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REGIONAL INTEGRATION, DEMOGRAPHIC CHANGE, AND PATTERNS OF INDUSTRIAL GROWTH

by

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ABSTRACT

The recent trend in the less developed countries (LDC's) toward schemes of regional cooperation are conspicuous in number and cautious and limited in scope. A partial explanation of this anomaly is two-fold. On the one hand, the potential benefits of expanded total regional output through specialization, competition, economies of scale, and dynamic effects lead to the popularity of integration. On the other hand, the difficulties of an equitable distribution of benefits and the possibility of a conflict of individual industrialization goals with regional demands account for timidity in the scope of economic cooperation. Thus, while the LDC's may favor any viable means to expand national output, they may not wish to compromise the goal of industrialization in the process. This sentiment is summarized well in a statement of the ECAFE Secretariat:

> There is no other way of achieving high rates of growth (let us say 6% annually) for the developing ECAFE countries than through a policy of industrialization serving the needs of agriculture and supported by fast agricultural growth--a sort of balanced growth with emphasis on industrialization.[1]

Any realistic analysis of the probable success of regional cooperation must be couched in terms of its impact on both the economic growth and the rate of industrialization of each individual member of the union. This premise may be reversed and posed in the form of an hypothesis: The prospects for successful economic cooperation increase in so far as the results of integration further the joint national goals of economic growth and industrialization.

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[1]United Nations, ECAFE, "Development Planning in ECAFE Countries in the Recent Past--Achievement, Problems and Policy Issues," Economic Bulletin for Asia and the Far East (December 1964), p. 7.

An important element in testing this hypothesis lies in the identification of the factors explaining differential rates of industrialization as economic development takes place. The present study examines this topic, focusing on demographic change and its relationship to the structure of economic growth and development. The nature and significance of the impact of family size, total population growth and rural-urban migration on industrial patterns is developed in detail.

A model is presented which provides a technique for isolating the influence of selected elements of demographic change on the level and composition of demand. The Philippine experience in the 1960's is used as a case study to illustrate the properties of the theoretical framework. It is shown that systematic trends tend not only to counter Engel's Law, i.e., the shift in demand away from agricultural products as per capita income advances, but also that demographic factors constitute, in the Philippine case, the major demand-originating influence changing broad industrial patterns. In fact, the net influence of income and demographic demand elasticities creates a pressure toward a relative expansion of agricultural production.

The implications of the theoretical model and empirical findings are 1) examined with respect to Chenery's finding on the relative unimportance of demand factors in explaining industrial patterns, 2) compared with the implications of the Leibenstein 'population trap' framework, and 3) used as a basis for formulating selected population and development policies.

A principle finding of the study is that many forms of demographic change, in particular total population growth and an expansion of average family size, may operate to diminish the rate of industrialization. Since

there is an inverse correlation between the rate of population growth and per capita income, our findings would thus suggest that, based on demographic factors, the relative ease of attaining an acceptable level of industrialization increases with the level of national economic development. Consider the relationship of this proposition to an assessment of the prospects for regional economic cooperation.

It has been proposed that the prospects for successful regional cooperation increase in so far as the results of integration further the joint national goals of economic growth and industrialization. Since the relatively poor members to a prospective economic union are typically those in which internal demographic factors are most depressing to rates of industrial progress, it is reasonable to infer that the likelihood of successful regional integration also increases as the benefits of industrialization are distributed to the poorer member countries. It has been argued, however, that typically the relatively developed nations will, through economic integration, share more than proportionally in increased industrial production.[1] Thus there emerges a conflict of national economic goals and the results of economic cooperation. An important factor contributing to this conflict is the differential rates of population growth of the member countries. A recognition of this relationship of demographic change and regional economic cooperation constitutes an additional dimension to economic policy in the areas pertaining to national and regional economic growth and development.

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[1]A.C. Kelley and J.C. Knowles, "Regional Integration and National Economic Development: The Case of Southeast Asia," AID-University of Wisconsin Research Project on "Economic Interdependence in Southeast Asia," Working Paper, April, 1967.

Demand Patterns, Demographic Change, and Economic Growth

by

Allen C. Kelley*

1.0 Introduction

One of the most widely observed and pervasive trends associated with the process of economic development is the rise in the importance of industrial production which accompanies an expansion in per capita income [3], [4], [5], [8], [14]. At the same time, primary production declines as a share of total output.

