

A Demographic, Economic, and Social Summary of Major Non-Oil Developing Countries

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I. Introduction

Numerous studies have been undertaken comparing developing countries in general with developed countries in general. In addition, particular dimensions of this comparison have been explored at length such as population growth,¹ dependency ratios,² overurbanization,³ literacy,⁴ population policy,⁵ etc.

The present study will be devoted entirely to analyzing a sample of 30⁶ major non-oil developing countries in five different geographic regions. These countries are indeed "major" in the third world of developing nations in that the sample represents on-

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1 Kamerschen (April, 1971), pp. 293-303.

2 Kamerschen (1970), pp. 621-622.

3 Kamerschen (1969), pp. 235-253.

4 Kamerschen (June, 1968), pp. 175-188.

5 Kamerschen (March, 1968), pp. 70-75, and Kamerschen (September, 1971), pp. 237-241.

6 For some variables the list of countries was reduced to as low as 27 in the linear regression equations. In some further analysis, only reported here in part, using logarithmic functions which have the advantage of providing factor elasticities and eliminating the

ly about 30% of the total universe, but a much higher percentage of the total population and are more advanced in many aspects of their economic and social development. The sample excludes major oil countries on the grounds that at least for the near term they represent a special situation which is best handled separately.

Although there has been as abovementioned a great numerosity of studies of developing nations in general, there have been very few focusing on the major non-oil developing countries.⁷ A summary of the major demographic, economic, and social conditions in this important constellation of nations is mandated. This we attempt in this paper. In addition, we try through zero-order and multivariate analysis, to provide an explanatory vector for our major findings. Since developing countries are committed to improving their configuration of demographic, economic, and social conditions, laying bare the explanatory vector is useful. The cynosure of our study will be the great diversity in demographic, economic, and social conditions even within this small sample of developing countries.

II. The Variables

While there are numerous explanatory variables that could be explored, we have parsed the list to emphasize the analysis of three key variables in the development literature; viz., population growth, the level of economic income, and the level of urbanization. The data for variable levels are basically for 1975, whereas the data for the average annual growth rates are for 1970-1975. We have attempted to use as much as possible mnemonic variable names in Table 1's listing of the variables.

III. Means, Standard Deviations and Ranges

Perhaps the easiest and most direct way to get a feel for the

effect of the differential sizes of the variable used--the sample was made less effective because the convention was followed the few negative numbers found in real GNP growth rates to be recorded as zeros. As if often true in economic studies, especially those involving economic development, the statistical problems of multicollinearity, heteroscedasticity, and simultaneous equation bias are an ever present danger no matter what the functional form which is used. This latter problem is especially troublesome in single-equation ordinary least squares studies where it is uncertain if there is reverse causation from the dependent to the independent variables; the parameter estimates are unbiased only if the independent variables are considered exogenous in the sense of being independent of the error term.

⁷ The major exception is Friedman (1977). It should be noted that some of the variables in the sample include Indonesia which is an oil-exporting country.

Table 1
LIST OF VARIABLES

LEGEND	DESCRIPTION
POPLEVEL	= Total population (millions)
POPGROWTH	= Annual growth in population (%)
DENSITY	= Population \div Land (sq. km.)
EXPECTANCY	= Life expectancy at birth (years)
FARMING	= Labor force in agriculture (%)
LITERACY	= Adult (i.e. 15 years of age or over) literacy rate (%)
URBAN	= Urban population (% of total)
CALORIES	= Daily per capita supplies of calories (% of requirements)
PROTEIN	= Daily per capita supplies of protein (% of requirements)
POWER	= Annual per capita power consumption (kwh)
RADIOS	= Radio receivers (per 1000 population)
CARS	= Passenger cars (per 1000 population)
TOTGNPGROW	= Average growth rate in total gross national product (%)
PCGNPGROW	= Average growth rate in per capita gross national product (%)
INDUSTRIAL	= Labor force not in agriculture (%)
TOTALGDP	= Total gross domestic product (\$)
PERCAPGDP	= Per capita gross domestic product (\$)

demographic, economic, and social conditions in major non-oil developing countries is to peruse the mean, standard deviation, and range (low and high) shown in Table 2 for the variables listed in Table 1.

