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MIGRATION AND URBANIZATION
IN THE ASIAN PACIFIC

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FOREWORD

Roughly 1.6 billion people, 40 percent of the world's population, live in urban areas today. At the beginning of the last century, the urban population of the world totaled only 25 million. According to recent United Nations estimates, about 3.1 billion people, twice today's urban population, will be living in urban areas by the year 2000.

Scholars and policy makers often disagree when it comes to evaluating the desirability of current rapid rates of urban growth in many parts of the globe. Some see this trend as fostering national processes of socioeconomic development, particularly in the poorer and rapidly urbanizing countries of the Third World; whereas others believe the consequences to be largely undesirable and argue that such urban growth should be slowed down.

As part of a search for convincing evidence for or against rapid rates of urban growth, a Human Settlements and Services research team, working with the Food and Agriculture Program, is analyzing the transition of a national economy from a primarily rural agrarian to an urban industrial-service society. Data from several countries selected as case studies are being collected, and the research is focusing on two themes: spatial population growth and economic (agricultural) development, and resources/service demands of population growth and economic development.

This paper focuses on "transparent" models of urbanization as vehicles for assessing the reasonableness of projections whose underlying assumptions are not known by the user. It was prepared for presentation at the XIV-th Pacific Science Congress, and it is addressed, in particular, to the users of recent U.N. projections of future urbanization in the Asian Pacific.

A list of papers in the Population, Resources, and Growth Series appears at the end of this publication.

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ABSTRACT

The principal aim of this paper is to suggest two alternative methods for assessing the reasonableness of alternative sets of United Nations projections of population growth and urbanization. Both methods use models of urban population dynamics that are simple enough to be called transparent. The conclusion of the paper is that the most recent U.N. projections appear to be reasonable ones in the light of historical experience.

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MIGRATION AND URBANIZATION IN THE ASIAN PACIFIC

Jacques Ledent and Andrei Rogers

The original aim of this essay was to describe patterns of rural-urban migration and urbanization in those eleven nations in East Asia and South East Asia that border on the Pacific Ocean, a region that we shall call the Asian Pacific.* At first, the U.N. projections published in 1976 for the Habitat Conference were used (United Nations 1976) as the fundamental reference; but, more recently, a revised set of as yet unpublished projections was made available to us (United Nations 1979), and in several instances these project a somewhat different pattern of urbanization than did the earlier versions.** The dilemma of which version to believe led us to then change the principal focus of this paper to one of assessing the consistency and reasonableness of both sets of projections. In this assessment we follow Keyfitz's (1977) advice for developing a better appreciation of alternative projections:

*Our definition of the Asian Pacific includes nine countries and two city-states: Cambodia, China, Hong Kong, Indonesia, Japan, Korea (North and South), Malaysia, Philippines, Singapore, Thailand, Vietnam.

**We are most grateful to Dr. Sam Preston of the U.N.'s Population Division for providing us with the necessary unpublished data, which is forthcoming in United Nations (1979).

One way of enabling clients to understand the model they are to buy is to compare its results with alternative forms simple enough to be called transparent... With much consideration of detail, the United Nations in 1968 arrived at 6.5 billion for the world in the year 2000; in 1972 they gave the figure as 6.2 billion. Can we judge such totals by formulas simple enough to be worked out on a hand calculator? (Keyfitz 1977:4-5).

Similarly, the 1976 U.N. Habitat projections give Cambodia a 40.0 percent urban population in the year 2000; in the 1979 projections the revised figure is 23.7 percent. Without access to detailed documentation, it is impossible to judge which is the more reasonable projection. A transparent model can at least shed some light on the likely underlying assumptions regarding components of change.

1. PROJECTED POPULATION GROWTH AND URBANIZATION IN THE ASIAN PACIFIC

The population of the Asian Pacific in 1975 numbered about 1.3 billion and was growing at a rate of just under two percent a year. Continuing growth at this rate would double the region's population in roughly 35 years and would raise the region's total population to almost two billion by the end of this century.

Urban populations in the Asian Pacific are growing much more rapidly than the total populations of which they are a part. Between 1950 and 1970 the total population of the Asian Pacific Region increased by 42 percent; its urban population, however, increased by 133 percent during the same period. Roughly 400 million people, almost 30 percent of the region's population, live in urban areas today. Both the 1976 and the 1979 United Nations projections indicate that this urban population will more than double by the year 2000.

Table 1 presents urban and rural population estimates and projections and average annual rates of growth for the nine countries and two city-states of the Asian Pacific region from 1950 to 2000 as assessed by the United Nations in 1979. Appendix Table A.1 presents similar information as assessed by the same agency some three years earlier. The corresponding degrees of urbanization, as measured by percentages urban (i.e., percentage of population in urban areas) appear in Tables 2 and A.2, respectively.

Table 1. Population estimates and projections (in thousands) and average annual rates of growth (per thousand): Asian Pacific, urban and rural, 1950-2000.

	1950	1960	1970	1975	1980	1990	2000						
ASIAN PACIF	826324	16.9	976640	18.4	1176053	18.8	1293139	18.3	1416411	15.6	1554317	13.4	1858622
U	135221	52.3	227690	32.2	314187	32.1	368931	32.5	433927	31.3	593464	32.7	833762
R	691253	8.5	750950	13.9	862666	13.8	924208	12.3	982864	8.1	1265933	2.5	1292602
CHINA	558190	15.9	654488	16.5	771840	16.6	838803	15.8	907609	12.8	1031142	10.7	1147547
U	61393	68.4	121716	31.5	166710	31.7	195355	33.2	230652	32.9	320393	32.5	443213
R	496797	7.0	532772	12.7	605130	12.3	643448	10.2	676957	4.9	710749	-0.8	724774
JAPAN	83625	11.8	94096	10.3	104331	12.6	111120	11.2	117546	7.1	126213	5.2	132929
U	41977	33.6	58712	23.7	74386	22.9	83424	19.5	91970	12.9	104668	8.7	114128
R	41648	-16.3	35384	-16.7	29945	-15.6	27696	-15.9	25576	-17.2	21545	-13.6	18621
R ASIAN PAC	184089	22.1	230056	26.8	302682	26.5	343216	26.4	391656	24.8	501962	20.4	615726
U	31651	40.1	47262	43.6	73091	42.0	90152	42.2	111305	41.4	168003	38.1	248421
R	128838	17.9	182794	21.9	227591	21.2	253064	20.5	280351	17.4	333559	10.2	369285
CAMBODIA	4163	25.3	5364	27.5	7060	27.7	8110	29.7	9409	28.3	12491	23.6	15819
U	425	30.1	574	36.4	826	43.2	1025	48.9	1309	52.5	2213	52.7	3749
R	3738	24.8	4792	26.3	6234	25.6	7085	26.8	8103	23.8	10278	16.1	12273
HONG KONG	1974	44.3	3075	24.8	3942	13.9	4225	13.6	4522	12.9	5147	8.9	5625
U	1747	45.0	2739	25.5	3534	14.5	3800	14.5	4085	14.1	4703	10.2	5210
R	227	39.2	336	19.4	408	8.2	425	5.6	437	1.6	444	-6.8	415
INDONESIA	75449	20.6	92701	25.4	119667	26.0	136004	25.9	154869	23.8	194576	18.9	237507
U	9362	36.8	13522	41.1	20395	41.3	25079	44.3	31293	45.8	49477	43.7	76612
R	66087	18.1	79179	22.4	98272	22.7	110965	21.5	123576	17.4	147399	9.2	163895
KOREA	30096	15.7	35221	25.1	45257	22.0	50515	21.0	56111	19.9	60386	16.1	62400
U	7371	40.7	11074	57.7	1723	50.7	25412	43.7	31621	35.6	45132	24.6	57813
R	22725	6.1	24147	5.6	25334	3.4	25103	-0.9	24490	-4.7	23354	-3.1	22635
MALAYSIA	6187	24.5	7908	28.0	10466	28.9	12093	29.3	13498	26.6	18262	16.9	22054
U	1260	45.9	1994	34.8	2823	35.5	3371	39.6	4110	41.8	6244	38.5	9172
R	4927	18.3	5914	25.6	7623	26.4	8722	25.1	9888	19.5	12016	7.0	12882
PHILIPPINES	20988	27.2	27561	31.0	37564	33.6	44437	32.2	52203	29.5	70119	24.6	89707
U	5655	30.3	8350	39.1	12347	42.2	15244	43.0	18902	43.5	24190	41.0	43988
R	15293	22.8	19211	27.2	25217	29.3	29193	26.3	33301	20.6	40921	11.1	45714
SINGAPORE	1022	46.9	1634	23.9	2075	16.0	2248	16.1	2437	14.9	2629	13.0	3126
U	815	44.2	1268	20.9	1562	12.8	1665	16.1	1805	16.2	2123	14.4	2433
R	207	57.0	366	33.8	513	25.6	583	16.1	632	11.1	786	-4.0	673
THAILAND	20810	27.7	26392	30.3	33745	32.7	42093	32.3	49473	30.0	66752	24.9	85618
U	2096	45.4	3302	35.8	4725	38.2	5718	43.6	7113	49.4	11650	53.3	16658
R	17914	25.4	23090	29.5	31020	31.8	36375	30.5	42363	26.3	55102	17.7	65760
VIETNAM	20600	20.5	30200	25.8	39106	21.1	43051	22.5	48634	23.1	61302	21.2	75802
U	2880	43.3	4439	47.8	8838	45.0	11070	46.7	17663	46.7	17663	49.5	27574
R	21720	17.1	25761	21.5	31950	16.0	34613	16.4	37564	15.0	43634	10.0	48288