The theoretical explanation of this observed pattern of economic growth typically focuses on Engel's law: food expenditures occupy a declining proportion of household budgets as income rises [2], [11], [13], [15], [17], [22]. By inference, non-food expenditures plus savings will tend to increase in relative importance.

Based in part on these 'basic laws of economics', the development strategy of hastening the shift in the center of production from agriculture to secondary activity is frequently cited as a policy which is consistent with the 'natural course' of consumption trends and economic development. Unfortunately, the uncritical application of this set of theoretical ideas may be based on a misinterpretation of the factors explaining the widely observed patterns of industrial growth.

On the one hand, Chenery has argued that the almost exclusive attention to the demand forces operative in explaining industrial patterns has

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resulted in overlooking supply factors, that is, the changes in comparative advantage in production which derive from alterations in technology and factor endowments [4]. Based on a cross section analysis of fifty-one countries, he concludes that the major influences shaping industrial patterns are not the determinants of final demand (including exports), but rather those of supply.

On the other hand, even when the demand factors are considered separately, we argue below that the Engel curve analysis, in which primary attention is focused on expenditure and income elasticities, may serve only as a very rough first approximation in assessing the influence of aggregate demand in explaining industrial patterns. This is the case because 'economic development' should be more broadly conceived than merely an expansion of per capita income. It must include additional attributes of economic progress--some the result of changes in per capita income, some largely independent of it. Demographic change is a case in point.[1]

Systematic changes in the rate of population growth, of ages, of average family size, and of urbanization (internal migration) are all a part of economic development. While each of these factors exerts an impact on the size and composition of demand, a theoretical examination of the nature of this influence or an appraisal of its importance in the context of an economic-development framework is largely lacking.[2]

The present study investigates several aspects of the relationship

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[1]While selected aspects of demographic change have been theoretically and empirically related to the level of per capita income, ([1], [7], [21], [24], [26]) the association is frequently quite tenuous and indirect.

[2]An exception to this claim is the work of Coale and Hoover [6].

of demographic change and industrial demand. It is argued on theoretical grounds, and illustrated by reference to Philippine experience, that the apparent unimportance of demand in explaining changes in industrial patterns may rest not on the relative weakness of Engel effects, but rather upon demographic influences which accompany economic progress. Indeed, in the Philippine case income elasticities explain a very small fraction of the total change in demand (primary versus 'other' demand), perhaps as little as ten percent of the total. However, when demographic factors are incorporated into the analysis, not only does a much more complicated demand analysis emerge but also the analysis enables a fuller appreciation of the nature and significance of the factors explaining changes in consumption patterns--and thereby industrial patterns--accompanying economic development.

Section 2.0 presents a model and a methodological approach in which demographic change is highlighted as an element in the level and composition of demand. Estimates of the variables and parameters included in the theoretical framework follow in Section 3.0. Section 4.0 presents an experiment which assesses the significance of accounting for population factors, taking the Philippines as a case study. We conclude with a statement of the implications of the analysis and empirical experimentation.

2.0 The Model

A simple model is developed below to identify the impact of selected demographic influences on the level and composition of demand. The focus is on three categories of change: alterations in the urban/rural distribution of the population (deriving from both differential natural growth

rates and net internal migration), changes in average family size, and growth in the total number of families.

This model is designed to illustrate a general methodological approach to the examination of demographic factors influencing over-all demand composition. It can thus be readily utilized in the context of several goods and alternative functional forms of Engel curves. Additionally, it can be expanded and modified to examine other categories of demographic change, e.g., social and/or occupational mobility, variations in the age distribution,[1] and so forth. In this section only a linear demand function is presented since it sufficiently illustrates the methodology and underlying assumptions. Appendix A contains the model applicable to the log-linear demand function.