Let us take up the items in Table 1 seriatim. The first four variables deal with population and illustrate vividly the great diversity in even what on the surface appears to be a relatively homogeneous sample of major non-oil developing countries.

It is clear that while the average population in a developing country⁸ is about 49 million, the range is from almost 600 million

⁸ In the rest of this paper, unless stated otherwise, "developing" will always refer to our sample of 30 major non-oil developing countries.

people in India and just over 107 million in Brazil to just over 2 million people in Singapore, 3.1 million in Uruguay, and 4.1 million in Senegal.

While average annual rate of population growth is 2.6%, 30% of the countries have rates of 3% or more. The annual population growth rate is lowest in Uruguay (1.2%) and Argentina (1.5%) and highest in Kenya, Mexico, and Zambia (3.5%).

The average population density of roughly 213 masks some very wide differences in the degree to which the "sharp elbows" syn-

Table 2
MEANS, STANDARD DEVIATIONS, RANGES

Variable	Average (Mean)	Standard Deviation	Range	
			Low	High
POPELVEL	48.8	108.5	2.3	598.1
POPGROWTH	2.6	0.6	1.2	3.5
DENSITY	213.2	706.8	5.0	3,890.0
EXPECTANCY	54.3	8.7	38.0	69.0
FARMING	55.1	22.6	2.0	86.0
LITERACY	47.8	30.3	7.5	93.0
URBAN	38.0	23.2	7.0	82.0
CALORIES	97.4	10.6	73.0	119.0
PROTEIN	153.1	38.7	79.0	262.0
POWER	326.4	321.4	11.0	1,063.0
RADIOS	100.1	98.4	3.0	370.0
CARS	13.7	16.7	1.0	64.0
TOTGNPGROW	5.3	3.7	-1.0	17.9
PCGNPGROW	2.7	3.6	-2.7	15.4
INDUSTRIAL	44.9	22.6	14.0	98.0
TOTALGDP	18,234.2	26,454.3	1,163.0	109,203.0
PERCAPGDP	613.5	544.2	120.0	2,510.0

drome presses, on developing nations. In Singapore an amazing average of 3,890 persons are crowded into a square kilometer and in Bangladesh it is 530 people. In contrast, Bolivia, Zambia, Sudan, and Argentina have but 5, 6, 7, and 9 people per square kilometer.

The average life expectancy for all developing nations in a little over 54 years. While most of the African countries have below-average life expectancies, the lowest is 38 years in Afghanistan. The three highest life expectancies are found in Uruguay, Singapore (tied with Republic of China), and Argentina at 69, 68, and 67 years, respectively.

While generalizations are always difficult with developing countries, the empirical evidence discussed above does not appear to provide strong support in general for those monoliths who contend that developing countries are ineluctably overpopulated. In fact, the enormous dispersion (formally the standard deviation) in some of the measures appears emphatic in its denial of any such generalization.

The variables FARMING, its siamese twin INDUSTRIAL (where industrialization is measured as the percentage of the population not engaged in agriculture or $INDUSTRIAL = 100\% - FARMING$) and URBAN (where urbanization is the percentage of the population living in urban areas) can be usefully examined together as several writers have studied the nontautological association between industrialization and either urbanization or farming.

The average percentage of the labor force engaged in agriculture is slightly over 55. The three countries with the lowest figures are Singapore (2%), Argentina (15%), and Uruguay (17%). Many of the African countries have better than 80% of their labor force farming with Tanzania's 86% the highest.

