population size was still a significant determinant in the amount of PRD, as far as the cities in the developed regions are concerned. In the other regions (Kyushu, Hokkaido, Shikoku, and Tohoku), population is an important determining factor, but also industrial cities and New Industrial Cities where prefectural governments initiated public projects had greater shares of PRD. Thus, the negative signs on INFRA, INMGR, and COLGE and the positive sign of POP and and INC can be attributed to the continuing PRD flow into metropolitan areas in the Tokaido region where both population and average family income are higher.

5. FURTHER EVIDENCE CONCERNING THE ROLE OF INTERGOVERNMENTAL RELATION IN REDUCING INTERREGIONAL INCOME INEQUALITY

5.1 Introduction

In Section 4, we presented analyses for data sets of large and small cities from our City Data Bank and indicated that redistribution of government revenues from rich to poor cities was being carried out during the 1960s. Here, we give further evidence of this phenomenon, employing more aggregative data on a prefectural basis for 1970.

5.2 Redistribution as Indicated by Prefectual Data

Data from the Japan Bureau of Statistics Office of the Prime Minister, [1973] for 1970 confirm our evaluation of the redistribution mechanisms outlined in Section 4. First, in order to see the extent that prefectural governments (hereafter, PGs) with below-average incomes receive more (or possibly less) revenue from the CG, we calculated the variable PTs, the percent of a prefectural government's total revenues accounted for by CG treasury disbursements. This variable should show us how these percentages vary across the 46 prefectures.[14] In Table 6, we see that PTS accounts for only 12.8 percent of Tokyo's total revenue in 1970, the lowest percentage of all prefectures. The highest percentage was in Kagoshima, 38.3 percent.

How does PTS vary with the index of prefectural personal income (Y) which is also given in Table 6? We computed a regression relating the two variables which yielded the following result:

$$\begin{aligned} PTS &= 61.01179 - 0.35039\ Y \qquad (11) \\ &\qquad\qquad (11.31575) \\ R^2 &= 0744 \qquad F = 128.046 \end{aligned}$$

[14] Okinawa was not included.

Table 6: Intergovernmental Transfers as seen from Prefectural Data, 1970

	Treasury and Prefectural Disbursements as a Percent of Cities' Total Revenue (CTPS)	Trasury Disbursements a Percent of Prefectures' Total Revenues (PTS)	Treasury and Prefectural Disbursements as a Percent of Cities' Total Revenues (DEP)	Index of Per Capita Personal Income (Japan=100.0) (Y)
Hokkaido	22.9	36.9	79.3	94.8
Aomori	23.3	35.2	86.8	77.7
Iwate	21.7	32.8	80.1	76.7
Miyagi	16.8	28.3	41.1	86.7
Akita	17.8	33.3	54.2	79.6
Yamagata	15.4	34.7	46.3	83.5
Fukushima	17.0	31.8	58.5	79.8
Ibaraki	13.8	25.2	35.4	83.5
Tochigi	14.6	25.1	36.3	88.1
Gumma	14.4	26.2	39.9	91.6
Saitama	9.9	21.9	27.0	108.5
Chiba	12.2	26.4	28.7	102.9
Tokyo	17.5	12.8	17.5	142.7
Kanagawa	12.5	15.5	25.7	120.0
Niigata	16.9	37.6	36.3	84.6
Toyama	16.6	32.0	40.2	91.9
Ishikawa	18.6	26.6	47.6	95.2
Fukui	15.2	29.5	39.4	88.9
Yamanashi	18.5	29.4	59.9	86.7
Nagano	15.4	31.5	44.3	85.4
Gifu	13.9	27.0	37.3	94.0
Shizuoka	12.6	25.7	28.2	98.5
Aichi	13.1	17.8	27.9	112.7
Mie	17.2	28.3	46.3	95.4
Shiga	15.1	24.7	37.7	93.5
Kyoto	17.7	21.7	46.7	110.0
Osaka	15.9	14.9	41.5	123.5
Hyogo	15.4	23.2	42.1	106.0
Nara	15.7	27.2	49.4	85.8
Wakayama	18.8	29.4	43.1	93.1
Tottori	21.1	30.5	67.6	83.5
Shimane	17.7	32.6	68.3	74.0
Okayama	15.1	28.3	36.0	99.4
Hiroshima	17.3	27.9	36.8	102.1
Yamaguchi	19.5	29.0	46.7	92.1
Tokushima	18.6	31.1	63.4	92.3
Kagawa	16.4	27.2	44.4	92.7
Ehime	20.4	30.2	53.7	91.2
Kochi	28.7	34.5	133.1	93.1
Fukuoka	25.2	31.9	82.7	97.3
Saga	26.3	33.3	115.7	80.4
Nagasaki	27.5	34.0	109.2	78.5
Kumamoto	25.7	33.4	93.1	73.7
Oita	24.5	34.7	84.7	75.6
Miyasaki	26.0	36.1	97.4	74.6
Kagoshima	25.4	38.3	113.4	64.8