Source: United Nations (1979, Annexes A and B).

Table 2. Estimated and projected percentages of population in urban areas: Asian Pacific, 1950-2000.

	1950	1960	1970	1975	1980	1990	2000

ASIAN PACIF	16.34	23.27	26.70	28.53	30.63	35.77	42.38

CHINA	11.00	18.60	21.60	23.29	25.41	31.07	38.61
JAPAN	50.20	62.40	71.30	75.08	78.24	82.93	85.86
R ASIAN PAC	17.16	20.54	24.31	26.27	28.42	33.55	40.02

CAMBODIA	10.21	10.70	11.70	12.64	13.91	17.72	23.70
HONG KONG	88.50	89.07	89.65	89.94	90.34	91.37	92.62
INDONESIA	12.41	14.59	17.07	18.43	20.21	25.17	32.26
KOREA	24.49	31.44	43.58	50.31	56.35	65.90	71.86
MALAYSIA	20.37	25.21	26.97	27.88	29.36	34.19	41.59
PHILIPPINES	27.13	30.30	32.87	34.30	36.21	41.64	49.04
SINGAPORE	79.75	77.60	75.28	74.07	74.07	75.04	78.47
THAILAND	10.47	12.51	13.22	13.58	14.37	17.45	23.18
VIETNAM	11.71	14.70	18.30	20.34	22.76	28.81	36.38

Source: Table 1.

The urban population of the Asian Pacific is expected to continue to grow at a relatively steady rate of just over three percent per annum until the year 2000. The rural population, on the other hand, is expected to slow its rate of increase dramatically, dropping from its current 1.2 percent rate to roughly one-fifth that value in the course of the next two decades. The current percentage urban figure of roughly 30 percent is expected to grow to 42 percent by that time.

The aggregate totals for the Asian Pacific region conceal large differences in subregional patterns of population growth and urbanization. Japan's rural population, for example, is expected to continue to exhibit a negative growth rate in excess of one percent per annum by the year 2000; China's, on the other hand, will be almost stationary by then, and the Rest of the Asian Pacific's should still be increasing at the rate of about one percent a year. Japan's degree of urbanization at that time is expected to stand at roughly 85 percent urban; China and the Rest of the Asian Pacific are projected to show less than half that level. Further disaggregation of the latter region reveals, of course, a much wider range of differences in expected patterns of growth and urbanization.

It can be demonstrated that the difference between the urban and total annual growth rates, $r_u - r_T$, is a rough indicator of the "tempo" of urbanization.* Table 3 sets out these differences over time for the eleven Asian Pacific nations. They indicate that the tempo of urbanization is expected to continue to decline for Japan, to increase slightly for China, and to hold steady for the Rest of the Asian Pacific. Further insights into the changing patterns of urbanization may be obtained by disaggregating these growth rates into their principal components: natural increase and migration.

*Arriaga (1975). "Tempo" here is defined as the rate of change, with respect to time, of the percentage of the population residing in urban areas.

Table 3. The tempo of urbanization: Asian Pacific, 1950-2000.

	50-60	60-70	70-75	75-80	80-90	90-00

ASIAN PACIF	35.34	13.76	13.28	14.19	15.51	16.97

CHINA	52.52	14.96	15.07	17.45	20.10	21.72
JAPAN	21.75	13.34	10.33	8.26	5.82	3.47
R ASIAN PAC	18.02	16.83	15.50	15.75	16.59	17.64

CAMBODIA	4.71	8.92	15.44	19.20	24.17	29.09
HONG KONG	0.64	0.65	0.65	0.88	1.14	1.36
INDONESIA	16.17	15.73	15.36	18.35	21.96	24.81
KOREA	24.98	32.65	28.70	22.71	15.65	8.66
MALAYSIA	21.36	6.74	6.58	10.39	15.24	19.58
PHILIPPINES	11.02	8.15	8.55	10.80	13.98	16.35
SINGAPORE	-2.73	-3.04	-3.24	0.00	1.31	4.47
THAILAND	17.77	5.50	5.46	11.27	19.42	28.40
VIETNAM	22.75	21.91	21.15	22.50	23.57	23.31

Source: Table 1. The data for Singapore appear to be incorrect (note the large differences between the values in Table 1 and Appendix Table A.1).

2. COMPONENTS OF GROWTH

Population growth and urbanization are direct consequences of increasing rates of natural increase and of net rural-to-urban migration*. In most developing countries, populations have gone through a process of demographic change in which a decline in mortality eventually was followed by a decline in fertility, and in which internal migration increased during the course of the nation's socioeconomic development.

The urban population of Japan in 1960 was increasing by about 2.92 percent a year according to 1976 United Nations estimates set out in Table 4. This estimate falls within the range given by the

Table 4. Component rates of population growth (per thousand): Asian Pacific, urban and rural, 1960.

REGIONS AND COUNTRIES		GROWTH RATE	BIRTH RATE	DEATH RATE	NATURAL INCREASE RATE	TRANSFER RATE
		r	b	d	n	m
China	T	17.7	37.4	19.7	17.7	0.0
	U	50.3	33.9	15.4	18.5	31.8
	R	9.7	38.2	20.7	17.5	-7.8
Japan	T	9.6	17.3	7.7	9.6	0.0
	U	29.2	15.8	6.6	9.2	20.0
	R	-5.9	18.5	8.6	9.9	-15.8
Other East Asia*	T	28.7	40.8	12.1	28.7	0.0
	U	56.2	35.8	9.0	26.8	29.4
	R	14.9	43.3	13.6	29.7	-14.8
South East Asia**	T	25.6	45.9	20.3	25.6	0.0
	U	43.3	42.2	16.2	26.0	17.3
	R	21.9	46.7	21.1	25.6	-3.7

* Hong Kong, Korea (and Mongolia).

** Cambodia, Indonesia, Malaysia, Philippines, Thailand, Singapore, Vietnam (and Burma and Laos).

Source: United Nations (1976:50-52).

*Our net rural outmigration includes area reclassification.