On average 38% of the population in developing countries live in urban areas. Generally, most African nations have had a slow pace of urbanization--e.g., Tanzania, Kenya, and the Sudan have 7%, 11%, and 11%, respectively of the populations urbanized, Bangladesh, Thailand, and Indonesia have 10%, 13%, and 17%, respectively of their populations living in cities. In contrast, the urban population accounts for 82%, 81%, and 78% in Argentina, Singapore, and Uruguay, respectively. We will later confirm that industrialization and urbanization are closely related when we find that the simple correlation coefficient between industrialization (farming) and urbanization is $+ .91 (-.91)$. And as will be discuss-

ed below, there is also a close positive association between economic growth and industrialization. That is, those countries that are more diversified and industrialized achieved a better growth performance.

While it is always difficult to disentangle cause and effect, with the possible exception of literacy, the next group of variables--calories, protein, power, radios, and cars--are more likely to be results rather than causes of economic growth. This is corroborated in varying degrees in our zero-order correlation analysis which follows.

While, on average, almost 48% of the adult population is literate, the situation varies considerably from country to country. Generally speaking, in many of the African and Asian countries less than one-quarter of the adult population is literate. The three lowest percentage literacy rates are found in Senegal (7.5), Afghanistan (8) and Sudan (12.5). The Latin American countries generally have relatively higher percentage levels of literacy with Argentina (93), Uruguay (90), and Chile (tied with Republic of Korea at 88) leading the way.

Because of flagging rates of growth in food and fiber production in developing nations, over half the developing countries can not meet the daily minimum nutritional requirements although the average stands at over 97%. Contrastingly, average protein supplies exceed calculated requirements not only on average (153.1%) but in most developing nations. 80% or less of the daily dietary calories requirements are met in Tanzania, Bolivia, and Afghanistan. Argentina, Republic of China, and Mexico met 110% or better of these energy requirements. The range in protein supplies is from 78% in Zaire (the only country below 100%) to 262% in Argentina. Caloric and protein consumption are linked to each other and to per capita gross domestic product.

For the most part, per capita power consumption, radios, and cars are results or indicators of economic development rather than causal elements. The average annual rate of per capita power consumption of about 326 kwh hides a wide differential ranging from 11 in Bangladesh, 20 in Afghanistan, and 25 in Sudan to 1063 in Singapore, 938 in Argentine, and 932 in Zambia.⁹ For purposes of contrast, it should be noted that per capita power consumption in developed world, on average, is about 4,000 kwh a year and in the

⁹ This relatively high figure in Zambia is the result of its large energy-intensive mining operations.

United States it is over 8,000 kwh.¹⁰

For each 1000 people in the country the average developing country has about 100 radios and 14 cars. By comparison, there are 400 (1,500) radios and 230 (435) cars in the average developing (United States) economy. The range is again quite large. There are only 3 (6) radio receivers in Zaire (Bangladesh), there are 370 (346) in Argentina (Uruguay). In over 40% of the countries there are 5 or fewer passenger cars per 1,000 of population with only 1 car in India and 2 cars in Sudan, Tanzania, Republic of Korea, Pakistan, and Indonesia. At the other extreme, there are as many as 64, 62, and 42 cars per thousand people in Singapore, Argentina, and Uruguay, respectively. And as is documented below, per capita car and radio consumption are positively and significantly related to per capita gross domestic product.

Average growth rates in per capita and to a lesser extent total Gross National Product (GNP) exhibited, over the years surveyed 1970-1975, perhaps more variance than would prevail at other times. On the downside, those countries which have agriculture as their major economic activity--especially those in Africa, Southeast Asia, and on the Asian subcontinent--were especially volatile. The encouraging "green revolution" of the second half of the 1960s was followed by unfavorable weather conditions in 1971 and 1972 and the oil embargo and so-called energy crisis beginning in 1973. Some feel that the long-term prospects for food and fiber production are equally lububrious. At any rate, the result of these short-term influences was to produce not only declining but negative growth. The average annual growth in total GNP of 5.3% included Chile (-1.0%) and Bangladesh (-0.4%) on the one hand and such double-digit growers as Sudan (17.9%), and the Republic of Korea (10.1%)¹¹ on the other hand. The average annual rate of growth in per capita income was 2.7%. Negative percentage rates of growth were suffered by Bangladesh (-2.7), Chile (-2.7), Zambia (-1.2), Uruguay (-1.0); and India (-0.2). Ebulient annual rates of growth were achieved by Sudan (15.4%), Republic of Korea (8.4%), Singapore (7.4%), and Brazil (7.1%). At the risk of liklihoods hardening into assertions, superior growth in total GNP, and as we shall see below in the level of per capita gross domestic product (GDP), does seem to be associated with a