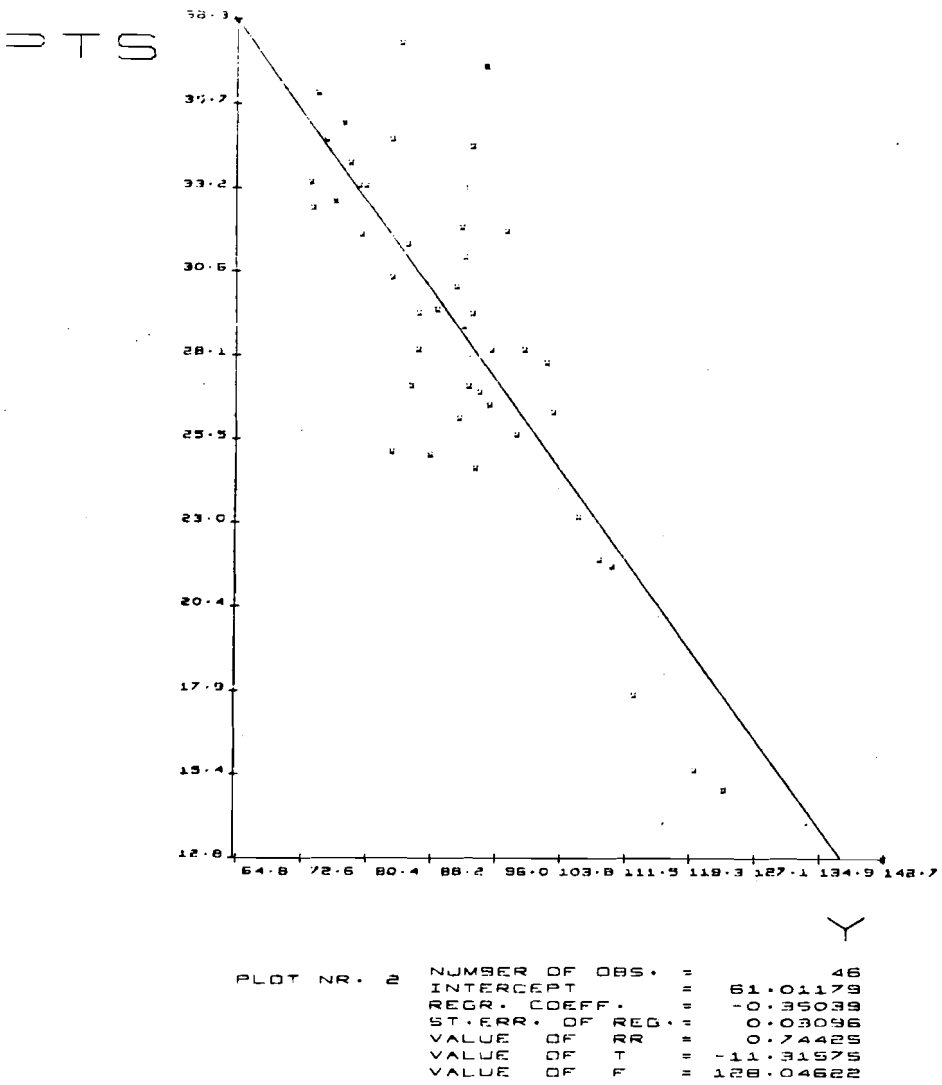
The figure in parenthesis below the regression coefficient is the "t" statistic which is significant at a 95 percent confidence interval and the F is the F-statistic which measures the goodness-of-fit of the regression. It is significant at a one percent confidence interval. Equation (11) shows that for every unit increase in income, there will be a 0.35 unit decrease in the proportion of total revenues of a PG received from the central government. This is also seen in Figure 12 where the two variables and the regression line are plotted. Figure 12 shows the strong negative corelation between PTS and Y. Therefore, there is clearly redistribution of government revenues between rich and poor prefectures through the central government's allocations to prefectural governments.

A second type of redistribution--the combined effects of CG and PG redistribution to cities--can be seen in Equations (12) and (13). We constructed two measures of the relationship between LGs and the higher governmental units. CTPS (Table 6) is the percent of the cities' revenues coming from combined prefectural and treasury disbursements; the lowest was in Saitama (9.9 percent) and the highest was Kochi (28.7 percent). Equation (12) relates CTPS to Y in an effort to see if the hypothesis that cities in poorer regions are subsidized through treasury and prefecture disbursements is confirmed:

$$CTPS = 32.21341 - 0.15143\ Y \qquad (12)$$
$$\qquad\qquad\quad (3.64037)$$

$$R^2 = 0.231 \qquad F = 13.252$$

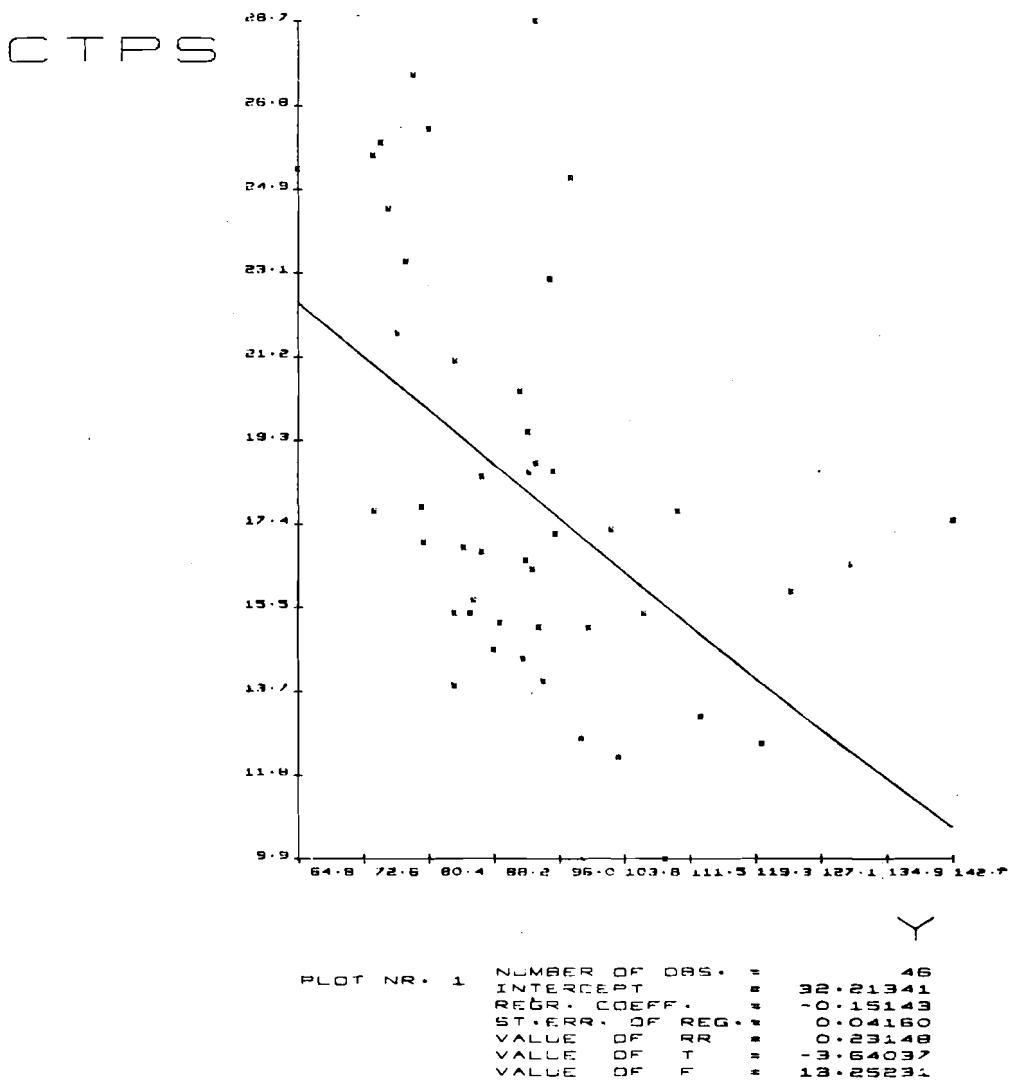
The negative sign attached to Y indicates that, this hypothesis is correct. The lower (higher) the prefectures income, the less



PLOT NR. 2

NUMBER OF OBS.	=	46
INTERCEPT	=	61.01179
REGR. COEFF.	=	-0.35039
ST.ERR. OF REG.	=	0.03096
VALUE OF RR	=	0.74425
VALUE OF T	=	-11.31575
VALUE OF F	=	128.04622

Figure 12: Relationship Between PTS and Y, 1970



PLOT NR. 1

NUMBER OF OBS.	=	46
INTERCEPT	=	32.21341
REGR. COEFF.	=	-0.15143
ST.ERR. OF REG.	=	0.04160
VALUE OF RR	=	0.23148
VALUE OF T	=	-3.64037
VALUE OF F	=	13.25231

Figure 13: Relationship Between CTPS and Y, 1970

(more) its cities get from these revenue sources. Figure 13 shows this graphically. However, the relationship is much weaker than that given in Equation (12), as shown by the lower F-, and t - statistics although both are still highly significant.

In Equation (13), we relate prefectural income to another (and related) measure of the relationship between LGs and higher governmental levels, what we call the "dependency ratio" (DEP). DEP is the ratio of the cities' treasury and prefectural disbursements to local taxes; it measures the extent to which LGs are "dependent" upon the CG and the PGs and is also a gauge of local "tax effort". Equation (13) is:

$$DEP = 153.48419 - 1.12747\ Y \qquad (13)$$
$$(4.97705)$$

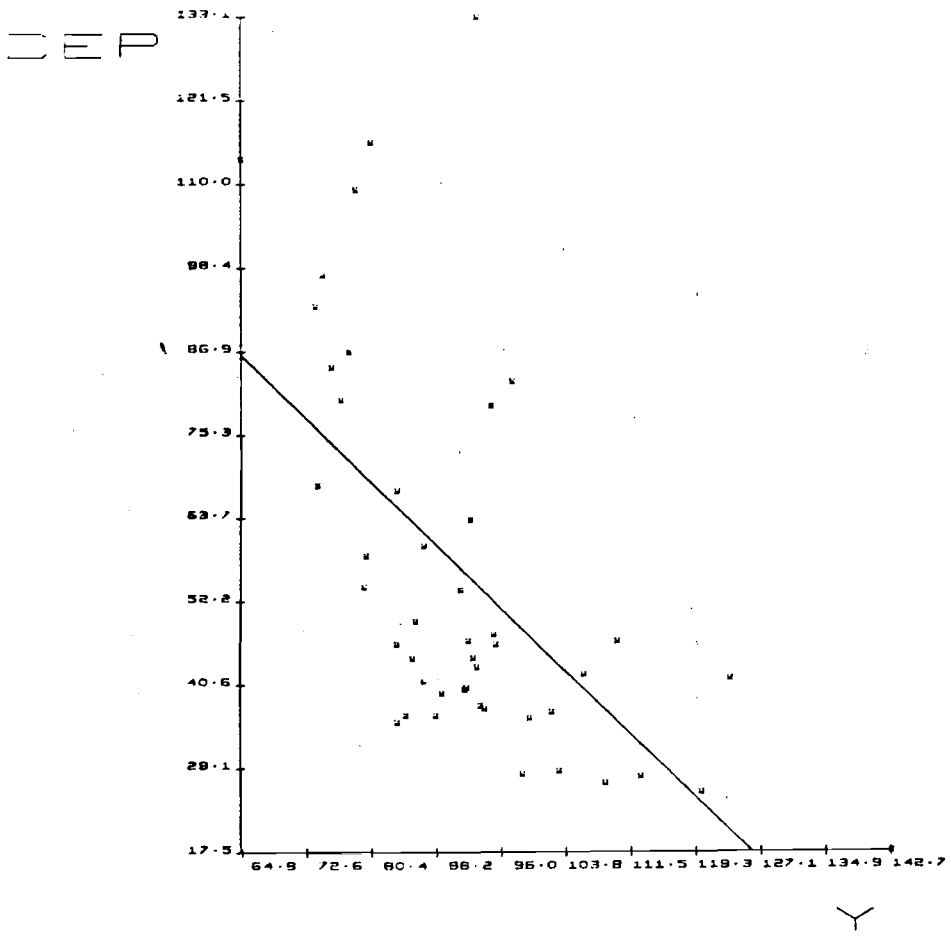
$$R^2 = 0.360 \qquad F = 24.771$$

This also confirms our general argument that poorer cities are aided by other governments since, again, the coefficient is negative and significant: LGs in poorer prefectures, therefore, get more exogenously-determined funds relative to locall raised revenues than LGs in richer prefectures. This relationship is also shown in Figure 14 where DEP and Y are graphed.

One final relation, given in Equation (14) shows the extent to which prefectures "pass through" revenues received from the CG to LGs and to some degree, the joint effects of CG and PG efforts towards cities, with the relationship between DEP and PTS:

$$DEP = -34.94318 + 3.15200\ PTS \qquad (14)$$

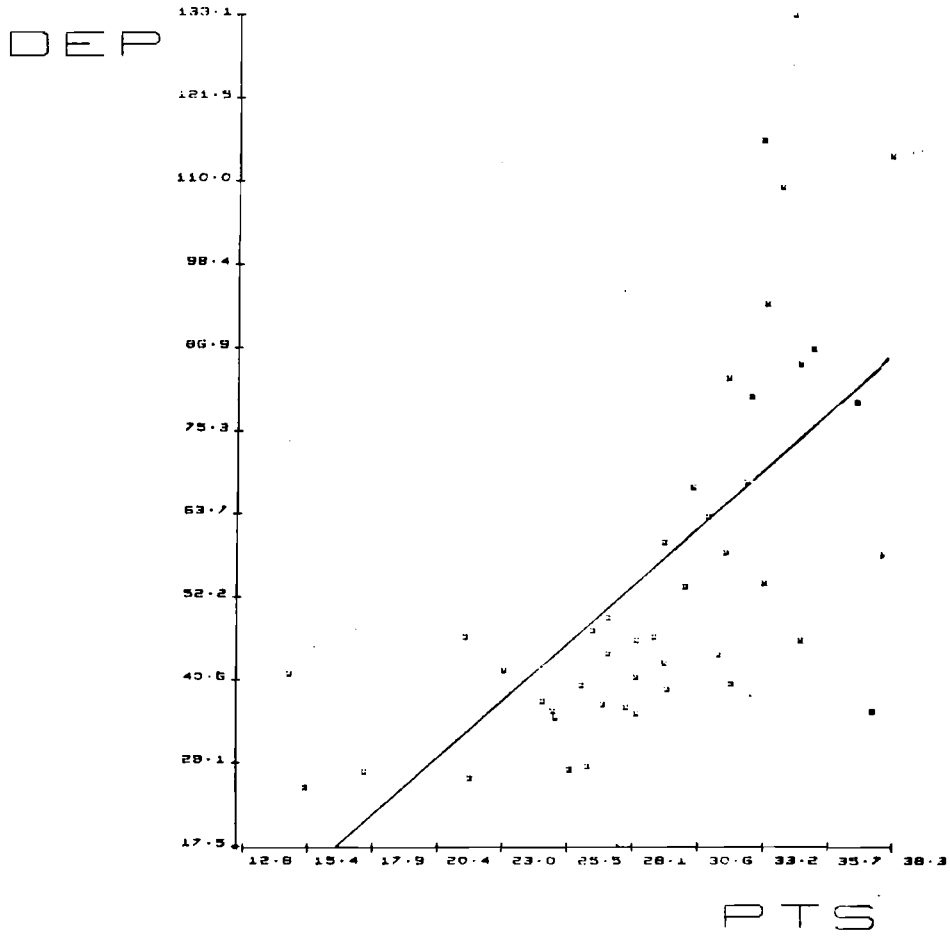
$$R^2 = 0.464 \qquad F = 38.147$$



PLOT NR. 3

NUMBER OF OBS.	=	46
INTERCEPT	=	159.48416
REGR. COEFF.	=	-1.12747
ST.ERR. OF REG.	=	0.22653
VALUE OF RR	=	0.36019
VALUE OF T	=	-4.97705
VALUE OF F	=	24.77100

Figure 14: Relationship Between DEP and Y, 1970



PLOT NR. 6

NUMBER OF OBS.	=	46
INTERCEPT	=	-34.94318
REGR. COEFF.	=	3.15200
ST.ERR. OF REG.	=	0.51033
VALUE OF RR	=	0.46437
VALUE OF T	=	6.17635
VALUE OF F	=	38.14725

Figure 15: Relationship Between DEP and PTS, 1970

Equation (14) and Figure 15 indicate that the relationship is strongly positive: the more a prefecture gets from the CG, the more it and the CG give to its cities.

The results of Section 5. underline those of Sections 3. and 4. as they indicate the redistributive nature of the Japanese urban public finance system in yet another way. We showed that (1) low-income prefectural governments got relatively more treasury disbursements and (2) cities in low-income prefectures got relatively more funds from the CG and their respective PGs (both in relation to total revenues and in relation to local taxes) than did cities in richer prefectures.

6. CONCLUSIONS

The major purpose of this paper was to investigate the trends and patterns of intergovernmental/fiscal relations within the Japanese urban system. After undertaking a brief description of the system itself (Section 2.), we conducted our empirical analysis of fiscal relations among the levels of government for the 1960s (Section 4. and 5.). The empirical part of this study was largely done on a data base consisting of city-specific data.

The major question posed in this study involved the degree to which vertical redistribution of financial revenues took place within the financial system and how this was related to the level of economic development in individual regions. We have found that vertical equity was the stated goal of Japanese policy-makers and that to a degree, movements toward equity were achieved. Poorer regions were clearly seen to be benefitting from the tax and subsidy

programs carried out during the 1960s, especially with respect to earmarked revenues. This was particularly true in the less developed regions such as Kyushu, Shikoku and Hokkaido. Our less elaborate analysis of prefectural data (in Section 5.) confirms these findings.

These patterns of fiscal behavior are important not only in isolation but in relation to the overall regional planning system which we have discussed in Glickman [1977c]. There we saw that even though the cental government planners who were involved in regional development efforts claimed to be redistributing resources and people away from the richer, more densely populated agglomerations, this was not the case. Central government investment remained highly concentrated in the Tokaido megalopolis until late in the 1960s. The governmental efforts to create New Industrial Cities and Special Areas as growth poles were not backed by sufficient public investment. Moreover, the plans lacked enforcement powers to encourage plants to located away from the metropolitan core. The redistribution of population and, to a lesser degree, jobs which occurred in the late 1960s was seen to be more of a result of market-oriented forces than of planning. The redistribution of income from rich to poor regions was probably not a result formal planning.

However, this paper indicates that there were other forces at work in the attempt to redistribute income. The intergovernmental fiscal system was responsible for some of the decline in income disparities noted by Mera [1976] and Sakashita [1976] and reviewed in Glickman [1977c]. By reducing the relative tax burden of people in poorer regions and by making tax subsidies available

to LGs in those regions, the income gap between rich and poor was somewhat reduced. Obviously, this program was not the only factor, as we have argued in Glickman [1977c], but it certainly made a contribution.

Appendix 1

List of Variables in the City Data Bank

File 1 contains the following items:

1. Prefectural Government (Dummy)
2. New Industrial City (Dummy)
3. Special Area (Dummy)
4. Distance from Tokyo
5. Distance to the Nearest City
6. Comprehensive Growth Index
7. Comprehensive Inhabitant Power Index
8. Age of City (1968=1)

Each of the remaining three files is comprised of the following data:

1. Index of Financial Power
2. City Planning Area
3. Number of Terms of the Major's Election
4. Major's Affiliation (LDP=1)
5. Japan Housing Corporation Units
6. Number of Eligible Voters
7. Number of Voters
8. Number of Voters Obtained by LDP Candidates
9. Telephones per 1,000 population
10. Percent of Population with Water Supply
11. Number of Books in Libraries
12. Ordinary Households Living in Dwelling Houses
13. Owned House
14. Tatami per Household Member
15. DID Ordinary Households Living in Dwelling Houses
16. DID Owned House
17. DID Tatami per Household Member
18. Owned Car
19. New Housing, Total
20. New Housing, Owned House