1950-60 annual rate of 3.36 and the 1960-70 annual rate of 2.37 shown in Table 1. The 1960 urban growth rate, r_u , apparently was the sum of a rate of natural increase, n_u , of 9.2 per 1000 and a positive net immigration rate of 20.0 per thousand (Table 4). Expressing these rates on a per capita basis gives

$$\begin{aligned} r_u &= n_u + m_u \\ &= .0092 + .0200 \\ &= .0292 \end{aligned}$$

The corresponding identity for the rural population is

$$\begin{aligned} r_r &= n_r + m_r \\ &= .0099 - .0158 \\ &= -.0059 \end{aligned}$$

a value that falls outside those set out in Table 1 (i.e., -.0163 and -.0167). The inconsistency could be the consequence of errors in any or all of the estimated components of change, but it is most likely a result of the inconsistent net migration rates. If the 1960 urban and rural population totals in Table 1 may be taken to be accurate, and if $m_u = .0200$ is the correct rate of urban net immigration, then total net immigration from rural to urban areas in 1960 must have consisted of $.0200 (58,712) = 1.174$ million individuals. The same total viewed as net outmigration from rural areas would give $-1.174/35.384 = -.0332$ for m_r and not the -.0158 given in Table 4. If we now assume that this revised net migration rate is the correct one, and accept the rural natural increase rate as also being correct, then we have that

$$\begin{aligned} r_r &= n_r + m_r \\ &= .0099 - .0332 \end{aligned}$$

$$= -.0233 ,$$

a rate that is about 7 per thousand larger than the one suggested by Table 1. If we accept the rural growth rates of Table 1, then it appears that our estimate of net rural-to-urban migration is too high. These difficulties indicate that alternative estimates of natural increase and net migration are needed, ones that will give m_r a value closer to the average of the above two estimates (i.e., $m_r = -.0245$) if the data in Table 1 are assumed to be accurate.

Let $S(t)$ denote the urban to rural population ratio at time t , then

$$r_u = n_u + m_u = n_u + \frac{-m_r}{S(t)}$$

and

$$r_r = n_r + m_r .$$

Assume that natural increase rates in urban regions are equal, i.e., $n_u = n_r = n_T$, where n_T is the rate of the natural increase of the total national population. Assume that the country is undisturbed by immigration and emigration and that therefore n_T is equal to the national rate of growth r_T . Then, the rural net outmigration rate is given by:

$$\hat{m}_r = r_r - r_T .$$

Because the assumption that natural increase rates are the same in urban and rural areas is probably incorrect, we now test the sensitivity of this assumption. First, differentiating between urban and rural rates of natural increase gives

$$m_r = r_r - n_r$$

and the error introduced by assuming those rates to be identical

is

$$\hat{m}_r - m_r = n_r - r_T .$$

By definition, the national rate of growth is the weighted sum of the urban and rural rates of natural increase:

$$r_T = \frac{\bar{n}_r + n_u S(t)}{1 + S(t)} .$$

Setting $\frac{n_u}{n_r} = k$ gives

$$r_T = n_r \frac{1 + k S(t)}{1 + S(t)} ,$$

whence

$$\begin{aligned} \hat{m}_r - m_r &= \left[\frac{1 + S(t)}{1 + k S(t)} - 1 \right] r_T \\ &= \left[\frac{(1 - k)S(t)}{1 + k S(t)} \right] r_T \\ &\approx [u(t)(1 - k)]r_T , \quad \text{for } k \neq 1 , \end{aligned}$$

where $u(t)$ denotes the proportion urban at time t . Thus if $k = .95$, the error is less than five percent of the value of the national rate of growth (since $u(t) < 1$).

Table 5 presents our estimates of rural net migration rates, $\hat{m}_r$, for the Asian Pacific nations during the period 1950 to 2000, taking the data in Table 1 as given. Note that the rate for Japan between 1950-70 lies in the range specified earlier.

Dividing minus the rural net migration rates, $-m_r$, in Table 5 by the urban-rural population ratio, S , gives the corresponding urban net migration rates, m_u . Subtracting these from the urban growth rate, r_u , gives n_u , the urban annual rate of natural

Table 5. Estimates of rural net migration rates (per thousand):
Asian Pacific, 1950-2000.

	50-60	60-70	70-75	75-80	80-90	90-00

ASIAN PACIF	- 8.64	- 4.57	- 5.06	- 5.96	- 7.70	- 10.86

CHINA	- 8.92	- 3.76	- 4.36	- 5.61	- 7.89	- 11.58
JAPAN	- 28.10	- 27.02	- 28.22	- 27.17	- 24.27	- 18.81
R ASIAN PAC	- 4.18	- 4.85	- 5.24	- 5.92	- 7.44	- 10.25

CAMBODIA	- 0.55	- 1.12	- 2.14	- 2.94	- 4.52	- 7.55
HONG KONG	- 5.11	- 5.42	- 5.70	- 8.02	- 11.36	- 15.64
INDONESIA	- 2.52	- 2.95	- 3.31	- 4.39	- 6.42	- 9.95
KOREA	- 9.66	- 19.49	- 25.39	- 25.96	- 24.68	- 19.23
MALAYSIA	- 6.28	- 2.38	- 2.49	- 4.16	- 7.09	- 11.92
PHILIPPINES	- 4.44	- 3.76	- 4.32	- 5.88	- 8.90	- 13.55
SINGAPORE	+10.06	+9.87	+9.57	0.00	- 3.84	- 14.77
THAILAND	- 2.30	- 0.81	- 0.84	- 1.83	- 3.66	- 7.20
VIETNAM	- 3.45	- 4.31	- 5.06	- 6.17	- 8.16	- 11.23

Source: Estimated by authors.

increase. Dividing the latter by the former, and multiplying by 100, indicates the percentage of urban growth that is attributable to natural increase. Table 6 sets out these percentages for the Asian Pacific data. The results seem to be intuitively plausible. The Asian Pacific's urban population recently has been growing more because of urban natural increase than because of net rural-to-urban migration. However, the relative contribution of the latter component to China's urban growth is expected to increase dramatically by the end of the century.

3. URBANIZATION DYNAMICS

Given a set of estimated natural increase and net migration rates for the eleven Asian Pacific nations, what can we then say about the reasonableness of the expected urban and rural population totals set out in Table 1? The following simple model of urbanization dynamics will be used to assist us in this assessment. Let $P_T(t)$, $P_U(t)$, and $P_R(t)$ denote, respectively, the total, urban, and rural populations of a region at time t . Assume that

$$P_T(t) = P_T(0)e^{r_T t}$$

$$P_R(t) = P_R(0)e^{(r_T - m_R)t}$$

and

$$P_U(t) = P_T(t) - P_R(t)^* .$$

*The urban and rural populations are assumed to have natural rates of increase equal to the national growth rate r_T .

Table 6. Percentage of urban growth due to natural increase:
Asian Pacific, 1950-2000.

	50-60	60-70	70-75	75-80	80-90	90-00

ASIAN PACIF	32,38	57,28	58,67	56,29	50,46	44,07

CHINA	23,25	52,43	52,47	47,47	38,83	33,00
JAPAN	35,16	43,64	54,98	57,64	55,01	59,92
R ASIAN PAC	55,05	61,41	63,07	62,64	59,92	53,65

CAMBODIA	84,34	75,48	64,23	60,75	53,96	44,81
HONG KONG	98,57	97,47	95,54	93,94	91,89	86,74
INDONESIA	56,01	61,72	62,85	58,55	52,05	43,26
KOREA	38,63	43,44	43,37	48,06	56,02	65,01
MALAYSIA	53,47	80,61	81,45	73,80	63,56	49,09
PHILIPPINES	71,20	79,16	79,72	74,89	67,85	60,11
SINGAPORE	106,17	114,58	125,40	99,99	91,92	69,10
THAILAND	60,91	84,65	85,70	74,14	60,66	46,71
VIETNAM	47,41	54,12	49,91	50,04	49,54	47,67

Source: Estimated by authors.

Such a simple model has been used by Keyfitz (1978) and Ledent (1978) to examine a number of interesting dimensions of urbanization. We shall use it here only to project the 1975 Asian Pacific population forward to the year 2000, using two variants. In both variants the national growth rates r_T are assumed to follow the paths set out in Table 1. In Run 1, the rates of net migration are those presented in Table 5; in Run 2, they are all forced to converge, linearly over time from 1975 onwards, to the same rate of $m_r = -.016$ by the year 2000. The latter rate was selected after an examination of migration data for a number of countries and represents, in our judgement, a reasonable assumption against which to assess the U.N. projections.

The projections generated by the two alternatives are presented in Tables 7, 8, 9, and 10; they are the "transparent-model" counterparts to the U.N. results in Tables 1, 2, 3, and 6, respectively. Table 11 brings together summary results of all three sets of projections for purposes of comparison.