¹⁰ See Friedman (1977), pp. 15. Unless stated otherwise any subsequent references to comparable series for the U.S. or the developed countries in general can be found in this source.

¹¹ Brazil was a near miss at 9.9%.

country's success in diversifying its industrial structure and in particular broadening its industrial base.

The traditional measure of national economic welfare is something close to per capita GDP. To guesstimate, say, military power, perhaps total GDP is more appropriate. The mean total GDP in developing countries is slightly over \$18,234, but in some countries TOTALGDP is as low as \$1163 (Senegal) and in some as high as \$109,203 (Brazil). The average per capita GNP, measured in equivalent U.S. dollars, was about \$613. The highest figure was that of Singapore at \$2,510. However, all the following countries had relatively high per capita GDP of \$1,000 or more: Argentine, Brazil, Mexico, and Uruguay. The Republic of China was next at \$895. Some of the poorest of the developing countries, for which hard data were not available on per capita GDP--such as Afghanistan, Bangladesh, and some sub-Saharan African countries--have been guesstimated to have only about the equivalent of U.S. \$100 per year or less. Among the sampled countries India (\$120), Zaire (\$145), Tanzania (\$150), and Pakistan (\$160) were the lowest in the PERCAPGDP.

Zero-Order Correlation Coefficient Matrix

Table 3 presents a zero-order (simple) correlation coefficient matrix involving the variables listed in Table 1. In reading this matrix it is useful to keep in mind that for a product moment correlation coefficient (R) to be statistically significant¹² with 30 (25) observations at the .05 level requires $R \geq .36$ (.40) and at the .01 level requires $R \geq .46$ (.51). We are only going to examine those interrelationships which have been of the most interest to previous researchers in economic development and cultural change. Although it is difficult to make a strong case for anything on the basis of zero-order correlation analysis, these bits of evidence plus what we know about the theories of economic development seem to support the following tentative conclusions. (1) The two variables which are both widely discussed in the development literature and generally statistically significant¹³ are industrialization¹⁴ and per

¹² This is based on a two-tailed t-test.

¹³ Unless stated otherwise we will mean significant at the .05 level or better through this paper.

¹⁴ Of course, since INDUSTRIAL is tautologically related to FARMING with $R = -1.00$ everything that is said about the former applies with the sign change to the latter. To avoid redundancy we have eliminated all discussion of the latter. While PERCAPGDP is not tautologically related to FARMING, any further discussion of this high negative association has also been deleted.

capita GDP. Each is significantly related to all variables except for POPLEVEL, PCGNPGROW and TOTALGDP. The signs on all the significant variables are positive except for POPGROWTH. This important role played by INDUSTRIAL and PERCAPGDP comports in general with the development literature that emphasizes that economic and/or social welfare tends to be ameliorated by creating a broader industrial or larger income base. The overall insignificance of PCGNPGROW and TOTALGDP would be the major exceptions found in our study to this general expectation. It is also noteworthy that while INDUSTRIAL and PERCAPGDP are very similar in the relationships with other variables, their intercorrelation of .40 is (positively) statistically significant at the .05, but not the .01, level.

(2) Urbanization is a variable which has been sometimes discussed as an important ingredient in the development stew and which also appears to have considerable statistical significance. Without getting into the details of the pother between those who feel developing countries are overurbanized and those who feel they are not, the high positive association between urbanization and industrialization ($R = .91$) and urbanization and per capita GDP ($R = .81$) are less than cordial to the former thesis.¹⁵

(3) Growth in GNP, in either total or per capita terms, appears to have little zero-order relationship with the variables examined in this study. PCGNPGROW does not have a statistically significant relationship with any of the variables. TOTGNPGROW is significantly related to only two variables INDUSTRIAL and PERCAPGDP, although these correlations are very strong.

