PHILIPPINE INSTITUTE FOR DEVELOPMENT STUDIES
Working Paper 81-07

# SOURCES OF PHILIPPINE INDUSTRIAL GROWTH, 1956-1978

by

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June 1981
Philippine Institute for Development Studies

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## EXECUTIVE SUMMARY

Results of analysis that confirm conventional wisdom can be received in one of two ways. Either they can be regarded as meaningless because they reveal nothing new, or they can be taken as proof that some sense can be extracted out of the many seemingly incoherent data and of the usual tools to deal with them. Since the first alternative is too painful for any group of authors to accept, it is usually the second that is entertained. The number of hours spent in collating data and subjecting them to some analytical tools may be taken as a justification for presuming in favor of the second alternative. But it must be clear, at the outset, how the first is disposed of: it is simply assumed away.

In this work, the record of 16 of the most important manufacturing industries had been tested for general acceptability. Necessarily, a criterion had to be adopted, and it is not the usual one of taking data, because they exist, as facts. Rather, facts from many sources are sifted to provide the background against which data can be evaluated for realism. While such an approach almost automatically consigns this work to the most boring category, still in industrial economics, there does not appear to be any more interesting alternative, for it is impossible to begin analyzing where

data sources are conflicting. One is then faced with the question, what is the appropriate set of data to subject to analysis, and until this question is known, there lurks the danger that analysis is undertaken almost for its own sake. It is carried out with whispy comments about the state of data in a developing country such as the Philippines, but it is carried out nonetheless without further batting an eyelash over whether the data make sense or not in the first place.

The fact is that in the Philippines, most industrial data can be made to make sense. There are enough people in many industries who know what is going on, or what has been going on in their respective industries. Moreover, provided the setting is appropriate, they are more than willing to talk, at least in broad terms, of the growth and of the problems of their industries. Thus it is possible that data on industries cease to be seemingly lifeless numbers that go their own way, while reality moves another way in many occasions. Indeed, they can be made to come alive, if the facts behind them can be brought out, clearly tagged, and tested against sense.

In more ways than one, Philippine industrial statistics are acceptable. In most cases, they are far from useless, if care is taken to show that the consistency that is assumed in economic thinking does hold in actual industrial practice. It is for this reason that starting from specific industries, gradually grouping such industries together, brings one along

a road that ends up with sectoral and macro-economic aggregates that fit and tell. There is nothing surprising about all this, because common sense suggests that what the most important parts dictate has a great, almost inevitable bearing on the whole. Thus, what happens in the 16 most important manufacturing industries, taking into account the shape and pattern of the Philippine economy, has a significant influence not only on the manufacturing sector, but also on other important sectors as well and thus on the entire economy.

There is little sense in discussing aggregates unless consistent references can be made to specific components. Given Philippine statistical and informational endowments, no time needs to be wasted in engaging in futile talk about aggregates, because it is impossible to find many important references to the most significant components of the economy. Furthermore, the discipline of economics and the practice of statistics and econometrics which have taught social scientists to infer from meaningful samples to a more aggregative universe have long made complete accounting unnecessary. Inferences made from the 16 most important industries regarding the wider economic reality surrounding them have been founded precisely on such a discipline and practice.

On such a data base, some traditional analysis can be founded.

The major question addressed to in this work is: to what elements can the growth of industry output be attri-

buted? As a corollary, once the elements are cited, their relative contribution to manufacturing output growth should be quantified.

Demand and supply analysis provides a guide to identifying the probable elements that contribute to the growth of Philippine industry during the two decades bounded by 1956 and 1978 (the excess of two years being dictated by the need to deal with averages to minimize the effects of single unusual years). Since there is a tendency to emphasize either one or the other set of elements, it is necessary that both are looked into within the context of the Philippine experience.

Among the demand elements, depending on the formulas used, it is possible to cite domestic final demand, intermediate use, import substitution, export expansion, and technological change.

Considering how often Philippine industrialization policy in the past has been characterized as import substituting, the quantified results--following the formula originally suggested by Chenery and subsequently used by him and others--show a surprisingly low contribution from import-substitution. But the complaints made by Sicat, Ranis, Cheetham, and many others about the domestic market orientation of Philippine industrialization policy is borne out by the results. Their complaints, to the extent that they include the relative neglect of export markets, are further substantiated. And if such complaints were also made to

include the relative neglect of productivity increases, these would have been supported too.

The conclusions given by the results are therefore not novel. But the advantage of Chenery's formula lies in the quantification of the relative contribution of each demand element to industry output growth. Thus, while the specific percentage points are perhaps too concise-looking, given the roughness of the results, still it is possible to suggest the relative importance of each demand element--in the context of all the other demand elements--in the growth of industry output.

Among the supply elements, traditional economics counts the factors of production. Labor and capital are universally included. Where agriculture is involved, land too is usually considered. But since we are dealing with manufacturing industries, we felt that raw materials were too important to leave out. Besides, there is already some precedent in including a third factor, raw materials, in the analysis of production. Finally, as a catch-all for all other unknown elements that contribute to output growth, a fourth factor is included, and this comes with an impressive-sounding name, "disembodied technical change" to mask the ignorance about what these elements are.

To help determine the relative contribution of each of these factors to industry growth, industry production functions were set up so as to yield factor coefficients, which were then used--following the simplifying assumptions

In general, these ideal weights can be applied to the quantitative increase of labor, capital, and raw materials over time. Not surprisingly, these ideal weights were different from the actual shares of industry gross value which can be obtained from the input-output tables of the Philippines.