Demographic

21. Total Population
22. Area
23. Population Growth Rate
24. Number of Persons per Household
25. Ordinary Household
26. Age Distribution, percent 15-64
27. Age Distribution, percent 65+
28. Average Age of Residents
29. Education percent completing primary school
32. Immigration
33. Ratio of Daytime population to Nighttime population
34. Male/Female Ratio
35. DID Population (not adjusted)
36. DID Population Growth Rate
37. DID Area (not adjusted)
38. DID Population Density (not adjusted)
39. DID Population (adjusted)
40. DID Ordinary Household (not adjusted)

30. Education, percent high school graduates
31. Education, percent college graduates
41. Ordinary Household (adjusted)
42. DID Ordinary Household (adjusted)
43. Population of the Nearest City (adjusted)

Family Income and Expenditures

44. Receipt
45. Income (monthly)
46. Wage and Salaries
47. Receipt other than Income
48. Carry over from Previous Month
49. Living Expenditures
50. Food
51. Housing
52. Fuel and Light
53. Clothing
54. Miscellaneous
55. Transportation and Communication
56. Private Transportation
57. Non-living Expenditure
58. Earned Income Tax
59. Other tax
60. Savings Flow
61. Amount of Savings (stock)
62. Yearly Income
63. Wholesale Sales
64. Retail Sales
65. Bank Deposit
66. Bank Loans
67. Value added by manufacturing

Economy

By municipality, by place of residence

68. Percent white collar workers
69. Employment, All Industry
70. Employment, Primary Industry
71. Employment, Secondary Industry
72. Employment, Manufacturing
73. Employment, Tertiary Industry
74. Employment, Wholesale and Retail
75. Employment, Finance and insurance
76. Employment, Transportation and Communication
77. Employment, Service
78. Employment, Government

By Municipality, by place of work

89. Total labor force
90. Participation Rate
91. Employment, Total
92. Employment, Primary
93. Employment, Secondary and Tertiary
94. Employment, Mining
95. Employment, Construction
96. Employment, Manufacturing
97. Employment, Wholesale and Retail
98. Employment, Finance and Insurance
99. Employment, Transportation and Communication
100. Employment, Service

By Densely Inhabited District

79. Employment, All Industries
80. Employment, Primary Industry
81. Employment, Secondary Industry
82. Employment, Manufacturing
83. Employment, Tertiary Industry
84. Employment, Wholesale and Retail
85. Employment, Finance and Insurance
86. Employment, Transportation and Communication
87. Employment, Services
88. Employment, Government

101. Total labor force
102. Value Added per Worker in Manufacturing
103. DID Employee Total
104. DID Primary
105. DID Secondary and Tertiary
106. DID Mining
107. DID Construction
108. DID Manufacturing
109. DID Wholesale and Retail
110. DID Finance and Insurance
111. DID Transportation and Communication
112. DID Service

Appendix 2

Interrelationships of the Independent Variables Used in the Study

Most of the independent variables that were constructed for this study are highly correlated. Analyzing these relations will help understanding the results of the regression analysis. In Tables 1 and 2 of this appendix, correlation matrices of the independent variables are given, for 1965 and 1970, respectively. An examination of these matrices reveals two patterns: first, certain variables have very high interrelations and, second, that the correlation coefficients change significantly from first time point to the second for certain sets of variables. We searched for families of variables by using the linkage method of factor analysis (this is a rather approximate method, but suffices when the objective is solely descriptions of families of factors). Figure 1 of this appendix contains the groupings of the variables both for 1965 and 1970.

In 1965, the outstanding family of variables is Group I which consists of (a) SALES: volume of retail and wholesale sales, (b) POP: population, and (c) INFRA: the index of physical and social infrastructural development of the urban area. The fourth member--the percent of LDP votes (LDPV)--is negatively related to the other variables in this group, while the first three are highly positively related. Group II displays high positive relations among its members as well, all of which are rate-of-change variables: (a) total employment (Δ TEMP), (b) total population (Δ POP), (c) secondary sector employment (Δ SECE), and (d) service sectors employment (Δ SRVE). Interestingly, Δ TEMP plays the central role, that is, the other three variables relate to each other via Δ TEMP rather than directly.

The third group relates ADULT (percent of population at adult age) positively to COLGE (percent of population with college degrees) and INC (average family income) while negatively

Table 1

Correlation Coefficients for the Independent Variables for the Set of Large Cities, 1965.