Let the total demand D for a good be broken into an urban and a rural component by the following identity:

(1) $$D = F_r\bar{D}_r + F_u\bar{D}_u$$

where F_r and F_u are the numbers of rural and urban families and $\bar{D}_r$ and $\bar{D}_u$ are the average per family demands for the good by rural and urban families. Assume that these demands are determined by the following linear demand functions:

(2) $$\bar{D}_r = \alpha_r + \beta_r\bar{X}_r + \gamma_r\bar{f}_r \text{ and}$$

$$\bar{D}_u = \alpha_u + \beta_u\bar{X}_u + \gamma_u\bar{f}_u$$

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[1]The present formulation omits this variable since the available Philippine data did not permit a treatment of age-specific variations in consumption. A detailed theoretical and empirical examination of the influence of a changing age distribution on economic growth is found in [18]. Consult also [19].

In the near future the data constraints will be eliminated and the micro-economic data (6,500 households) of the 1965 Philippine Statistical Survey of Households will be subjected to analysis in a joint research project "Consumer Behavior in the Philippines: An Econometric Analysis of Household Budgets," by Allen C. Kelley and Jeffrey G. Williamson.

where $\bar{X}_r$ and $\bar{X}_u$ are total per family consumption expenditures of the rural and urban sectors, and $\bar{f}_r$ and $\bar{f}_u$ are average family sizes in the rural and urban sectors. The parameters of the functions (2) will be estimated below by disaggregation and using cross-section household data.[1] The choice of total expenditure as the independent variable is based on the proposition that this measure is a better proxy for permanent income than total income and that permanent income is the relevant explanatory variable of both total expenditure and of its components. Additionally, total expenditure typically possesses a higher level of measurement accuracy in household surveys.[2] Substituting (2) in (1) gives

$$D = F_r(\alpha_r + \beta_r\bar{X}_r + \gamma_r\bar{f}_r) + F_u(\alpha_u + \beta_u\bar{X}_u + \gamma_u\bar{f}_u). \tag{3}$$

Let $F = F_r + F_u$ be the total population of families; let μ be the fraction of total family growth taking place in the rural sector, excluding migration effects; and let ϕ be the rate of rural to urban migration of families. Then, letting a dot over a variable indicate a time derivative

$$\dot{F}_r = \mu\dot{F} - \phi \text{ and} \tag{4}$$
$$\dot{F}_u = (1 - \mu)\dot{F} + \phi.$$

If we assume that the sectoral distribution of household formation is proportional to the number of families residing in each sector, μ can be

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[1]To estimate the parameter values of (2) from cross-section information, the usual assumption that the parameters are identical across households is made.

[2]Prais and Houthakker argue that "The use of family household consumption expenditure as a determining variable in the consumption function can be justified on the assumption that while consumption expenditure may depend in a complicated way on income expectations, the distribution of consumption expenditures among the various commodities depends only on the level of consumption expenditure" [25, p. 81].

taken as the share of new households in the rural area.

Now taking the time derivative of (3), substituting expressions (4) for $\dot{F}_r$ and $\dot{F}_u$ wherever they appear, and rearranging terms,

$$\dot{D} = [\mu(\alpha_r + \beta_r\bar{X}_r + \gamma_r\bar{f}_r) + (1-\mu)(\alpha_u + \beta_u\bar{X}_u + \gamma_u\bar{f}_u)]\,\dot{F} \quad \{\text{family units}\} \tag{5}$$

$$+ [\gamma_r F_r \dot{\bar{f}}_r + \gamma_u F_u \dot{\bar{f}}_u] \quad \{\text{family size}\}$$

$$+ [(\alpha_u - \alpha_r) + (\beta_u - \beta_r)\bar{X}_u + (\gamma_u - \gamma_r)\bar{X}_r]\,\phi \quad \{\text{rural to urban migration}\}$$

$$+ [\beta_r F_r \dot{\bar{X}}_r + \beta_u F_u \dot{\bar{X}}_u] \quad \{\text{average expenditure}\}.$$

The bracketed terms in (5) represent, respectively, the portion of total expenditure growth on the commodity attributable to changes in the number of households, changes in the average family size, the rate of rural-urban migration, and the growth of the mean expenditure level. For each category except internal migration, the total effect can further be subdivided into the elements of change occurring in the urban and the rural sectors. Each term thus has a clear analytical and economic interpretation.[1]