Irrespective of whether ideal or actual weights are used, the increase in labor input contributed little to industry output growth in all cases. The contribution of the increase in real fixed assets is much higher, and in most cases that of the increase in raw materials is highest. Furthermore, changes not embodied in factor inputs contributed significantly to the growth of output in a number of industries.

As with demand elements, there has been some soul-searching regarding past industrialization policy towards the use of the different factor inputs. Such soul-searching has invariably produced complaints to the effect that past policy favored an industrial technology that left labor with little to contribute to the growth of output, and that relied mainly on capital with much of the contributory role. While some support to these complaints can be found in the results, still they (the complaints) are shown up to be too narrow in focus.

Indeed, the results suggest that micro-operators who are close to industrial operations do have a valid point when they emphasize the importance of raw materials. To

them and to almost everyone else, this point is obvious (and it speaks well both for the data and the analysis that have been used here, despite their limitations, that their results give support to such an obvious point); and it cries for attention so that a two-factor production process would no longer be so readily assumed, especially where manufacturing industries are concerned.

The contribution of disembodied technical change is not minuscule in many industries. This is a call for lifting this dark curtain and for penetrating further into this unknown, multi-faceted, complex set of contributory elements to industry growth. Detailed industry studies will have to be directed towards qualitative changes in factor inputs, as Griliches has suggested, or to other external economies, which for many industries operating in a developing country such as the Philippines are not insubstantial.

In both demand and supply analysis, there is a reference to productivity. The results in one set point to a disappointing record in this regard. The results in the other set leave open how much the increase in productivity has pushed the growth of output. In any case, this obviously is an important element that can be disregarded without impunity especially in the process of industrialization. It is an element that is crying for more than attention and lip service; it is in need of effective action.

In putting together the considerations afforded by the analysis of industrial growth in the Philippines from

the demand and supply side, a facet that comes out more clearly is the influence of the external environment upon the results of industry operations. Not only is there a broad consistency in relatively short-term behavior between economic aggregates and industry outputs. There is also some specific evidence of the importance of such environmental influences as growth in real income and in relative prices upon industry output. The conceptual responsiveness of the latter to the former has long been clear. But the consideration of such responsiveness has neither been sustained nor deep so as to lead towards taking out guarantees that growth in real income and in relative prices are cushioned from shocks and abrupt turns.

Policy-makers who advise industries to be conscious of and sensitive to the changes in the economic environment can practise what they preach. They can assign a top priority to making sure that the general environment within which industries operate is one of high growth in income and of bounded increases in over-all prices. While specific industry-directed policies cannot be disregarded, so much can be achieved in so many industries by first making sure that such a general environment prevails.

# CHAPTER I

## THE RECORD OF INDUSTRIAL GROWTH

Philippine industrial growth has been called many names. It has been characterized as inward-looking, as lacking in external orientation, and as import-substituting. Moreover, it has been accused of certain biases: in favor of foreign exchange and of capital, and against labor, thereby using more of those factors that have been in short supply and less of those that have been in relative abundance. Its technology has therefore been inappropriate, and its productivity low. It has been subjected to expected constraints, and its growth has been only moderate (Ranis, 1974; Cheetham, 1976).

In view of the facts that have been presented to support the statements above, an implicit and oftentimes also explicit reference has been made to Philippine industrial policy. It is almost impossible to escape the suggestion that such policy had something to do with the resulting industrial facts, and this is only a short step away from an indication that inappropriate policies have led to inappropriate technology and an unsatisfactory industrial record.

Since these allegations have substantive import on

what the Philippines must do in the next few years, particularly in the field of industrial policy, it is necessary to focus upon the relation between the industrial record of growth and the sources of such growth. Where the sources of growth are inextricably linked, either directly or indirectly, with the orientation of industrial policy, there is the possibility of indicating the relative influence of industrial policy upon industrial growth.

While the question at hand is straightforward, its solution is not. In the first instance, there is some difficulty in identifying just what the industrial record of growth has been. Fortunately, this difficulty does not stem from a scarcity of information; rather it comes from a relative abundance of it, which does not necessarily tally with one another (Estanislao and Go, 1978). In trying to resolve this specific difficulty, there is a choice over the route to take: one is through the broadest measure of industrial performance over time, which is provided by the manufacturing component of GDP in the official national income accounts; the other is through more specific indicators of industrial performance for key, selected industries, whose relative importance in the industrial sector confers upon them a representative character.

In this work, the second route is the one chosen. The record of specific industries is scattered, but more verifiable. It is so much easier to fall back upon the

long NCSO series of manufacturing survey results, which include all industries in one convenient set of reports. But it is so much more reassuring to check industry data from various sources and to relate them with one another. As an example, sugar milling reports are set against sugar cane harvests and against exports of milled sugar or export receipts from sugar deflated by sugar export price movements. In this manner, it is possible to have a much broader information base upon which to build our industrial record, one whose relation with the different specific components of the industrial sector can be easily traced.

Such an advantage conferred by the second route does have an offsetting disadvantage. From the standpoint of strict accounting, one has to go after the record of every industry included in the manufacturing sector. Fortunately, since in economics the need to focus upon substance gives license to use indicators, provided that these are selected based on their relative importance in the total sector and therefore on their probable capacity to represent the entire sector, one can concede the accounting deficiency but still proceed to take advantage of the convenient license. Thus, guided by information obtained from occasional comprehensive studies of industrial structure such as the I-O tables or from the NCSO manufacturing survey results, one can choose only a few important, representative manufacturing industries and put them together into convenient classes or groups of

specific industries within the entire sector.