	MFPROD	SALES	INMG	DEPR	ΔPOP	ADULT	INFRA	LOPV	COLGE	INC	REMP	SPDIST	POP	CTYAGE	ΔTEMP	ΔSPVE	ΔSECE
MFPROD	1.	-.01	-.17	.16	.21	.03	-.05	-.16	-.10	.10	.39	.07	.03	.24	.18	.10	.07
SALES		1.	.40	-.15	-.02	.37	.88	-.29	.20	.32	-.01	-.23	.88	.08	-.14	-.06	-.19
INMG			1.	-.22	-.17	.13	.23	.17	-.05	-.05	-.06	-.14	.17	-.10	-.11	-.08	-.12
DEPR				1.	-.20	-.52	-.16	-.19	.10	-.24	-.40	.14	-.12	-.09	-.24	-.19	-.16
ΔPOP					1.	.10	.01	-.16	.15	.04	.18	.06	.04	.07	.76	.62	.62
ADULT						1.	.55	-.27	.52	.56	.11	-.13	.50	.15	.10	.14	-.03
INFRA							1.	-.40	.43	.50	-.11	-.25	.97	.11	-.16	-.07	-.22
LOPV								1.	-.33	-.15	.01	.04	-.43	.03	.02	.01	.10
COLGE									1.	.48	-.43	.00	.41	-.04	.11	.16	.05
INC										1.	.01	-.05	.48	.00	-.02	.00	-.13
REMP											1.	-.12	-.01	.20	.18	.10	.07
SPDIST												1.	-.28	-.14	.05	.01	.00
POP													1.	.12	-.14	-.05	-.21
CTYAGE														1.	-.03	.04	-.01
ΔTEMP															1.	.81	.91
ΔSRVE																1.	.76
ΔSECE																	1.

Table 2

Correlation Coefficients for the Independent Variables for the Set of Large Cities, 1970

	MFPROD	SALES	INMG	DEPR	ΔPOP	ADULT	INFRA	LOPV	COLGE	INC	REMP	SPDIST	POP	CTYAGE	ΔTEMP	ΔSPVE	ΔSECE
MFPROD	1.	-.04	-.01	.10	.15	.04	-.01	-.17	-.12	.39	.21	.06	.00	.25	.09	.17	-.01
SALES		1.	.91	-.04	-.12	.41	.78	-.32	.20	.13	-.05	-.27	.84	.10	.05	.01	-.04
INMG			1.	.01	-.05	.53	.93	-.46	.45	.25	-.05	-.30	.99	.11	.07	.06	-.02
DEPR				1.	-.24	-.24	-.04	-.34	-.08	.08	-.20	.80	.02	-.06	-.15	.23	-.26
ΔPOP					1.	.06	-.06	-.15	.02	.11	.71	.18	-.02	.08	.16	.90	.87
ADULT						1.	.53	-.33	.64	.26	-.12	-.15	.54	.04	.02	.01	-.07
INFRA							1.	-.39	.44	.28	.01	-.21	.94	.12	-.04	.03	-.04
LOPV								1.	.33	-.24	.03	.12	-.48	-.14	-.12	-.20	-.03
COLGE									1.	.22	-.25	-.09	.51	-.11	.03	-.04	-.05
INC										1.	.11	-.16	.29	.08	.14	.15	.03
REMP											1.	.13	-.05	.09	-.39	.81	.75
SPDIST												1.	-.31	-.19	-.16	.16	.20
POP													1.	.11	.08	.07	-.02
CTYAGE														1.	.18	.13	.08
ΔTEMP															1.	.04	.01
ΔSRVE																1.	.84
ΔSECE																	1.

to DEPR, which shows the ratio of population to total employment (dependecy ratio). Finally, in the fourth group, we have CTYAGE (index the age of the city) and MFPRD (manufacturing value added per worker) which are related positively, but very weakly to REMP (the ratio of the employees in the producting sectors to that of service sectors of the urban economy).

These four groups have relatively low correlations with each other, none of them exceeding r = .25. This means good statistical separation, a sound basis for any interpretation to follow. The first group of variables are indicators of a metropolitan area: large volume business transactions, high population, and a significantly developed physical urban layout and social overhead capital; these are things the urbanists would expect to occur simultaneously in big metropolitan areas. This hypothesis is further supported by the negative relation of LDP votes to the preceeding three variables, that is, LDP support comes mostly from smaller urban areas.