It appears that the U.N. projections fall roughly midway between our two alternative "transparent" projections. Thus they would seem to assume a level of rural-urban migration that is higher than shown in Table 5, for all but the already highly urbanized countries, Japan and Korea, but one that is lower than is implied by a convergence of migration rates to the level of $m_r = -.016$ by the year 2000.

The transparently simple models of urbanization dynamics used here allow us to gauge the reasonableness of the U.N. projections with respect to the implied levels of future patterns of net migration. But net migration patterns in turn are associated with patterns of economic development, as reflected, for example, in changes in levels of per capita income and other indicators of a nation's structural transformation. We next consider how a widely observed regularity in this dimension of change may be used to create yet another "transparent" model of urbanization.

Table 7. Alternative population projections (Runs 1 and 2), in thousands, and average annual rates of growth (per thousand), Asian Pacific, urban and rural, 1975-2000.

	1975	RUN 1		2000	RUN 2						
		1980	1990		1980	1990					
ASIAN PACIF T	1293139	18.3	1659317	13.4	1895622	18.3	1416811	15.8	1659317	13.4	1895622
U	368931	29.8	428234	25.4	552012	34.7	439847	35.8	633284	34.2	893139
R	924208	13.5	985577	11.3	1107305	9.2	1213668	11.3	977964	9.7	1025033
CHINA T	835603	15.8	937639	12.8	1031142	10.7	1147987	15.8	907609	12.8	1031142
U	175356	29.5	223390	24.8	290227	21.1	358308	36.3	230277	33.5	348202
R	643448	11.4	691215	8.4	743914	6.4	789679	9.1	673332	1.4	682939
JAPAN T	111122	11.2	117546	7.1	126213	5.2	132929	11.2	117546	7.1	126213
U	53424	19.8	92104	13.7	105813	9.9	116366	19.1	91791	12.3	103773
R	27696	-17.0	23442	-21.1	20600	-23.0	16361	-14.5	25755	-13.8	22400
R ASIAN PAC T	343215	26.4	391656	24.8	501962	20.4	615706	26.4	391656	24.8	501962
U	90152	39.3	109736	35.3	156172	28.7	208078	44.8	112778	40.0	192309
R	253064	21.6	281920	20.4	345790	16.5	407628	19.4	278978	13.6	319553
CAMBODIA T	8112	29.7	9429	28.3	12491	23.6	15819	29.7	9409	20.3	12491
U	1025	43.9	1277	41.0	1923	34.6	2719	60.7	1389	73.7	2922
R	7005	27.6	8132	26.2	10568	21.5	13100	24.8	6220	17.9	9591
HONG KONG T	4225	13.6	4522	12.9	5147	8.9	5625	13.6	4522	12.9	5147
U	3080	14.2	4083	13.5	4672	9.4	5134	14.4	4286	14.1	4705
R	425	7.9	442	7.2	475	3.2	491	5.9	436	1.1	422
INDONESIA T	136044	25.9	150869	23.8	196576	19.9	237507	25.9	154869	23.8	196576
U	25279	40.0	30625	36.3	44013	28.6	59186	49.9	32191	57.1	56977
R	110965	22.6	124244	20.5	152563	15.6	178321	20.1	122676	12.9	139599
KOREA T	59515	21.0	59111	19.9	68986	16.1	80408	21.0	56111	19.9	68986
U	25112	43.3	31551	36.0	45231	27.0	59258	41.8	31320	33.2	43631
R	25103	-4.4	24560	-5.5	23855	-9.3	21192	-2.5	27911	0.2	24835
MALAYSIA T	12003	29.3	13996	26.6	18260	18.9	22354	29.3	13996	26.6	18260
U	3371	35.6	4027	32.5	5572	24.3	7127	42.1	4161	47.9	6717
R	8722	25.8	9971	24.1	12688	16.4	14947	24.1	9837	15.0	11343
PHILIPPINES T	44037	32.2	52203	29.5	70119	24.6	89707	32.2	52203	29.5	70119
U	15244	40.2	18641	36.8	26947	31.2	36811	44.4	15631	46.6	30235
R	29193	27.9	33562	25.2	43172	20.3	52996	25.6	33172	13.2	39764
SINGAPORE T	2234	14.1	2437	14.9	2029	10.0	3126	16.1	2437	14.9	2029
U	1665	12.7	1774	11.1	1982	5.6	2324	14.6	1791	16.9	2121
R	503	25.7	663	24.5	847	19.5	1230	20.6	648	4.1	700
THAILAND T	42003	32.3	49473	30.0	64752	24.9	85610	32.3	49473	30.0	64752
U	5718	37.6	6901	35.0	9794	29.7	13176	55.3	7541	72.2	15327
R	35375	31.5	42572	29.1	56958	24.0	72442	28.4	41932	20.0	51255
VIETNAM T	43451	22.5	46534	23.1	61332	21.2	75002	22.5	46534	23.1	61332
U	8035	41.2	10660	39.0	16338	34.3	22594	40.6	11271	54.2	19375
R	34613	17.5	37774	16.1	45264	15.2	53288	15.3	37363	11.5	41927

Source: Projected by authors.

Table 8. Alternative projections of percentages of population in urban areas (Runs 1 and 2): Asian Pacific, 1975-2000.

	1975	RUN 1			RUN 2		
		1980	1990	2000	1980	1990	2000
*****	*****	*****	*****	*****	*****	*****	*****
ASIAN PACIF	28.53	30.23	33.27	36.01	30.97	30.23	47.09
*****	*****	*****	*****	*****	*****	*****	*****
CHINA	23.29	24.94	28.15	31.21	25.81	33.77	43.56
JAPAN	75.08	78.36	83.68	87.69	78.09	82.22	84.85
R ASIAN PAC	26.27	28.02	31.11	33.80	28.80	36.32	45.52
*****	*****	*****	*****	*****	*****	*****	*****
CAMBODIA	12.64	13.57	15.40	17.19	14.76	23.22	34.57
HONG KONG	89.94	90.22	90.77	91.28	90.32	91.41	92.68
INDONESIA	18.43	19.77	22.39	24.92	20.79	28.98	39.48
KOREA	50.31	56.23	66.04	73.66	55.82	63.74	69.10
MALAYSIA	27.88	28.77	30.52	32.22	29.72	36.79	46.13
PHILIPPINES	34.30	35.71	38.43	41.03	36.46	43.26	51.65
SINGAPORE	74.07	72.80	70.06	67.06	73.48	74.97	78.67
THAILAND	13.58	13.95	14.67	15.39	15.24	23.26	34.61
VIETNAM	20.34	22.33	26.16	29.81	23.18	31.61	41.72
*****	*****	*****	*****	*****	*****	*****	*****

Source: Table 7.

Table 9. Alternative tempos of urbanization (Runs 1 and 2):
Asian Pacific, 1975-2000.

	RUN 1			RUN 2		
	75-80	80-90	90-00	75-80	80-90	90-00

ASIAN PACIF	11.54	9.59	7.92	16.44	21.03	20.86

CHINA	13.72	12.08	10.34	20.57	26.87	25.46
JAPAN	8.55	6.57	4.68	7.87	5.15	3.15
R ASIAN PAC	12.91	10.47	8.27	18.38	23.21	22.58

CAMBODIA	14.19	12.64	11.00	31.00	45.32	39.80
HONG KONG	0.63	0.60	0.56	0.85	1.19	1.38
INDONESIA	14.04	12.42	10.71	24.01	33.25	30.91
KOREA	22.27	16.09	10.91	20.79	13.27	8.08
MALAYSIA	6.30	5.91	5.44	12.83	21.32	22.64
PHILIPPINES	8.03	7.34	6.56	12.16	17.12	17.72
SINGAPORE	-3.46	-3.82	-4.38	-1.58	2.00	4.82
THAILAND	5.29	5.06	4.77	23.04	42.27	39.73
VIETNAM	18.67	15.84	13.04	26.10	31.03	27.76

Source: Table 7.