It is against those considerations that only 16 specific manufacturing industries have been included in this study. Four are classed together under "Base Industries"; six are listed under "Consumer-Oriented Industries"; two are under "Intermediate Products Industries"; and four are under "Investment-Related Industries." Table 1 cites the specific industries.

Table 1.--Specific Industries Under Different Classes within Manufacturing

| Class | Specific Industries |
|---|---|
| Base | rice milling |
| | sugar processing |
| | coconut oil milling |
| | wood processing |
| Consumer-Oriented | milk processing |
| | flour milling |
| | textile manufacturing |
| | tobacco manufacturing |
| | beverage manufacturing |
| | meat processing |
| Intermediate Products | petroleum refining |
| | paper and paper products |
| Investment-Related | appliance |
| | iron and steel |
| | cement |
| | automotive |

In Section 2 of this Chapter, the relative importance of each specific industry will be indicated.

While one can go to the level of specific industries in trying to set up the industrial record, one can not do

the same so easily when industrial policy is considered. In this second instance, a choice is offered also. One option is to focus upon the major sources of growth that can be cited for all industries. Common sources of probable growth are investigated for specific industries, and to the extent that such sources are closely related with a specific industrial policy orientation, then industrial policy can be said to have an impact upon the growth of specific industries. A second option is to look at each specific industry and to search for all the possible industrial policies that could have influenced its performance. Here, the list of specific policies can be short or long, but the list differs from one industry to another.

This second option has many advantages. Conceptually, an industry is set off from the others presumably because it has features and characteristics that are specific to it. Such features and characteristics can be touched in a particular manner even by broad industrial policy; more importantly, specific industrial policies may well be designed to bear maximum impact upon them. Moreover, in the practical world of business operations, what is recognized as important is the quantifiable or at least a guesstimated influence from either the general environment or the more specific policies directed at a given industry.

In this work, while the advantages of the second option are recognized, a choice has been made mainly for the first option. The reasons for this choice are both tactical and practical.

Tactical considerations suggest that in this initial work on industrial economics, the commonly used techniques of accounting for industrial growth must be applied to the Philippines. While the inter-relation between industrial policy and industrial growth has been studied previously (Sicat, 1968; Power and Sicat,1976), still no account has been made publicly available of attempts to measure the sources of industrial growth from the demand and supply side.

Chenery (1979) has pioneered in the field of decomposing industrial growth into its probable demand sources by the use of I-O tables. Nadiri (1972 and 1974) has described the general considerations behind decomposing growth into its probable supply sources and reported preliminary findings at the broad economic level for selected countries. Thus, before rushing into the thicket offered up by the second option, and before getting caught up in a maze of details required by such an option, a sense of priority dictates that the Chenery demand analysis into industrial growth should be undertaken first, and this is done in Chapter II. It also dictates that the traditional analysis of industrial growth from the supply side should be carried out by the use of industrial production functions. This is done in Chapter III.

Practical considerations also advise that it is only after the results of the first option have been reported out that a decision can be made on whether or not to

proceed with the second option. The initial analysis can highlight the impact of industrial policies as they affect all industries. It is possible that the results of such initial analysis reveal that a significant percentage of the growth of each specific industry can be largely explained by such general industrial policies. It is then reasonable to weigh these results against the time and effort required by the second option and to decide whether or not it would be worthwhile to spend them.

Indeed, because the traditional demand and supply sources of industrial growth analysis does not account for the variability of growth of specific industries through different sub-periods, an attempt is made in Chapter IV to determine whether general environmental variables would be sufficiently important to explain the changes in growth rates from one sub-period to another. The extent to which they can help explain such changes can help determine the importance of undertaking further analysis on an industry by industry basis following the second option described above.

The approach taken in this work is ecclectic in the sense that it goes into specific industries in setting up the industrial record; into broad sources of growth which are indicative of the general industrial policy orientation of the Philippines; and into the extent of impact upon specific industries of the general economic environment. No specific policies aimed at a specific industry will be

covered in this work, but an indication will be given on the advisability of moving further and covering this portion of the industrial economics field.

1. Need for Consistency

Before undertaking any analysis of industrial growth, it is advisable to go over the data base that is available. In many developing countries, the Philippines included, it is imperative to secure one's data base first because the results of any analysis are heavily contingent upon the data used. As already noted, the industrial record of the Philippines is not free of controversy, and the controversy starts over which data to use. Fortunately, this portion of the controversy can be tackled with some ease because of the relative abundance of data sources.

Where two different sets of industrial data such as those taken from the NCSO and the Central Bank show different directions and rates of growth for various years at the two-digit level of industrial classification, there is a need for recourse to the basic principle of consistency. Since the data refer to the same set of industries within the same economy during the same time period, those that show much greater consistency with the other elements of the economy should be given more credence. This requires that data, because they are numbers, should not be taken as they are and then automatically assumed to be real or true. Rather, it demands that some sifting be done.

The sifting can follow the guideline that parts make up the whole and conversely that some macro-economic variables should be indicative of what is happening with at least some of the components of the economy. More specifically, the record of each specific, important industry has to be looked into. It can be evaluated against other known indicators of such industry, which can include qualitative statements from authoritative sources within an industry as well as other macro-economic information that have direct or at least a well-known bearing upon an industry. The example previously cited about sugar illustrates this particular approach.