It is seen that the impact of each element depends on the specific values of the behavioral parameters (α_r, α_u, β_r, β_u, γ_r, and γ_u) and on the level and change of the variables highlighted in the model (number of families, average family size, rate of rural-urban migration, and average expenditure). For example, if family size did not enter as a significant determinant of the household demand for the good, ($\gamma_u = \gamma_r = 0$), then the growth of average family size in either sector would have no influence on the demand for the good. Alternatively, if γ_u and/or γ_r did not equal zero and if average family size were changing, the influence

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[1]An expression analogous to (5) above, but employing instead an exponential representation of household behavior, is presented in Appendix A.

on the composition of demand would depend on the rate of change in the average family size in each sector, on the size of the sector, and on the magnitude of the behavioral response as determined by the values of γ_u and γ_r. In the linear formulation of the household expenditure equations the interpretation of the elements in the change, as represented in (5) above, is very straightforward.

The interpretation of the 'migration effect' must be made explicit. Since our basic model does not distinguish the recent migrant as behaving differently from the residents in the region to which he has moved, the 'migration effect' can thus be considered as that proportion of the differential sectoral growth of population which arises from rural-urban migration. While one would ideally hope to investigate the behavior of the migrant group separately, data availability typically constrains this possibility.[1] An approximation to the impact of actual migrant behavior can be made, however, by considering the range of possible economic parameters determining consumption. This range would plausibly span the economic behavior prevailing in the area from which the migrant moved and that in which he settled. At one extreme the migrant would take with him the behavioral patterns of his previous residence. Thus, actual net migration in accounting terms may be recorded from the farm to the city, but the opposite would be true when reckoning in 'behavioral' units. At the other extreme the migrant assumes immediately the attributes of his new residence. Finally, the most reasonable hypothesis would suggest that the rural (urban) migrant takes with him the behavioral response of

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[1] In a study of household expenditure patterns among Massachusetts urban workers in 1875, Professor Williamson has found that "new" American immigrants, to a large degree, were very slow to adjust to American incomes, relative prices, and tastes [27].

his previous environment. Over time this response is transformed to that of the new location according to some specified time path, e.g., a distributed lag model. A more detailed analysis of migration behavior will be presented in the next section.

3.0 The Model and Philippine Experience

The model presented in (5) allows an assessment of four elements in the changing composition of demand for a given commodity. The behavioral parameters must be estimated and inserted into the formulation. Then with assumptions (or estimates) regarding the size and growth of the relevant variables (family size, number of families, rural-urban migration, and average total expenditures), the expression can be evaluated. This procedure involves a simple parametric exploration which is useful in obtaining a first approximation to the impact of demographic change on the composition of demand and, indirectly, on industrial patterns, in so far as domestic production is related (as it obviously would be in a closed economy) to domestic consumption.

The extensive empirical investigation required for such an experiment is beyond the scope and objectives of this paper.[1] It is possible, however, to suggest the nature of the procedures and to provide a preliminary

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[1]Such an investigation would necessarily involve a detailed breakdown of (5), the consideration of many functional forms appropriate to estimating the demand for various products, the estimation of the relevant behavioral parameters, an attempt to resolve the serious aggregation problems associated with the use of micro-economic data, and the performance of many experiments designed to assess both the nature of the model itself, and the factors highlighted in the analysis.

appraisal of the significance of demographic factors by experimenting with (5) on a much more limited scale. Based on Philippine experience, two categories of expenditures will be examined: food (f) and non-food (n). The relevant parameters are estimated with grouped, in contrast to micro-economic, observations.

3.1 Estimates of the Parameters

The data are taken from the 1961 Philippine Statistical Survey of Households (PSSH) on Income and Expenditure [9]. The sample, comprising 4,426 households, is examined in two parts: total urban, including metropolitan Manila (1,505 households), and rural (2,921 households). In the regressions below, each observation is weighted by the number of households in its expenditure class. Table 1 presents the estimated parameters for both the linear and the log linear formulations.

All but five of the parameters are significantly different from zero at the 95% confidence level. Furthermore, the elasticity estimates (η) at the mean expenditure level accord with both *a priori* expectations and the findings of Houthakker [15], Feraren [12], and others [2], [13], [17], [22].