Table 10. Alternative percentages of urban growth due to natural increase (Runs 1 and 2): Asian Pacific, 1975-2000.

	RUN 1			RUN 2		
	75-80	80-90	90-00	75-80	80-90	90-00

ASIAN PACIF	61,27	62,23	62,80	52,63	42,89	39,06

CHINA	53,46	51,37	50,94	43,39	32,20	29,65
JAPAN	56,80	51,98	52,53	58,82	57,99	62,23
R ASIAN PAC	67,16	70,32	71,18	58,96	51,67	47,49

CAMBODIA	67,69	69,15	68,23	48,94	38,47	37,24
HONG KONG	95,58	95,58	94,05	94,11	91,56	86,55
INDONESIA	64,87	65,75	63,86	51,91	41,77	37,96
KOREA	48,55	55,34	59,60	50,26	60,03	66,59
MALAYSIA	82,29	81,82	77,62	69,51	55,49	45,47
PHILIPPINES	80,05	80,08	78,97	72,59	63,29	58,16
SINGAPORE	127,28	134,47	178,29	110,87	88,15	67,45
THAILAND	85,93	85,56	83,91	58,38	41,48	38,52
VIETNAM	54,69	59,37	61,95	46,34	42,73	43,34

Source: Estimated by authors.

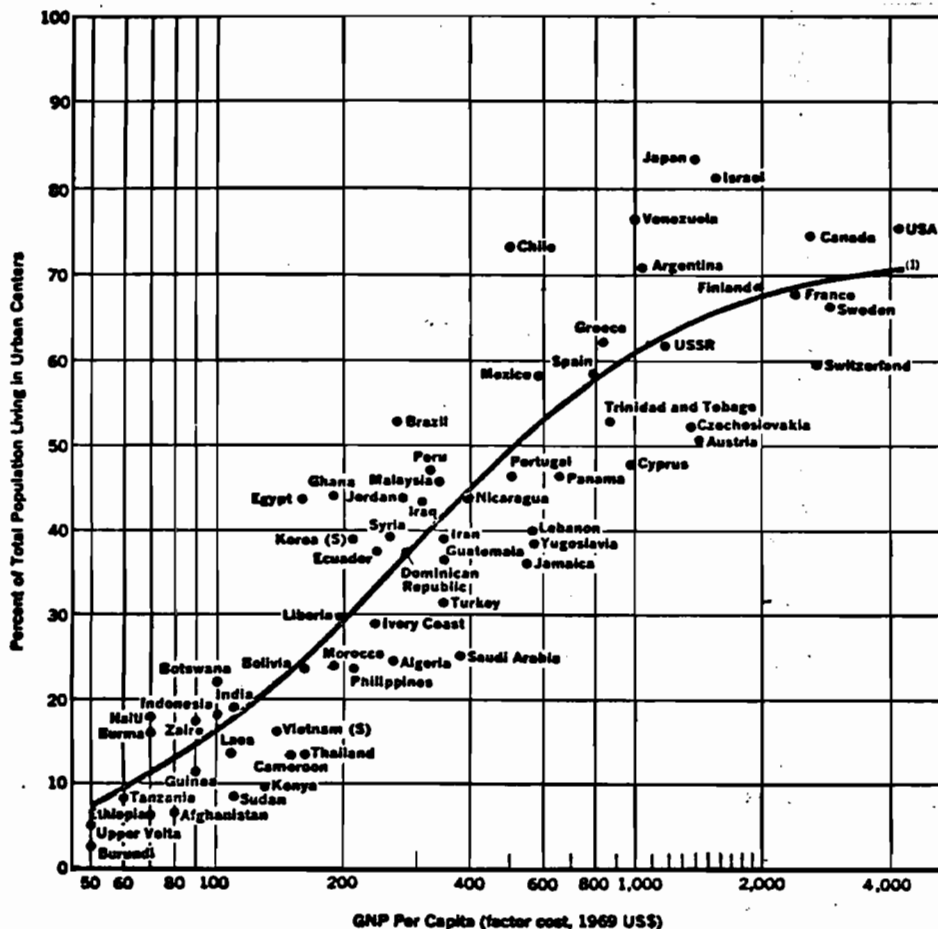
Table 11. Summary of alternative projections to the year 2000 (in thousands): Asian Pacific, 1950-2000.

	1950		1975		2000			
					RUN 1		U.N.	RUN 2
*****	*****	*****	*****	*****	*****	*****	*****	*****
ASIAN PACIF	T	826304.	17.9	1293139.	15.3	1896622.	15.3	1896622.
	U	135021.	40.2	368931.	24.6	682954.	31.1	893139.
	R	691283.	11.6	924208.	10.9	1213668.	6.7	1003483.
	P	16.34	22.3	28.53	9.3	36.01	15.8	47.09
*****	*****	*****	*****	*****	*****	*****	*****	*****
CHINA	T	558190.	16.3	838803.	12.6	1147987.	12.6	1147987.
	U	61393.	46.3	195355.	24.3	358308.	32.8	500079.
	R	496797.	10.3	643448.	8.2	789679.	3.6	647908.
	P	11.00	30.0	23.29	11.7	31.21	20.2	43.56
*****	*****	*****	*****	*****	*****	*****	*****	*****
JAPAN	T	83625.	11.4	111120.	7.2	132929.	7.2	132929.
	U	41977.	27.5	83424.	13.4	116568.	12.5	112789.
	R	41648.	-16.3	27696.	-21.1	16361.	-15.5	20140.
	P	50.20	16.1	75.08	6.2	87.69	5.4	84.85
*****	*****	*****	*****	*****	*****	*****	*****	*****
R ASIAN PAC	T	184489.	24.8	343216.	23.4	615706.	23.4	615706.
	U	31651.	41.9	90152.	33.5	208078.	40.2	280272.
	R	152838.	20.2	253064.	19.1	407628.	15.1	335434.
	P	17.16	17.0	26.27	10.1	33.80	16.8	45.52
*****	*****	*****	*****	*****	*****	*****	*****	*****

Source: Tables 1 and 7.

4. URBANIZATION AND DEVELOPMENT

In developed countries, high levels of urbanization and high rates of urban growth have been associated historically with high and increasing national per capita income and product (GNP). This positive correlation is usually attributed to factors such as rapid industrialization, increases in productivity, widespread literacy, improved nutrition, and advances in health care. But although high proportions of national populations in urban areas are positively associated with high levels of per capita income, this of course does not mean that rapid urbanization automatically fosters rapid increases in a nation's wealth or productivity. Nevertheless, a strong association between a nation's degree of urbanization and its level of per capita GNP is a commonly observed "stylized fact" in the economic development literature, and a logistic relationship is often indicated by the data (Figure 1). This regularity suggests an alternative transparent model for



Source: I.B.R.D. (1972:73).

Figure 1. Degree of urbanization compared with GNP per capita.

assessing the reasonableness of the U.N. projections--one that introduces an economic dimension to the purely demographic variables considered earlier.