Once a number of industries has been evaluated, it would then be possible to put together a few of them into separate classes, such as the ones mentioned in Table 1. The grouping into classes is admittedly arbitrary and is determined by the type of analysis that must be undertaken subsequently. For instance, a class, Base Industries, is set up on the assumption that there are certain important industries in the Philippine economy that are a base for others. Rice is one such industry from the standpoint of food supply and agricultural income. Sugar, coconut, and wood are a traditional base for earning foreign exchange, upon which import-dependent industries rely.

Many of the consumer-oriented industries are also import-dependent. Only six are included in this study, but they are some of the most significant industries within

the Philippine manufacturing sector and should be representative of similar types of industries. While meat, milk, and flour are food items, beverage and tobacco are less essential ones, but whose relative size within Philippine manufacturing demand that they be included. For reasons both of relative essentiality and size, textiles have to be included.

Petroleum products are intermediate in the sense that they are used to make either further production or consumption possible. Under such a wide conception of intermediate products, paper is included because--for the most part--it is used to help perform another function, although here the concept has been stretched far more than in the case of petroleum products.

Appliances and automotive vehicles are listed together with cement and iron & steel under investment-related industries. In the case of the former, although most of its products go directly to consumers, the decision on the part of consumers to purchase them is partly related to savings, access to financing, hedge-buying--elements which figure prominently in investments. In the case of the latter, similar considerations apply where consumers are concerned. Where more direct investors are involved, the classification under this particular heading becomes even more natural.

In order to put together specific industries into the above-listed classes, some common information

about them must be obtained. The first that is of more than passing interest is the physical volume of production and its gross value. Implied by both is a unit price, whose relative movement to that of other relevant prices can be indicative of the real income either provided by or generated within an industry. Since gross values of various industries can be added up, ratios between components and totals can be calculated.

Furthermore, each specific industry is faced with raw material costs, whose movements vary from industry to industry. Thus, not only are the value added ratios different to start with. Over time, the changes in such ratios do differ between industries. Thus, appropriate raw material costs must be accounted for in each industry, and after these are deducted from gross values, one is left with gross value added. Naturally, the movements of gross value added between industries also differ. Thus, once they are summed up, the computed ratios between components and totals can vary over time.

Adding up either gross values or gross value added is one way of putting together the information on various specific industries. This, however, yields ratios between components and relevant totals, ratios which can be used as weights in putting together the physical volume and unit price or relative price data more directly. Since the ratios change over time, a typical index number problem arises if this second way is taken; but this is a

problem, which once recognized can be met squrely, although not very satisfactorily.

The sixteen specific industries put together into separate classes form one group which can be taken as representative of the entire manufacturing sector. Indeed, the group totals can be compared with the NCSO manufacturing survey results. Such a comparison can also be done at the level of class totals, if the NCSO data are reclassified to approximate the class coverage followed here. Agdamag (1981) has already gone through this exercise, and Estanislao (1981) has also shown that on the basis of a few selected industries, the GDP estimates can be checked.

It should therefore be possible to show preliminarily the ratio of each specific industry to the class and of each class to the group. Also, the ratio of each group to the entire manufacturing sector and the whole economy over time can also be shown.

Consistency within the manufacturing sector and within the economy demands that such ratios should not be changing wildly, i e. abruptly and without any clear direction. This particular demand assumes ordinary, normal circumstances. Such assumption need not be met at all times, and it is because of this that consistency issues another guideline: where extraordinary events occur, they must be reflected in the data that can be used.

This second guideline of consistency requires that qualitative and other non-quantitative information should be

given their due importance. The facts of industrial and economic life are variable enough to make over-regular patterns taken from quantitative sources suspect. Export prices can rise or fall dramatically. Physical volumes of production can shoot up or drop with surprising suddenness. Financial policies can be changed with some abruptness. Social and political parameters can be revolutionized with stunning and irreversible instantaneity. These can not fail to have impact upon industries--an impact which can be deep and sometimes also rather immediate.

But precisely because they are extraordinary, they can not escape notice, and because their impact is significant, it should be captured by data on industrial performance. Thus, consistency requires that data be tested on the basis of their ability to show fluctuations that are in consonance with well-known facts.

This means that there is value in the traditional differentiation made between trend and cyclical elements, where annual data are involved. The cyclical factor, which can be taken off the trend line, is suggestive of the relative importance of any extraordinary event that may have influenced an industry's growth performance over a limited period of time. The greater the cyclical factor, the more extraordinary the event, and the bigger its influence.

In trying to account for this cyclical factor, two sources must be considered. The first would naturally be

resulting from the wider environment which may have hit a specific industry in a special way. Thus for example, a drop in sugar prices is specific to the sugar industry, and at least in 1976 and 1977 it had nothing to do with the level of coconut prices. The second would be from the general economic environment which can hit the whole gamut of an economic hierarchy: the entire economy, the manufacturing sector, a group or various classes of industries.

The first requires some familiarity with industry operations and some intimacy with industrial facts. The second suggests that cyclical factors at various levels of the economy be compared, and on the basis of such a comparison, a determination can be made on whether or not the cyclical movement of a given industry's performance is in line with or is seriously out of step with that of the economy, and whether or not it ordinarily leads or lags behind that of the economy.

In this work, the period 1956 through 1978 is covered. Inevitably, it is necessary to refer to a first period, whose beginning is delimited by the average of the years from 1956 to 1958 and whose ending is delimited by the average of the years from 1966 to 1968. Similarly, the second period covers 1966-68 through 1976-78.