A particularly interesting result is the rather wide urban-rural difference in the family size coefficients. There are theoretical reasons to expect such a deviation, however. The addition of another family member to the household has several influences. Using Houthakker's terminology [15, p. 544], there is an *income effect*, which results from the lower income of everyone in the family due to an additional member, and a *specific effect*, which derives from the additional consumption required for that particular member of the family. Scale economies in

Table 1

Linear and Log Linear Engel Functions, and Mean Expenditure Elasticities (η_{ij}) For Food and Non-Food Categories (pesos)

	$X = \alpha + \beta \bar{X} + \gamma \bar{F}$				$\log X = \log \alpha + \beta \log \bar{X} + \gamma \log \bar{F}$			
	Rural		Urban		Rural		Urban	
	food	non-food	food	non-food	food	non-food	food	non-food
α	2.16 (76.83)	-2.16 (76.83)	-485.37 (187.28)	485.37 (187.28)	.99 (.14)	-2.95 (.19)	1.18 (.09)	-2.72 (.06)
β	.40 (.02)	.60 (.02)	.28 (.02)	.72 (.02)	.75 (.05)	1.30 (.06)	.67 (.03)	1.25 (.02)
γ	45.35 (17.40)	-45.35 (17.40)	174.09 (34.06)	-174.09 (34.06)	.19* (.12)	-.08* (.16)	.409 (.10)	.00* (.07)
η	.65	1.51	.58	1.39	.75	1.30	.67	1.25

*Not significantly different from zero at the 95% confidence level.

consumption explain in part the specific effect. The family size coefficient will vary inversely both with the scale economy effect and with the income elasticity of demand for the product.

Consider the case of food expenditures. It is seen from Table 1 that the expenditure elasticity for food is greater in rural than in urban areas. One explanation of this result which is consistent with both functional forms employed above is based on the premise that the variety and quantities of alternative goods available for consumption are greater in the city than on the farm. Thus, even at constant expenditure levels, urban competition for consumption by alternative goods is greater, and the resulting expenditure elasticities for food are less than on the farm.

The specific effect, based on scale economies in consumption, appears to be at variance with the results in Table 1 since one would expect economies of scale in the consumption of food to be greater in urban than in rural areas (and thus $\gamma_r > \gamma_u$). Economies arise from the purchase,

storage, and preparation of food. While urban-rural differentials are difficult to justify in food preparation, it is plausible to argue that, given buying economies and greater availability of storage facilities in urban areas, economies would indeed be greater in the city than on the farm. It should be noted, however, that with respect to non-food items, the scale economy effect is consistent with the results. That is, consumer durables and social overhead capital, in which there are significant economies of consumption, bulk relatively greater in the urban than in the rural household budget.

With respect to food consumption, we would thus suggest that the results can be explained by a dominance of the income effect over the specific effect. With respect to non-food expenditures, scale economies enter more significantly.

Two final points of interpretation should be made explicit. First, the estimated parameters may be biased given the interaction of family size and total expenditure. No attempt has been made to cope with possible error deriving from simultaneous equation bias. Second, since the results are not invariant to the particular expenditure grouping available in the PSSH summary tables, confidence in the specific parameter estimates could be significantly increased by the use of micro data. However, given the rather wide commodity groupings employed (i.e., food and non-food), it will be seen below that our results are insensitive to wide changes in the parameters. We thus feel justified, at this stage, to return to and focus on the main problem--the implications of demographic change on demand patterns.

3.2 The Course of Demographic and Economic Change

Four elements of demographic and economic change are represented in

(5). The object of this section will be to provide estimates of these variables which approximate an average year's experience between 1956 and 1966 utilizing, as the base Philippine population, the number and composition of households in the 1961 PSSH of Income and Expenditures.

The growth in family size is based on the average annual change between the 1956 and 1961 PSSH of Income and Expenditure [9]. Urban growth, .0575 persons per year, is considerably more rapid than rural experience, .0136. This result derives in part from differing age distributions in the two areas, originating largely from rural-urban migration. The average Philippine family increased by 0.286 members per year.

An estimate of the annual expansion in the number of Philippine families can be found utilizing 1) an assumed population growth of 3.33% per year [10], and 2) the above annual change in the size of the average family. The resulting rate is 2.82%. To transform this expression into levels of change per year, the 1961 PSSH sample of 4,426 households is again employed, yielding $\dot{F}$ of 125 per year.