(4) The level of population POPLEVEL is significantly related to only one commonly employed development variable TOTALGDP.¹⁶ POPGROWTH does seem to be more explainable within the matrix. In concordance with a considerable body of the growth literature, if a country wishes to slow its population growth the zero-order relations suggest that this can be accomplished in part by prolonging life expectancy, improving the literary rate, accelerating urbanization, improving health through greater protein intake, increasing industrialization, and increasing per capita GDP.

15 While this journal has contained a number of articles on this topic in recent years, the general lineaments of the opposing theories are presented in Kamerschen (1969).

16 The (negative) significant relationship with radios is not relevant for any growth theories I am aware of.

(5) As suggested earlier, it is best to look at some of the abovementioned variables as results rather than causes of economic development. In particular, many of the variables move in a direct and significant way with a nation's income. Economists often use the concept of income elasticity to describe this phenomenon. Income elasticity shows how much the quantity consumed of a good or service changes as income changes, assuming all other things, especially commodity prices, are constant; that is, $\eta_{X,I} = \frac{\% \Delta Q_X}{\% \Delta I}$.¹⁷ If $\eta_{X,I} > 0$, the good is called superior or normal and if $\eta_{X,I} < 0$, it is called inferior. Some writers further use the concept to define "luxuries" $\eta_{X,I} > 1$ and "necessities" $\eta_{X,I} < 1$. If a regression equation is run in (natural) logs, with quantity consumed the dependent variable and income the only independent variable, the resulting regression coefficient is a *gross* elasticity measure in that relative prices and other things are not held strictly constant. The analysis revealed that all of the following were not only superior but luxury items¹⁸ for which proportionately greater quantities were consumed as incomes (measured by PERCAPGDP) rose: EXPECTANCY, CALORIES, PROTEIN, POWER, RADIOS, CARS.

IV. Multiple Correlation Results

Within the single-equation least-squares method we have relied on in the present work, the analysis may be extended by employing multivariate statistical techniques. These results are presented in Tables 4 and 5. We have limited the extension to only three theories which have received considerable attention in the growth, development, and demographic literature.¹⁹

The following tentative conclusions are suggested by Tables 4 and 5.

- (1) Equation 1 and Table 4 corroborates the simple correlation results that we have yet to formulate a model which is very useful in explaining PCGNPGROW. Just as none of the zero-order correlations were statistically significant,

¹⁷ See any standard price theory text such as Kamerschen and Valentine (1977), especially Chapter 3.

¹⁸ All the elasticity coefficients were greater than 3 and some went as high as between 6 and 7.

¹⁹ The functions presented here continue to be limited to the linear type although both our zero-order and multiple analyses were also run, with generally poorer results according to the admittedly arbitrary R^2 test of goodness of fit, in logarithms.

Table 4
COEFFICIENTS OF CROSS-SECTIONAL MULTIPLE REGRESSIONS RELATING INCOME
AND INCOME GROWTH TO VARIOUS INDEPENDENT VARIABLES

Equation	Regressor	Regressands and Regression Coefficients					Coefficient of Multiple Determination R ²	F Statistic
		POPGROWTH	DENSITY	LITERACY	URBAN	INDUSTRIAL		
(1)	PCGNPGROW	0.222 (0.16)	0.002 (1.78)	0.054 (1.80)	0.042 (0.50)	-0.123 (-1.08)	0.144	0.74 N = 27
(2)	PERCAPGDP	84.024 (0.96)	0.0402** (5.46)	4.068 (1.67)	21.875** (4.27)	-9.406 (-1.36)	0.874**	26.38 N = 24

Notes: Figures in parentheses denote t values of regression coefficients; figures without asterisks are not significant.