However, the thrust of economic forces indicates shorter sub-periods which are characterized by a greater or lesser than average economic performance. These are short-term economic cycles, whose timing and depth would

be conditioned by the cyclical factors observed in key industries; alternatively, such economic cycles can influence those observed in some key industries.

The consideration of consistency therefore provides guidelines for setting up the industrial record and for evaluating the industrial data available. These guidelines stem from the very make-up of any economy: that specific industries help determine the class to which they belong, and similarly from class one moves up to group, and then to sector, and the economy as a whole. They also stem from the facts of industrial and economic life: that there is an underlying trend of growth, but deviations from such trend can at times be significant either due to forces that are specific to an industry or to more general ones that flow and meander down from the economic environment.

## 2. Industrial Growth

Philippine GDP at current prices has grown from an average level of ₱10,903 million in 1956-58 to ₱28,384 million in 1966-69 and finally to ₱153,787 million in 1976-78. While such numbers give the impression that growth has been high, still it must be remembered that throughout this period included in this study there has been an inflation of prices, whose rate varies from year to year (see Chapter IV). Provided that this is kept in mind, the numbers cited above can be used mainly as a frame of reference for the growth of value added by manufacturing, also expressed in current prices.

The manufacturing sector, as expected, has grown faster than the whole economy. Thus, it reports an average level of value added of only ₱1,829 million in 1956-58, then of ₱5,856 million in 1966-68, and finally of ₱39,858 million in 1976-78. The share of manufacturing in the whole economy has been increasing; it is now more than a fourth of GDP.

Table 1.2.--The Manufacturing Sector within the Economy, 1956-1978

| Period | Value Added by Manufacturing* | GDP** | Share of Manufacturing in GDP |
|---|---|---|---|
| 1956-58 | ₱ 1,829 M | ₱ 10,903 M | 16.8% |
| 1966-68 | 5,856 | 28,384 | 20.6 |
| 1976-78 | 39,858 | 153,787 | 25.9 |

Source: Estanislao (1981).

*These are in current prices, in million pesos.

**Also in current prices. These figures have been shown to be close to the average levels reported by NEDA as the official GDP estimates for the same years.

It is of interest to specify the industries whose rapid growth may have helped boost the relatively fast pace of the manufacturing sector. It is here where data problems arise, because different statistical sources provide different industrial growth rates. But it is precisely here where consistency can be used as a guideline fruitfully, because it can help resolve such differences.

Both general knowledge and specific information available from either the NCSO Survey of Manufactures or the I-O tables for 1974 suggest that some 16 manufacturing industries can account for more than two-thirds of value added by the entire sector. Such information can be used as a starting point.

Table 1.3.--Relative Importance* of Selected Industries in Manufacturing

| | | | |
|---|---|---|---|
| Base Industries | 23.7%* | Consumer-Oriented Industries | 20.4% |
| Rice Milling | 3.7 | Milk | 1.4 |
| Sugar Milling | 9.6 | Flour | 1.8 |
| Coconut Oil | 3.0 | Textiles | 3.2 |
| Wood Processing | 2.4 | Tobacco | 5.3 |
| Investment-Related Industries | 7.9 | Beverage | 4.4 |
| | | Meat Processing | 4.3 |
| Cement* | 1.1 | | |
| Iron & Steel | 2.3 | Intermediate Products | 16.3 |
| Appliances | 1.2 | Paper | 3.9 |
| Automotive | 1.3 | Petroleum | 12.4 |

Source: I-O Table of the Philippines, 1974.

*Share in total value added by the manufacturing sector.

Since the list includes industries whose share of manufacturing value added comes to only 1%, it is far from being restrictive. Still, the relative fewness of big industries (where bigness is thought of as an industry's

share in the total sector's value added) is highlighted by the aggregate shares of only 16 industries, which come up to 50.3% of value added by manufacturing. Thus, there is value in focusing attention on these 16 industries. They are few enough to be manageable, but they are sufficiently spread across the manufacturing sector to be representative.

Consistency permits the use of such shares in deriving the absolute levels of the value added by each industry in 1974. Each industry's volume of production, as reported by varying sources, can be used as a basis for an index which can be multiplied against the respective absolute level of value added by each industry in 1974. The resulting time series is the value added by each industry in 1974 prices from 1956 to 1978. To obtain time series data, expressed in current prices, price "inflators" for each industry are utilized (see Appendix A).

Among industry classes, only the consumer-oriented industries were unable to keep in step with the entire manufacturing sector, thereby losing relative importance by $t_3$. The others, including the base industries, gained relative importance as their shares in total sector value added rose between $t_1$ and $t_3$.

Such broad statements based on aggregative data can be given more specific content if the derived shares in total manufacturing of each industry can be traced through time. This is possible given the methodology followed in this work, and as suggested by considerations of consistency.

Table 1.4--Value added by Selected Classes of Industries in the Manufacturing Sector, in Current Prices, for Selected Time Periods

| Industry Classes* | Value Added** | Share in Manufacturing |
|---|---|---|
| Base | 167.8 | 9.2 |
| | 741.0 | 12.7 |
| | 5246.4 | 13.2 |
| Consumer-Oriented | 459.9 | 25.1 |
| | 1399.1 | 23.9 |
| | 8093.8 | 20.3 |
| Intermediate Products | 99.2 | 5.4 |
| | 765.2 | 13.1 |
| | 6044.4 | 15.2 |
| Investment-Selected | 101.5 | 5.6 |
| | 391.0 | 6.7 |
| | 3448.8 | 8.7 |

Source of Basic Data: Industry and government reports.