The rate of internal migration is considerably more difficult to estimate. Since no data on internal migration are available, two separate proxies are utilized. The first is based on the pre-1961 experience. The second assumes a rate consistent with the government projections for the 1966-1971 period. Consider first the pre-1961 period.

Estimates have been compiled of the annual rate of urban growth between the 1948 and 1961 censuses for two separate definitions of urban areas [8]: 1) Rizal province and Manila (4.71% per year) and 2) the seventeen largest cities excluding Manila, Quezon and Pasay, but including

the provinces of Manila and Rizal (4.31% per year). If this range of rates continues in the 1960's and the rate of family growth is 2.82%, the annual proportion of the population migrating to urban areas ranges from .25% to .35%.[1] This estimate is, in fact, a lower limit with respect to the 1960's in which, if the changing agricultural, non-agricultural labor force composition can be taken as an indication of shifts toward urban employment, a one percent shift per year would be a more reasonable approximation (see also [16]).

An upper limit can be represented by the government's 'projected' shift toward industrial and tertiary employment, as found in the Socio-Economic Development Program for FY 1966-67 to FY 1969-70 [23]. Even though total employment is expected to grow by 3% per year between 1967 and 1971, agricultural employment is anticipated to remain approximately unchanged. Assuming constant utilization rates, these estimates are consistent with an average annual shift into non-agricultural (and urban) employment, and a resulting rate of rural-urban migration, approaching 2%. Below the analysis employs migration rates of 1/2 %, 1% and 2% with the presumption that 1/2% and 2% represent outer limits and that 1% is the most plausible estimate for the mid-sixties.

The growth of total real family expenditures has ranged between 1/2% and 1% over the period 1956-1962. The Socio-Economic Development Program estimates that these rates will continue at least until 1969/70. Since the model of (5) requires an explicit assumption regarding the distribution of the improvement in living standards as between the urban and rural population, three possibilities are considered: the

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[1] No attempt has been made to account for the effect of net international migration.

total increase is enjoyed by the urban population only, by the rural population only, or by the two populations equally.

4.0 Demand Patterns, Demographic Change, and Economic Growth

We are now able to identify the relative significance of several factors influencing the composition of demand in the Philippines. Estimates of both the behavioral parameters and the trend values for the structural variables have been provided. Substituting these estimates into (5) a first approximation to the level and composition of demand may be obtained. The results, presented in Table 2, may be interpreted as follows. Given various assumptions regarding the growth of per family expenditure, population, family size, and migration, what would be the level of demand for food and non-food products, postulating respectively a linear and log-linear demand function for these commodity classifications.

Consider first the importance of each element in explaining the level, as distinct from the composition of demand. Several striking results appear. First, and not too surprising, the most important factor in the Philippine case appears to be total population growth. Second, depending upon the rate of urbanization, internal migration may, under likely circumstances, enter more importantly into demand than per family expenditure growth. Third, the combined influence of two relatively unheralded elements in demand, internal migration and family size growth, turn out to possess a greater aggregate impact than the expansion in mean family expenditure. And finally, the combined demographic factors are overwhelmingly the crucial explanatory variable. Given probable trends for the near future, i.e., increasing internal migration and an expansion of population growth, the margin is likely to increase.

Table 2

Increase in Demand Projected for Food and Non-Food Products, with Indicated Values for Expansion in Total Per Family Expenditures, Family Size, Rural-Urban Migration, and Total Number of Families

Component of Demand	Projections with Linear Model (Pesos)		Projections with Log Linear Model (Pesos)*	
	Food	Non-Food	Food	Non-Food
Per Family Expenditure Growth 1% per year, distributed to the				
1. Urban sector; totally	7,634	19,342	8,965	16,026
2. Urban & rural sectors, equally	14,235	25,430	16,216	15,369
3. Rural sector, totally	20,837	31,518	23,467	30,737
1/2% per year, distributed to the				
1. Urban sector, totally	3,817	9,671	4,483	8,013
2. Urban & rural sectors, equally	7,090	12,715	8,108	11,690
3. Rural sector, totally	10,419	15,759	11,733	15,369
Increase in Total Number of Families	123,083	101,477	123,183	104,124
Family Size Growth	16,866	-16,866	8,685	0**
Rural-Urban Migration at				
1. 1/4% per year	6,212	8,803	5,938	7,486
2. 1/2% per year	12,424	17,606	11,877	14,972
3. 1% per year	24,847	35,212	23,753	29,944
4. 2% per year	49,696	70,425	47,506	59,889

*While the estimated family size coefficient is significant for rural food and urban food at the 85% and 95% confidence levels, respectively, the estimated parameters for the non-food category are not statistically different from zero. On the latter we have, for purposes of demand projections, assumed that the coefficient is zero.