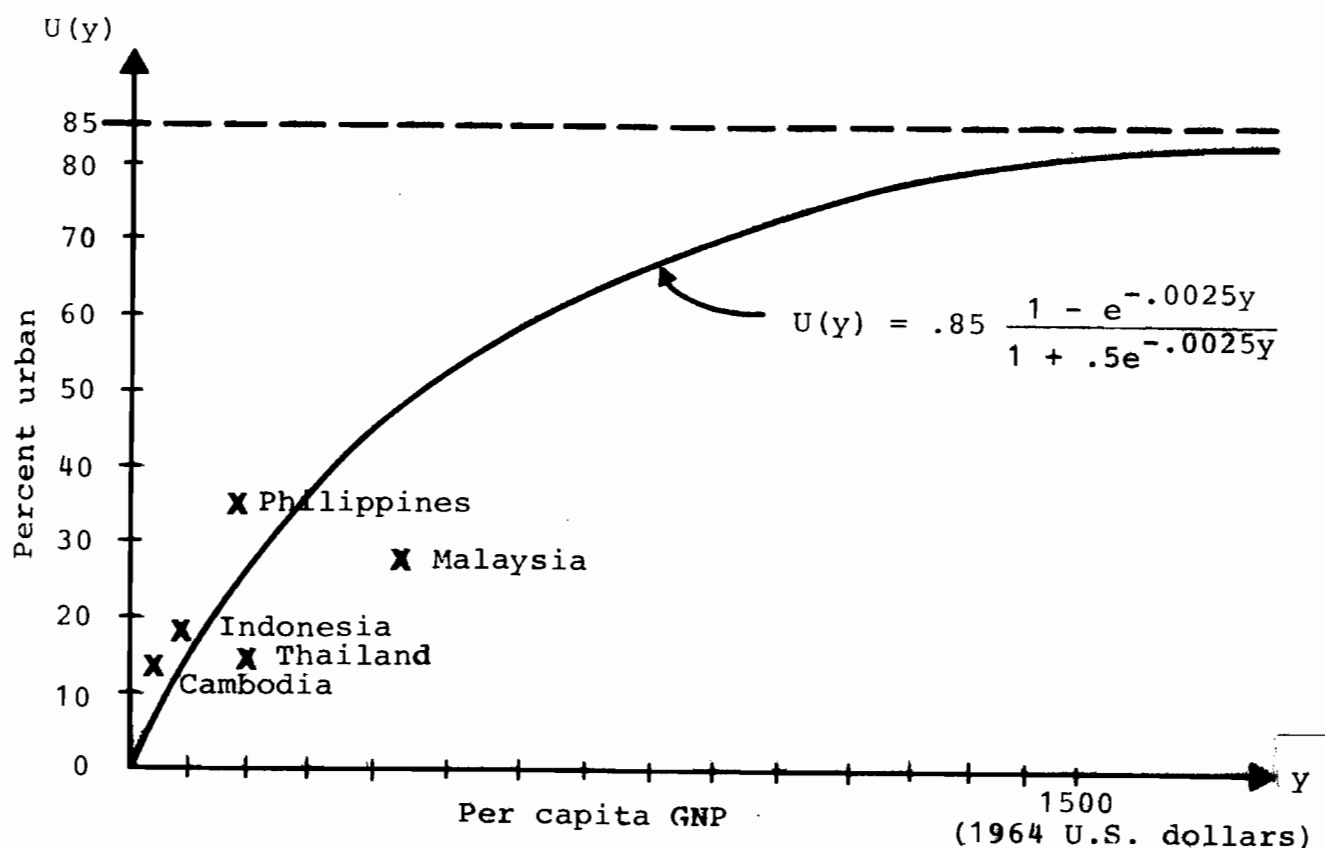
A cursory examination of recent cross-sectional urbanization and per capita GNP levels published by the World Bank (Chenery and Syrquin 1975) suggests the following approximate logistic relationship between per capita GNP, y , and percentage urban, $U(y)$:

$$U(y) = .85 \frac{1 - e^{-.0025y}}{1 + .5e^{-.0025y}} .$$

This function associates, for example, an urbanization level of 25 percent urban with a per capita product of 200 U.S. (1964) dollars and a level of 53 percent urban with a per capita product of 500 dollars. Entering this relationship with the U.N. urbanization projections set out earlier in Table 2 gives a corresponding set of expectations for per capita GNP. Our transparent model therefore asks the question: what growth path of per capita GNP is implied by the projected pace of urbanization, if the historical association between the two variables continues as before?

The estimated logistic function has an upper asymptote of 85 percent urban, and it does not exhibit a point of inflection (Figure 2). Omitting the three nations that are already highly urbanized (Japan, Hong Kong, and Singapore) and the three others for which per capita GNP data are not available (China, Korea, and Vietnam), leaves us with five observations. Applying the logistic to these five data points gives the per capita GNP levels set out in the second column of Table 12 below.

Table 12 indicates that Malaysia and Thailand have lower levels of urbanization than other countries with comparable per capita GNPs. On this dimension, therefore, they may be said to be "underurbanized". Cambodia, Indonesia, and the Philippines, on the other hand, show higher levels of urbanization than their per capita GNPs would imply. Consequently, they may be said to be "overurbanized".



Source: Table 12.

Figure 2. The "standard" relationship between urbanization and per capita GNP.

Table 12. Urbanization and per capita GNP.

	Percent Urban ^a (1975)	Per Capita GNP of Standard ^b	Observed Per Capita GNP ^c
Cambodia	12.6	93	45
Indonesia	18.4	139	101
Malaysia	27.9	220	429
Philippines	34.3	280	209
Thailand	13.6	100	209

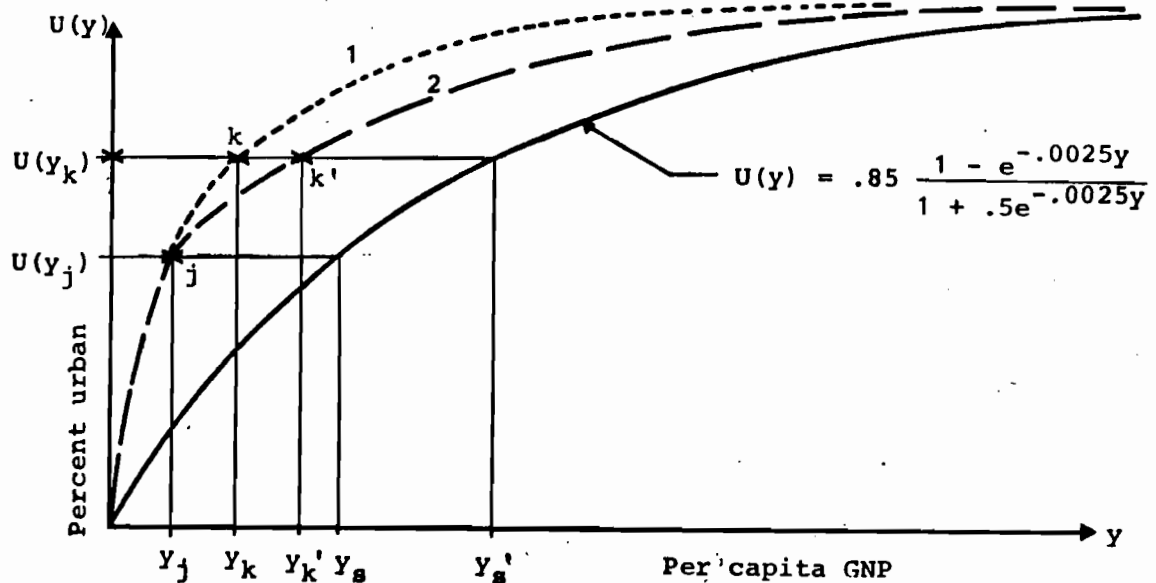
^aSource: Table 2

^bSource: Logistic curve in Figure 2. Expressed in millions of 1964 U.S. dollars

^cSource: I.B.R.D. (1976). Expressed in millions of 1964 U.S. dollars

Such was the situation at the start of the projection interval in 1975. What can be said about the reasonableness of the alternative urbanization levels projected for the year 2000, i.e., for the end of the projection period? How can we use the logistic curve in Figure 2 to associate a per capita GNP level with the alternative projections set out earlier in Tables 1, 7, and 11?

Suppose that a nation's current position with respect to the logistic standard is described by point j in Figure 3. This



Source: Calculated by authors.

Figure 3. Alternative trajectories of the urbanization-development relationship.

nation has achieved its level of urbanization $U(y_j)$ with a lower level of per capita GNP than given by the standard (i.e., $y_j < y_s$). It seems reasonable to assume, therefore, that this pattern of urbanization and development will continue, and that the future logistic trajectory of that nation will continue to exhibit "over-urbanization". Two alternative methods will be used to implement this assumption operationally. The first, Method 1, will assume

that the ratio of observed to standard per capita levels of GNP, i.e., y_j/y_s , will be maintained in the future. The second, Method 2, will suppose that the absolute difference between observed and standard per capita levels of GNP, i.e., $y_s - y_j$, will remain constant.

Figure 3 illustrates the two methods. In Method 1, it is supposed that, for a future point k,

$$\frac{y_j}{y_s} = \frac{y_k}{y_{s'}} .$$

Method 2 assumes instead that

$$y_s - y_j = y_{s'} - y_{k'} .$$

An analogous argument may be developed for "underurbanized" nations.