*Class of industries refers to groupings made in Table 1.1.

**All figures are average levels for three time periods: $t_1$ = 1956-58 ; $t_2$ = 1966-68; $t_3$ = 1976-78.

Thus, while base industries, as a class, showed rising shares in total sector value added, specific industries within the class showed divergent trends in their respective shares: those for rice milling and sugar milling

were falling, and those for coconut oil milling and wood processing were rising. Here, we have an instance of additional insight being provided by getting beyond aggregative class groupings and into more specific industries. Thus, the initial information, based on class data, suggesting that base industries have been growing faster than the entire manufacturing sector, may have been surprising to anyone who follows normal expectations: that base industries in the process of development ordinarily lose relative importance in manufacturing. But once such information is backed up by the more specific information that such a result for the class has been due mainly to the increased processing of coconut and wood products, then the policy to try and add more value to raw materials coming from base industries is given some focus.

Indeed, attempts in the past to move out of exporting mere copra and logs and to move into additional processing of coconut into oil and of wood into plywood and veneer or pulp and paper sported the rationale of promoting domestic industrialization. Such a rationale appears to be vindicated by the data available in the Philippine statistical system. In the case of coconut and wood, where adding more value has been possible, the growth of industry appears to have been made higher because of the pursuit of such policy; but in the case of rice and sugar, where the same has not been possible, the growth of industry has been lagging behind the pace of the entire manufacturing sector.

On the other hand, the statement regarding consumer-oriented industries taken as a class appears to apply to all the constitutive industries, although in varying degrees. Thus, the milk industry was starting off from such a low base and with such a low share that its growth turned out to be faster than that of the entire sector. It has been gaining shares in total sector value added, but even by $t_3$ its share was not much higher than 1%. The tobacco industry also shows itself to have been growing faster than the manufacturing sector as a whole, and its share has inched up to 3.6%. But it is difficult to envision that in the case of these two industries, milk and tobacco, a similar record can be sustained long into the future. Rather, it is more likely that their future record, relative to that of the entire sector, will follow the way of the other consumer-oriented industries.

Beverage, textiles, meat processing and flour milling were all posting growth rates that were below the entire manufacturing sector's average growth. Among these industries, the beverage industry is the only one which was significantly losing its relative importance to the entire sector despite have a growth which was only 0.2 percentage points below the sector average. Textiles, meat processing, and flour milling have had their shares rise from $t_1$ to $t_3$. The high visibility of the textile industry could easily give one the impression that at least it must have been keeping pace with the whole manufacturing sector. This is

confirmed by its growth which is only 0.4 percentage points below the entire sector's average growth. The relative newness of the meat processing and flour milling industries could cause one to expect their share in the sector to be rising, although their growth is significantly below the entire sector's average.

On the other hand, most of the industries falling under intermediate products and investment-related industries support initial expectations readily.

Paper and petroleum products have been growing faster than the manufacturing sector. They have been gaining shares in the sector's value added. The process of industrialization itself is a basis for such a result. In both cases, at least before the oil crisis, an increasing intensity has been observed in the use of paper and petroleum products. Since the oil crisis, the discipline imposed by much higher oil prices has shown that some room for flexibility can be introduced into the usual tendency to use more oil proportionately as GDP rises.

Iron & steel and cement have also been showing high relative growth rates, as implied by the trend in their shares in manufacturing value added. While their shares are small, the trend has been upward, and this conforms with the usual patterns of industrial growth (Hoffman, 1958; Maizels, 1970; Chenery and Taylor, 1968). Indeed, during the early phases of industrialization, when the country has so much to build, these construction-related industries should be growing at a fast pace.

Table 1.5.--Shares of Selected Industries in the Value Added by the Manufacturing Sector

| Specific Industry* | 1956-58 | 1966-68 | 1976-78 |
|---|---|---|---|
| Base Industries: | | | |
| Rice Milling | 4.6 | 4.9 | 2.5 |
| Sugar Milling | 3.0 | 4.0 | 2.8 |
| Coconut Oil Milling | 0.7 | 1.7 | 4.4 |
| Wood Processing[1] | 0.9 | 2.0 | 3.5 |
| Consumer-Oriented | | | |
| Milk | 0.2 | 1.2 | 0.7 |
| Flour | 0.5 | 1.2 | 1.4 |
| Tobacco | 3.3 | 3.9 | 3.6 |
| Beverage | 12.8 | 8.8 | 5.4 |
| Meat | 5.7 | 6.3 | 5.8 |
| Textiles | 2.6 | 2.4 | 3.4 |
| Intermediate Products: | | | |
| Paper | 0.3 | 0.9 | 2.4 |
| Petroleum | 5.1 | 12.2 | 12.8 |
| Investment-Related: | | | |
| Iron & Steel[2] | 0.1 | 0.5 | 1.3 |
| Cement | 1.6 | 2.5 | 2.8 |
| Appliances[3] | 1.0 | 1.5 | 1.1 |
| Motor Vehicles | 2.8 | 2.2 | 3.4 |

Source: Appendix A.

[1]Wood processing - the manufacture of veneer, plywood, and hardwood/sawmills, planning, and other wood mills.

[2]Iron & Steel - blast furnaces, steelworks, and rolling mill products.

[3]Appliances - household radios, phonographs, TV sets, refrigeration, and air-conditioning equipment.