**Given the above assumption regarding the non-food family size coefficients, this expression is zero. See Appendix A.

Even more interesting is the influence of demographic change on the composition of demand. While expenditure elasticities have dominated the literature in identifying growth industries and Engel functions have often been cited as a major determinant of the shift out of agriculture and into industrial production, a close analysis of the results in Table 3 presents

a significantly different interpretation of the demand trends consistent with the Philippine process of economic growth. For simplicity this Table provides the information relating to the linear formulations only, presenting the estimates for plausible assumptions regarding real expenditure growth (1/2% per year, shared equally by the two sectors) and rural-urban migration (1% per year). Column (3) indicates the percentage spending rate on food due to the indicated component, e.g., expenditure growth, internal migration, and so forth. Given an actual aggregate spending rate on food of 53.82% deriving from all component elements in demand in 1961, then a single component average less (greater) than the aggregate rate (i.e., column (4) greater (less) than one) represents a situation in which the demand forces initiate a decrease (an increase) in the relative allocation on food consumption.

Table 3

The Role of Selected Variables in Influencing the Proportion of Total Expenditure on Food[1]

Component of Demand	Projections for Food (1)	Projections for Non-Food (2)	Average Allocation Ratio 1/(1 + 2) (3)	Col. (3)/ 53.82 (4)[2]
Expenditure Growth (1/2% per year, distributed to the urban & rural sectors equally)	7,090	12,715	35.80	.665
Demographic Factors				
Total Population Growth	123,083	101,477	54.81	1.018
Family Size Growth	16,866	-16,866	---	---
Rural-Urban Migration (1% per year)	24,847	35,212	41.37	.769
Total Demographic	164,796	119,823	57.90	1.076
Total Demand	171,886	132,538	56.46	1.049

[1]This table is based on the linear demand fuctions.

[2]The average Philippine expenditure on food in 1961 was 53.82%. If column (3) is greater (less) than this ratio (i.e., column (4) is greater (less) than unity), then the indicated component is operating to shift relative demand toward (away from) food products.

Expenditure elasticities play the expected role. The expenditure average rate (35.80%) is considerably less than the 1961 average, yielding a ratio of .665, the strongest single demand force moving in this direction. On the other hand, the influence of expenditure growth is less than 10% of the total.

Of the three demographic factors, rural-urban migration exerts, in direction, the same influence as expenditure elasticities. It must be underscored, however, that the values of the migration parameters which are used to obtain the results in Table 3 represent a somewhat extreme assumption regarding the behavior of migrants. Migrants are assumed to take on the behavioral and economic characteristics of the area in which they reside. However, recall that Williamson has found with respect to 19th Century American experience that there may be a considerable lag in the adjustment process [28]. If the latter qualification is incorporated into the model, migration would serve much less as a force shifting demand away from food consumption and, under plausible assumptions, may even work in the opposite direction.

Total population growth is largely 'neutral' in its <u>specific</u> demand compositional effect (i.e., the value of column 3 $\approx$ 1.00). In the aggregate, however, given its overwhelming importance in the total, total population serves strongly to attenuate movements (in either direction) away from the previous composition of demand. An examination of the last two lines of the Table bears out this conclusion.

Not only do the demographic factors, in total, move the economy in an <u>opposite</u> direction from that dictated by the process of economic growth, narrowly conceived (an expansion of per capita income and expenditure), but also, even when combined with the impact of expenditure elasticities,

the net direction remains the same. And if we modify our assumption regarding the speed of the migrant's response to the new environment, then far from providing an engine of structural change into industrial growth and out of agriculture, the result is one in which demand factors, in the aggregate, severely attenuate or even reverse this course of development.