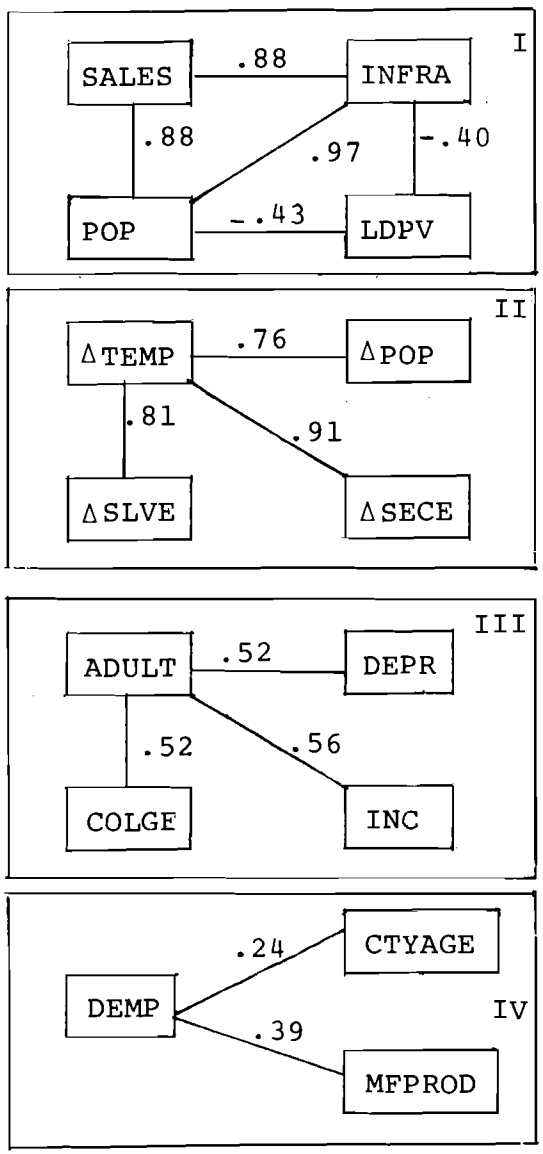
The second family of variables, is associated with urban areas experiencing rapid growth. Such areas would usually be in the newer metropolitan regions, or, in individual RECs in regions designated for growth. Thus, the Sendai metroplis has very low rates of change but high scores in Group I, while Osaka has high rates of change associated with high scores in Group I. This example illustrates that the rate of change of employment and population does not correlate with the size and levels of development of the urban area. (The correlation coefficient between Group I and Group II is, on the average, 0.11.)

The internal relations among the other two families are not as strong and not as interesting. Group III suggests that urban areas with high ratios of college graduates and workforce earn more, which is neither astonishing nor very revealing. Group IV, on the other hand, shows that newer urban areas with high manufacturing value added per worker co-varies with a higher ratio of secondary to total employment. However, this assertion should not be taken as anything more than plausible because the correlation coefficients are quite low in this group.

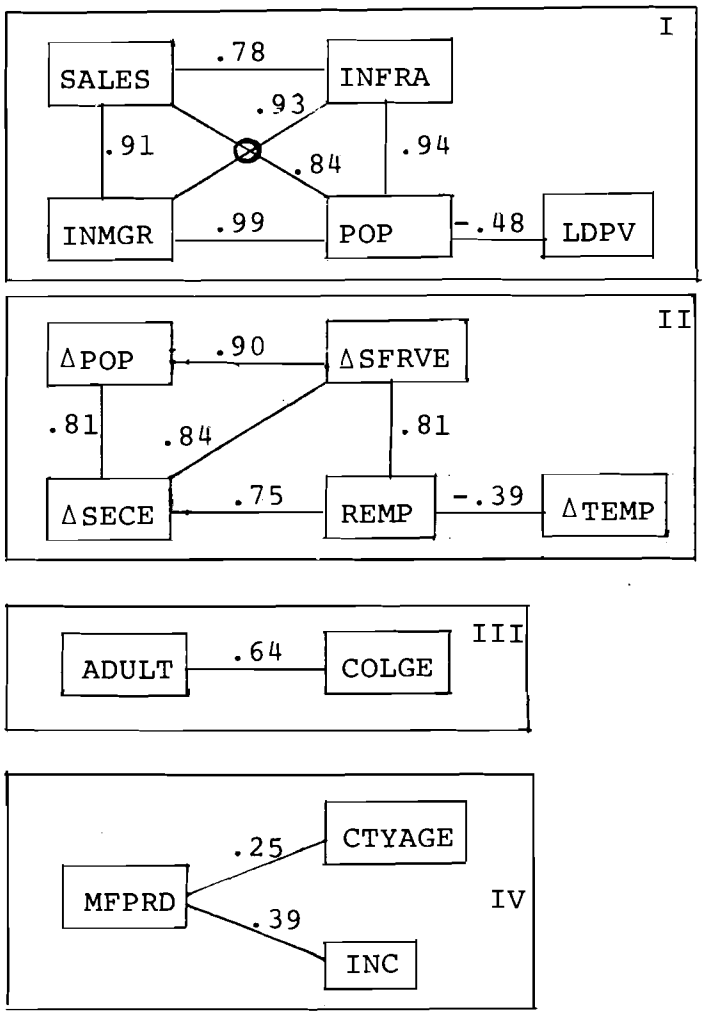
Observing Figure 1 of Appendix 2, we can see whether any changes have occurred in these families of variables from 1965 to 1970. Generally, the interpretation of the groups does not change greatly but some variables change groups, and some new ones enter. The first group stays relatively constant, except now a new variable, IMMGR (daytime/nighttime/ population, showing the relative commuting for work to the city), establishes a very strong positive relation with the first three variables of the group. Group II gains a new variable as well, REMP. However, the significant change is not in this new addition of a member, but rather that the variable Δ TEMP loses the significant relationship to other change variables in the group, to be replaced in this role by REMP. The third group reduces to ADULT and COLGE, the correlation among which increases in 1970. Group IV is still very loosely bound, so much so that one cannot make much of the new membership of INC into this group, while REMP drops out.

Appendix 2

Figure 1: Groups of independent variables in two points in time for the set of Large Cities (figure show correlation coeffcients)



1965



1970

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