Moving at such a fast pace has been the motor vehicle industry, which has the advantage of serving both the personal consumer and the investing business organization. As a consequence, its share in manufacturing value added has risen. On the other hand, the appliance industry which caters mostly to consumers appears to have grown only in step with the whole manufacturing sector, although such a statement can not be made with firmness, based as it is on beginning and end-year figures, which despite being averaged out could still be influenced by uncontrollable external factors. In the case of appliances, the straits into which the economy as a whole and private consumers as a group have been thrown by the oil crisis may have been a significant moderating influence on growth, which otherwise would have been much higher.

From all the statements made thus far, three general points can be set forth.

First: there is no need to maintain lack of consistency between various sources of industrial data in the Philippines. Indeed, there are ways--of which only one is shown here--by which some consistency can be forced into such data.

Since estimates for GDP and the value added by the entire manufacturing sector can be easily derived, a basic question left unaswered is: would one be willing to take the shares of each industry, as reported by one of the I-O tables (in this case, the 1974 set), as a basis for deriving the figures for value added by each industry? If

the answer is yes, then the way is open for taking the route that has been taken here. If the answer is no, the search must go on relentlessly for abiding by the principles of consistency even while using differing sources of industrial information.

The route taken here leads to the situation where value added by each industry would be consistent with each other and with the shares provided by one of the I-O tables, and therefore also with total manufacturing value added, at least for one year. It also allows the use of any appropriate time series data on the growth of an industry's volume of activity. Such data may come from any credible source. It could be any statistical agency of government or any industry association, provided some tests are run on the basis of perceived relationships either with other information or with some selected macroeconomic variables. Lim (1980) did this for iron & steel and cement. Cruz (1981) made similar tests for the automotive industry, and Nieva (1981) for the wood industry. Thus, specific industry information can be used to generate time series data based on the single derived figure for value added by a given industry. The latter serves as the reference, giving an absolute value, while the latter provides the growth rates, on an annual basis, for an industry. Each source of information is used for a purpose which it can adequately serve.

Second: growth rates at the industry level can be

cited which are similar to the ones ordinarily reported by the industry associations themselves.

Industrial information has to be credible, and credibility must be gained by evidence that the information is realistic. So much strain can be introduced by statistics that appear to defy experience on the part of those who are supposed to know. Thus, an industry can not be reported to have grown if the industry people themselves have been complaining of extreme difficulty in keeping their volume (not value) of sales--as measured by physical units sold--from dropping. Similarly, industrial growth statistics could not miss the sales excitement a given industry may be enjoying.

During the period covered by this study, the Philippine economy is reported to have grown at an annual compound rate of 5.7%. The corresponding figure for the manufacturing sector has been placed at 5.7%. Against these yardsticks, the growth of various classes of industries can be put in perspective. It must be pointed out, however, that an index number problem arises in putting together the growth rates of specific industries. In the case of Base Industries, if the weights of the beginning period are used, the class growth rate turns out to be small at 4.8% per year. On the other hand, if the weights of the end period are used instead, the class growth rate turns out to be much higher at 8.0% per year. To obtain a growth figure which is somewhere in between these extreme

Table 1.6.--Compound Growth Rates* for Selected Industries

| Industries | Growth Rates |
|---|---|
| Base Industries** | 5.[illegible] |
| Rice Milling | 2.[illegible] |
| Sugar Milling | 3.[illegible] |
| Coconut Oil Milling | 11.9 |
| Wood Processing | 8.9 |
| Consumer-Oriented** | 6.3 |
| Milk | 11.1 |
| Flour | 3.2 |
| Tobacco | 7.4 |
| Beverage | 6.5 |
| Meat | 5.4 |
| Textiles | 6.3 |
| Intermediate Products** | 10.3 |
| Paper | 14.8 |
| Petroleum | 9.8 |
| Investment-Related** | 1[illegible].2 |
| Iron & Steel | 15.[illegible] |
| Cement | 12.[illegible] |
| Appliances | 10.[illegible] |
| Motor Vehicles | 7.1 |

Source: Appendix A.

*Compound growth rates were calculated by using the absolute values for each industry's value added in constant prices. Only beginning and ending period averages were utilized.

**Growth rates for each class are weighted growth rates of the component industries. The weights used were the average shares of the component industries for the three time periods ordinarily cited in this work.

rates, the relative importance of each industry for the three time periods cited here was averaged out. The resulting class growth rate, using such average weights, comes to 6.4%.

Thus, the comparative growth rates for various classes of industries are obtained. When compared with each other, such growth rates confirm the broadest expectations: those for intermediate products and investment-related industries are highest, while those for base and consumer-oriented industries are lowest. However, there are sufficient reminders of the roughness of these growth rate figures.

The manner in which the index number problem was tackled here yields a class growth rate for base industries which is lower than the reference rate for the whole manufacturing sector. This is not what has been implied by the movement of their relative shares in sectoral value added over time.

Furthermore, although the compound growth rate of beverage is clearly below the sector growth rate, still the industry's loss of shares appears to be much steeper than what would be warranted by the relative compound growth rates reported. Finally, the compound growth rates cited for appliances (high at 10.8%) do not help explain the movement of their respective shares in total sector value added.

Indeed, all these reminders are suggestive of the move-

ment of relative prices. While relative growth rates for volume of production are indicative of the movement of shares on the part of each industry, still in a number of cases, there is a need to refer to relative price movements, a significant portion of which could be influenced by the price deflators used (see Appendix B).

The third: there has not been a significant change in the over-all composition of the manufacturing sector from the standpoint of its breakdown into classes of industries.