The increases in per capita GNP that are implied by the U.N. projection and our two alternative projections of urbanization (Runs 1 and 2, respectively) are set out in Table 13. The results of both methods of inference, Method 1 and Method 2, are included, and annual per capita growth rates for three time intervals are set out: 1975-80, 1980-90, and 1990-2000. Also included, for purposes of comparison, are the corresponding historical growth rates for the periods 1950-60, 1960-65, 1965-70, and 1970-73.

The U.N. projection for Indonesia, for example, implies an average annual rate of growth in per capita GNP of 2.0 percent during 1975-80, 2.4 percent during 1980-90, and 2.9 percent during 1990-2000, according to Method 1. These lie above the percentages implied by our first alternative projection, Run 1 (1.5, 1.4, and 1.2 percent, respectively) and below those implied by our second alternative projection, Run 2 (2.6, 3.7, and 3.7 percent, respectively). All seem reasonable when compared with the larger than four percent historical rates of growth exhibited during the 1965-73 period. The corresponding analysis using Method 2 does not change this conclusion. Note, however, that, in general, the growth rates of per capita GNP are lower (higher) with Method 1 than with Method 2 for overurbanized (underurbanized) nations.

Table 13. Annual rates of growth of per capita GNP: historical and projected.

	50-60	60-65	65-70	70-73	METHOD 1				METHOD 2			
					75-80	80-90	90-00		75-80	80-90	90-00	
CAMBODIA	1.7	1.1	-0.5	-5.2	RUN1 U.N. RUN2	1.5 2.0 3.3	1.3 2.6 4.9	1.2 3.2 4.6	3.0 4.0 6.3	2.4 4.4 7.6	2.0 4.6 5.9	
INDONESIA	1.6	0.4	4.1	4.5	RUN1 U.N. RUN2	1.5 2.0 2.6	1.4 2.4 3.7	1.2 2.9 3.7	2.1 2.7 3.5	1.6 3.1 4.7	1.9 3.4 4.3	
MALAYSIA	0.8	3.4	2.3	3.0	RUN1 U.N. RUN2	0.7 1.2 1.5	0.7 1.0 2.5	0.6 2.4 2.9	0.4 0.6 0.8	0.4 1.0 1.4	0.3 1.5 1.8	
PHILIPPINES	3.2	2.1	2.6	2.7	RUN1 U.N. RUN2	1.0 1.3 1.5	0.9 1.8 2.2	0.8 2.2 2.5	1.3 1.7 2.0	1.2 2.3 2.8	1.1 2.7 3.0	
THAILAND	2.6	4.1	5.4	4.2	RUN1 U.N. RUN2	0.6 1.2 2.4	0.5 2.1 4.6	0.5 3.1 4.6	0.3 0.6 1.2	0.3 1.1 2.6	0.3 1.0 3.1	

Source: I.B.R.D. (1976) and projected by authors.

The rates of change presented in Table 13 refer to each interval separately. By way of contrast, Table 14 sets out the corresponding changes compounded over two extended periods: 1950-75, and 1975-2000. The conclusion here is of course the same: all nations, except Cambodia, seem to be in a position to attain, during the last quarter of this century, increases in per capita GNP that are sufficiently large to be "consistent" with the level of urbanization projected by the U.N. The sole possible exception is Indonesia.

5. CONCLUSION

Our understanding of urbanization dynamics is heavily based on the historical experience of the presently more developed nations. A key element of the historical model is internal migration from rural to urban areas, a response to structural imbalances between spatial distributions of labor demand and labor supply arising during the course of industrialization. The end result of this massive transfer of people from rural to urban communities is, of course, a rise in the proportion of the national population that resides in urban areas, a proportion that increases from a low of 5 to 10 percent urban to a high of over 75 percent urban.

A number of researchers have observed that this basic model may contribute little to the understanding of urbanization in today's less developed nations, because in many instances urbanization there seems to be occurring independently of economic development. Not wishing to join either side of this debate, we have nevertheless sought to infer and judge the reasonableness of the future paths of rural-to-urban migration implied by recent U.N. projections of urbanization in the Asian Pacific. The reasonableness of these paths was assessed with respect to past trends in patterns of net migration, and with respect to past patterns of association between urbanization and development. Both assessments were conducted using a simple transparent model of urbanization dynamics, and both led to the conclusion that the U.N. projections appear to be reasonable ones in the light of historical experience.

Table 14. Changes in per capita GNP over two quarter-centuries: historical and projected.

	1950	1975	1975	2000
				METHOD
				1 2
*****				*****
CAMBODIA	100.	94.	RUN1 100.	138. 180.
			U.N. 100.	197. 301.
			RUN2 100.	304. 525.
INDONESIA	100.	177.	RUN1 100.	139. 154.
			U.N. 100.	187. 221.
			RUN2 100.	240. 293.
MALAYSIA	100.	167.	RUN1 100.	118. 109.
			U.N. 100.	162. 132.
			RUN2 100.	186. 144.
PHILIPPINES	100.	199.	RUN1 100.	125. 133.
			U.N. 100.	159. 179.
			RUN2 100.	171. 196.
THAILAND	100.	257.	RUN1 100.	114. 107.
			U.N. 100.	178. 137.
			RUN2 100.	282. 188.
*****				*****

Source: I.B.R.D. (1976) and projected by authors.

In summarizing the results of this exercise, it is important to distinguish between projected urban growth, which deals with the increase in the size of the urban population, and urbanization, which measures changes in the ratio of the urban population to total population. All of the alternative projections examined indicate that although urban growth in the Asian Pacific is likely to be rapid, urbanization is likely to continue to be moderate or slow.

The projections of urban growth and urbanization show wide variations among the eleven nations of the Asian Pacific. Highly urbanized countries like Japan and Korea are expected to continue urbanizing, though at a much decreased tempo. Primarily rural nations such as China, Indonesia, and Thailand are expected to exhibit a moderate rise in urbanization and an increasing tempo. Net rural to urban migration rates are likely to continue to be high for the former and low for the latter.

Finally, a number of countries are apparently increasing their per capita incomes without significantly increasing their pace of urbanization. The empirical evidence thus seems to indicate that in the Asian Pacific the process of urbanization has been slower than the historical pattern of today's more developed nations, and that the association between it and economic growth seems to have been running counter to the one posited by the "overurbanization" theorists.

REFERENCES

- Arriaga, E. (1975) Selected measures of urbanization. *The Measurement of Urbanization and Projection of Urban Population*, edited by S. Goldstein and D. Sly. Liège, Belgium: IUSSP.
- Chenery, H., and M. Syrquin (1975) *Patterns of Development 1950-70*. London: Oxford University Press.
- International Bank for Reconstruction and Development (1972) *Urbanization*. Sector Working Paper. Washington, D.C.: World Bank.
- International Bank for Reconstruction and Development (1976) *World Tables 1976*. Baltimore, Maryland: John Hopkins.
- Keyfitz, N. (1977) *Understanding World Models*. RM-77-18. Laxenburg, Austria: International Institute for Applied Systems Analysis.
- Keyfitz, N. (1978) Do cities grow by natural increase or by migration? Forthcoming in *Geographical Analysis*. January 1980.
- Ledent, J. (1978) *The Factors and Magnitude of Urbanization Under Unchanged Fertility and Mobility Patterns*. RM-78-57. Laxenburg, Austria: International Institute for Applied Systems Analysis.
- United Nations (1976) *Global Review of Human Settlements - A Support Paper for Habitat*. Statistical Annex. Oxford: Pergamon Press.
- United Nations Population Division (1979) *Patterns of Urban and Rural Population Growth*. Forthcoming.

APPENDIX

Table A.1 Population estimates and projections (medium variant, 1976), in thousands, and average annual rates of growth: Asian Pacific, urban and rural, 1950-2000.