* Significant at 5 percent level of probability, 2-tailed t test or F test.

** Significant at 1 percent level of probability, 2-tailed t test or F test.

none of the individual regression coefficients are significant. Moreover, the overall multiple correlation coefficient or its squared value, the coefficient of multiple determination, is not significant. Obviously, what causes PCGNPGROW is a vital and challenging question which in a world where over half the nations are developing rather than developed mandates our attention in future research.

- (2) Happily, the level of PERCAPGDP is more amenable with our present growth and development theories than is PCGNPGROW. The Table 4's equation (2), the overall coefficient of multiple determination as well as two of the individual coefficients--DENSITY and URBAN--are significant at the .01 level. Moreover, the R^2 (= .87) goodness of fit test is quite high. While this result is inconsistent with the amorphous theory called overurbanization -- which baldly states that developing countries and inexorably overurbanized in either a cross-sectional or time-series sense -- it collides with what many scholars think is the truth in development economics. This urbanization theory is investigated in more detail in (4) below.
- (3) Equation (3) in Table 5 makes it apodictic that we have a lot to learn about the factors that influence POPGROWTH as neither the overall coefficient of multiple determination nor any of the individual coefficients are significant. This conclusion is perhaps surprising in view of the fact several of the zero-order correlations between POPGROWTH and several of the variables were significant. When it gets down to the bottom line, most researchers will let the multivariate analysis take precedent over the zero-order analysis. This, of course, reinforces the need to calibrate multiple regressions in economic models where the theory is embryonic and controversial.
- (4) Finally, Table 5's equation (4) tests in a manner similar to other scholars²⁰ the much discussed overurbanization thesis. While the overall level of explanation for the dependent variable URBAN is quite high ($R^2 = .92$), the signs and levels of significance of many of the individual

²⁰ See, e.g., S. M. Pandey (1977), pp. 265-278. While his study employed a logarithmic function and ours generally reports only the linear regression equations, our findings were very similar whether the regressions were run in linear or logarithmic form.

Table 5
COEFFICIENTS OF GROSS-SECTIONAL MULTIPLE REGRESSIONS RELATING
POPULATION GROWTH AND URBANIZATION TO VARIOUS INDEPENDENT VARIABLES

Equation	Regressor	Regressands and Regression Coefficients							Coefficient of Multiple Determination	F Statistic
		DENSITY	EXPECTANCY	FARMING	LITERACY	URBAN	PCGNPCROW	PERCAPGDP		
(3)	POPGROWTH	-0.000 (-1.12)	-0.028 (-0.01)	0.000 (0.01)	-0.003 (-0.40)	-0.011 (-0.58)	0.046 (0.79)	0.000 (0.90)	0.415	1.72 N = 24
(4)	URBAN	POPGROWTH -1.280 (-0.45)	DENSITY -0.011* (-3.99)	LITERACY -0.166** (-2.24)	INDUSTRIAL 0.794** (5.56)	PERCAPGDP 0.022** (4.27)			0.921**	44.20 N = 24

NOTE: Figures in parentheses denote t values of regression coefficients; figures without asterisks are not significant.

* Significant at 5 percent level of probability, 2-tailed t test or F test.

** Significant at 1 percent level of probability, 2-tailed t test or F test.

coefficients provide weak support or reject strongly the overurbanization thesis as it is commonly formed or formulated up to now. Put simply, this theory emphasizes that there is generally excess urbanization in the developing world and this is undesirable. Yet the associations depicted in equation (4) suggest that urbanization is but a salubrious reaction to prevailing socioeconomic conditions.

V. Conclusion

We have explored too many individual relationships to attempt a comprehensive summary. The salient feature of our restricted sample of major non-oil developing countries²¹ is that when compared against the limited domain of demographic economic and social variables included in the present study, developing nations are diverse and diffuse. This means that planning and implementing the development of the developing nations in general is going to be more idiosyncratic if not more difficult than many people have envisioned.

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²¹ Most developing countries except for some in the Western Hemisphere have had only short histories as nations.

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