5.0 Implications and Conclusions

Since population growth and an expansion of family size appear to be an integral part of the early phases of economic development, the rate of change in the composition of final demand--and hence the pace of industrialization, another index of economic progress--may, as a result, proceed quite slowly. Nations that strive for industrialization should appreciate the role which demographic change plays in this process. An obvious government policy consistent with industrialization would be to curtail rapid population growth. If the country is unable to operate effectively in the area of population growth, several additional interesting policies are suggested by our analysis.

The shift away from demand for agricultural products, *ceteris paribus*, proceeds more rapidly 1) the greater the rate of total per family expenditure growth, 2) the more rapid the rate of internal migration into urban areas, and 3) the more the relative benefits of economic growth are distributed to the urban population. The first two of these factors increase the weight of the demand influences operating toward a shift out of agriculture; the third follows from the observation that the average allocation ratio on food diminishes as the relative distribution of expenditure growth to the urban population increases. If, as if likely to be the case, a rapid movement toward urbanization will diminish population

growth, the demand factors moving the economy toward a modern industrial base will be strengthened.

Thus, while we do not claim to have discovered another 'population trap', a comparison of our findings with those deriving from the models of Leibenstein and Nelson would seem appropriate [21], [24]. These population-trap models, couched in a unisectoral framework, have as their dependent variable the level of per capita income. They demonstrate that rapid population growth may inhibit, unless some 'critical minimum level' is reached, further expansions of well-being. The 'big push' is an implied development strategy.

In our own multi-sectoral growth framework, if we assume that the composition of demand exerts an influence on future industrial patterns, and if we accept that a shift of economic production into industrial and away from agricultural activities is another measure of economic progress (and possibly even more fundamentally, a 'cause' of rising per capita income), then population growth may move the economy away from economic progress. A significant initial push towardindustrialization, involving rapid internal migration, may offset the rapid growth of population.

Finally, our results are consistent with Chenery's findings which point to a predominance of supply factors in explaining industrial patterns. The demand-originating elements of his model are based primarily on income changes. Our findings suggest that demographic factors may, under plausible conditions existing in many developing nations, be an even more important element explaining changes in demand. Furthermore, the net influence of income and demographic elasticities may, in many cases, be largely offsetting, thus resulting in a relatively small demand effect as found by Chenery. If we are willing to disaggregate and to

examine explicitly the role of demographic factors, then demand may re-enter as a potentially significant element in explaining industrial progress. Furthermore, the disaggregated analysis adds several degrees of freedom for government policy. Clearly these conclusions argue strongly both for a closer inquiry into the role of demand, particularly in a disaggregated framework, and for a more explicit integration of demographic change into the economic models of growth and development.

Appendix A

Another widely used hypothesis of expenditure behavior is the simple exponential function of the form

(1A) $$\bar{D} = \alpha \bar{X}^{\beta} \bar{f}^{\gamma}.$$

This expression can be employed in a manner analagous to the linear formulation incorporated in (5). The resulting expression is presented below as (2A).

(2A) $$\begin{aligned} \dot{D} = {} & [\mu(\alpha_r \bar{X}_r^{\beta_r} \bar{f}_r^{\gamma_r}) + (1 - \mu)(\alpha_u \bar{X}_u^{\beta_u} \bar{f}_u^{\gamma_u})]\dot{F} && \{\text{family units}\} \\ & + [\alpha_u \bar{X}_u^{\beta_u} \bar{f}^{\gamma_u} - \alpha_r \bar{X}_r^{\beta_r} \bar{f}_r^{\gamma_r}]\, \phi && \{\text{migration, rural/urban}\} \\ & + F_r(\alpha_r \beta_r \bar{X}_r^{(\beta_r - 1)} \bar{f}_r^{\gamma_r})\dot{\bar{X}} + F_u(\alpha_u \beta_u \bar{X}_u^{(\beta_u - 1)} \bar{f}_u^{\gamma_u})\dot{\bar{X}}_u && \{\text{average expenditure}\} \\ & + F_r(\alpha_r \gamma_r \bar{X}^{\beta_r} \bar{f}_r^{(\gamma_r - 1)})\dot{\bar{F}}_r + F_u(\alpha_u \gamma_u \bar{X}_u^{\beta_u} \bar{f}_u^{(\gamma_u - 1)})\dot{\bar{F}}_u && \{\text{family size}\}. \end{aligned}$$

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