COUNTRIES	Total: T Urban: U Rural: R	TOTAL POPULATION (IN THOUSANDS) AND ANNUAL RATE OF GROWTH (IN PERCENT)													
		1950	Rate	1960	Rate	1970	Rate	1975	Rate	1980	Rate	1990	Rate	2000	
1. Cambodia	T U R	4163 364 3799	2.5 4.1 2.4	5364 548 4816	2.8 9.1 1.7	7060 1359 5701	2.8 5.9 1.9	8110 1828 6282	3.0 5.8 2.1	9409 2446 6963	2.8 5.3 1.8	12491 4136 8355	2.4 4.3 1.3	15819 6327 9492	
2. China	T U R	558190 61988 496202	1.6 6.8 0.7	654488 122162 532326	1.7 3.2 1.3	771840 167313 604527	1.7 3.3 1.2	838803 196943 641860	1.6 3.2 1.0	907609 231447 676162	1.3 3.0 0.6	1031142 312103 719039	1.1 2.8 0.2	1147987 414144 733843	
3. Hong Kong	T U R	1974 1561 413	4.4 5.5 -1.1	3075 2706 369	2.5 3.1 -3.5	3942 3683 259	1.4 1.7 -3.7	4225 4010 215	1.4 1.6 -3.3	4522 4340 182	1.3 1.4 -2.8	5147 5009 138	0.9 1.0 -2.3	5625 5515 110	
4. Indonesia	T U R	75449 8885 66546	2.1 4.2 1.7	92701 13553 79148	2.5 4.3 2.2	119467 20851 98616	2.6 4.6 2.2	136044 26232 109812	2.6 4.6 2.1	154869 32986 121883	2.4 4.4 1.8	196576 51001 145575	1.9 3.8 1.1	237507 74680 162827	
5. Japan	T U R	83625 42048 41577	1.2 3.4 -1.7	94096 58851 35245	1.0 2.4 -1.7	104331 74436 29895	1.3 2.3 -1.6	111120 83578 27542	1.1 2.0 -1.8	117546 92311 25235	0.7 1.4 -2.1	126213 105669 20544	0.5 1.0 -2.0	132929 116149 16780	
6. Korea	T U R	30096 5750 24346	1.6 5.4 0.4	35221 9834 25387	2.4 6.1 0.5	44613 18023 26590	2.2 4.7 0.3	49800 22843 26957	2.1 4.3 0.1	55370 28255 27115	2.0 3.6 -0.0	67707 40638 27069	1.6 2.7 -0.3	79456 53221 26235	
7. Malaysia	T U R	6187 1238 4949	2.5 5.0 1.7	7908 2049 5859	2.8 3.5 2.6	10466 2908 7558	2.9 4.6 2.2	12093 3651 8442	2.9 4.6 2.2	13998 4591 9407	2.7 4.3 1.8	18260 7045 11215	1.9 3.5 0.8	22054 9943 12111	
8. Philippines	T U R	20988 5511 15477	2.7 4.1 2.2	27561 8298 19263	3.1 4.2 2.6	37604 12638 24966	3.3 4.7 2.6	44437 15977 28460	3.2 4.6 2.4	52203 20106 32097	3.0 4.3 2.0	70119 31047 39072	2.5 3.8 1.2	89707 45587 44120	
9. Singapore	T U R	1022 484 538	4.7 8.5 -0.7	1634 1133 501	2.4 4.6 -5.6	2075 1790 285	1.6 2.5 -5.1	2248 2027 221	1.6 2.2 -4.4	2437 2260 177	1.5 1.8 -3.6	2829 2705 124	1.0 1.1 -2.5	3126 3029 97	
10. Thailand	T U R	20010 2052 17958	2.8 4.9 2.5	26392 3362 23030	3.0 4.7 2.8	35745 5356 30389	3.3 5.3 2.9	42093 6963 35130	3.2 5.2 2.8	49473 9045 40428	3.0 5.0 2.5	66752 14933 51819	2.5 4.5 1.8	85618 23424 62194	
11. Vietnam	T U R	24600 2327 22273	2.1 5.1 1.7	30200 3859 26341	2.6 4.2 2.3	39106 5894 33212	2.1 4.5 1.7	43451 7381 36070	2.3 4.6 1.7	48634 9299 39335	2.3 4.6 1.7	61302 14694 46608	2.1 4.2 1.4	75802 22301 53501	
TOTAL	T U R	826,304 132,208 694,078	1.7 5.4 0.8	978,640 226,355 752,285	1.8 3.3 1.4	1,176,249 314,251 861,998	1.9 3.3 1.3	1,292,424 371,433 920,991	1.8 3.3 1.2	1,416,070 437,086 978,984	1.6 3.0 0.9	1,658,538 588,980 1,069,558	1.3 2.7 0.5	1,895,630 774,320 1,121,310	

Source: United Nations (1976:36-41).

Table A.2 Estimated and projected percentage of population (medium variant), 1976, in urban areas: Asian Pacific, 1950-2000.

COUNTRY	ESTIMATED AND PROJECTED POPULATION IN URBAN AREAS (IN PERCENT)						
	1950	1960	1970	1975	1980	1990	2000
1. Cambodia	8.74	10.22	19.25	22.54	26.00	33.11	40.00
2. China	11.11	18.67	21.68	23.48	25.50	30.27	36.08
3. Hong Kong	79.08	88.00	93.43	94.91	95.98	97.32	98.04
4. Indonesia	11.78	14.62	17.45	19.28	21.30	25.94	31.44
5. Japan	50.28	62.54	71.35	75.21	78.53	83.72	87.38
6. Korea	19.11	27.92	40.40	45.87	51.03	60.02	66.98
7. Malaysia	20.01	25.91	27.79	30.19	32.80	38.58	45.08
8. Philippines	26.26	30.11	33.61	35.95	38.52	44.28	50.82
9. Singapore	47.36	69.34	86.27	90.17	92.74	95.62	96.90
10. Thailand	10.25	12.74	14.98	16.54	18.28	22.37	27.36
11. Vietnam	9.46	12.78	15.07	16.99	19.12	23.97	29.42
TOTAL	16.00	23.13	26.72	28.74	30.87	35.51	40.85

Source: United Nations (1976:36-41).

PAPERS OF THE POPULATION, RESOURCES, AND GROWTH STUDY

1. Nathan Keyfitz, *Understanding World Models*. RM-77-18. Laxenburg, Austria: International Institute for Applied Systems Analysis. Published in *Sociological Methodology 1978* edited by K.F. Schuessler, pp. 1-19. San Francisco: Jossey-Bass Publishers.
2. Andrei Rogers, *Migration, Urbanization, Resources and Development*. RR-77-14. Laxenburg, Austria: International Institute for Applied Systems Analysis. Published in *Alternatives for Growth: The Engineering and Economics of Natural Resources Development* edited by H. McMains and L. Wilcox, pp. 149-217. New York: Wiley.
3. Roman Kulikowski, *Optimization of Rural-Urban Development and Migration*. RM-77-14. Laxenburg, Austria: International Institute for Applied Systems Analysis. Published in *Migration and Settlement: Selected Essays. Environment and Planning A 10(5):1978*.
4. Frans Willekens, *Spatial Population Growth in Developing Countries: With a Special Emphasis on the Impact of Agriculture*. WP-77-04. Laxenburg, Austria: International Institute for Applied Systems Analysis.
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12. Jacques Ledent, *The Factors and Magnitude of Urbanization under Unchanged Natural Increase and Migration Patterns*. RM-78-57. Laxenburg, Austria: International Institute for Applied Systems Analysis.
13. Jacques Ledent, *The Forces of Urbanization and Varying Natural Increase and Migration Rates*. RM-78-58. Laxenburg, Austria: International Institute for Applied Systems Analysis.
14. Allen Kelley, and Jeffrey Williamson, *Urbanization, Distribution, and Economic Growth*. Unpublished manuscript. Laxenburg, Austria: International Institute for Applied Systems Analysis.
15. Zbigniew Pawlowski, *A Demoeconometric Model of Poland: DEMP 1*. WP-79-14. Laxenburg, Austria: International Institute for Applied Systems Analysis.
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18. Bruce Johnston, *Socio-Economic Aspects of Improved Animal-Drawn Implements and Mechanization in Semi-Arid East Africa*. Forthcoming.
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