Base industries, as a class, have not lost ground in the value added of the manufacturing sector. As expected, however, consumer-oriented industries lost some shares, while both the intermediate products and investment-related industries gained some shares. As a group, all these industries have become more important, relatively, in the whole sector. Whereas in 1956-58, they accounted for less than 50% of sectoral value added, by 1976-78, their share had gone up to approximately 50%.

In this regard, the increase in the share of coconut oil milling and wood processing has been impressive, and it shows one way by which industry can be pushed and made to grow at higher rates. Similarly, the growth of paper, iron & steel, cement, and motor vehicles has been a welcome as well as an expected development. On the other hand, the consumer-oriented industries for the most part, while continuing to post positive growth rates, have not contributed to the rising relative importance of these 16 industries in

manufacturing. It is in this sense that too strong a preference given to consumer-oriented industries can help bring down to moderate levels the growth of the whole sector. These industries have not been growing as fast as a few other, more dynamic industries; moreover, in the process of development, these industries can not be expected to be the fastest growing components of the manufacturing sector. Thus, instead of hitching on to them, the cause of faster industrial growth would probably be better served if more emphasis is given either to some of the base industries or to intermediate products as well as investment-related industries.

The differential growth over a long period of time that exists between industries does bring about changes in their relative position with respect to each other and to the manufacturing sector. Chenery (1979) referred to this phenomenon as structural change. Thus, growth is a basis for change, and since change is at the heart of development, growth--despite many reasonable misgivings--still is basic for development.

It is necessary, therefore, to focus upon the phenomenon of industrial growth and identify the sources whence it came.

# CHAPTER II

## SOURCES OF INDUSTRIAL GROWTH FROM THE DEMAND SIDE

A basic idea that is oftentimes forgotten in discussions about economic growth issues is the pull of market forces upon the level of industrial production. While this idea is concrete enough to be a fact of daily life in business, it is often given short shrift in economic explanations about the relative rise and fall in the growth rates of industrial production.

Chenery, however, has long insisted on this particular facet. While his Structural Change and Development Policy appeared only in 1979, it is a culmination of work that has stretched for many years, and it must be clear that he has been highlighting the importance of different market forces upon economic growth in general and upon inudstrial growth in particular (Chenery, 1960 and 1969; Chenery and Watanabe, 1958; Chenery, Shishido, and Watanabe, 1962; Chenery and Taylor, 1968; Chenery and Syrquin, 1975).

Market forces, however, are too general and too vague a term. Chenery has tried to give them a specification which has led to the possibility of quantitative analysis of the interaction between the pull of various demand forces and industrial growth. He fell upon the framework

afforded by the I-O tables and has used this for the purpose of accounting for industrial growth over time and across countries.

The I-O tables suggest that absolute growth of various sectors and industries can be directly accounted for by intermediate demand, by final demand, by export expansion, and by import substitution. Thus, the demand by other production sectors and industries in the economy, the demand by domestic consumers and investors in both the private and public sectors, export demand, and other demands imposed by import substitution can have an influence upon the production of a given industry, which must respond and ordinarily try to meet such demands. It is in this sense that the growth in production in a given industry can be traced back to the different demand elements that pull it up, and the sources of industrial growth from the demand side can be identified; furthermore, their relative contribution to such growth can be quantified.

The demand by other production sectors and industries comes from within the production system of an economy such that it is endogenous to it. Chenery has shown that if one wishes to focus only on exogenous demand elements, one can do so with an added advantage: the demand by other production sectors and industries can be removed and substituted by changes in technical coefficients (this being sometimes referred to as technical change). Thus, one is left with only the exogenous demand elements as the sources

of industrial growth. Moreover through the operation of the I-O tables and the substitution of one endogenous demand element by another (an exogenous one), the direct as well as the indirect effects of all the exogenous demand elements can be accounted for. The changes in domestic final demand, in export demand, in import substitution, and in technical coefficients can have their total impact (both the direct one as well as the indirect which passes through other production sectors and industries of the economy) on the production levels of a given industry traced through and quantified.

The total impact from such changes arising from exogenous demand elements does vary from one industry to another. It is natural, therefore, that the growth between industries would differ. The level of production of some would be growing faster than that of others, and when such differing growth rates between industries are compared with a standard growth rate such as that for the whole economy, then one arrives at an indication of industrial change. The natural lack of proportionality between the differing growth rates in various industries on one hand and the growth of the whole economy on the other hand provides an evidence of structural change. Some industries grow faster than the whole economy and thus gain in relative importance; others grow slower and thus lose relative importance. Therefore, in the same way that the growth of an industry can be traced to the total effects of the

different exogenous demand elements that pull its production volume, the change in relative position of an industry can be traced to the total effects of non-proportional growth of its different exogenous demand elements.

Chenery has shown the intimate connection between industrial growth and structural change. By following the conventional concepts that have formed part of an input-output framework, he has suggested a way by which to account for absolute growth and for non-proportional growth of industrial output. He has shown a way by which the relative contribution to industrial growth of various demand elements or market forces can be quantified.

1. Key Formulas and General Results

The considerations made above are the guidelines behind the formulae that have been given by Chenery (1979) and by Chenery and Syrquin (1977). However, in applying formulas to Philippine data, outside of the determination of industrial growth that had been made in Chapter I, care must be taken that the I-O coefficients reported for the Philippines are consistent with one another. Primero (1980) and Estanislao (1981) have reported that, after testing for the relative constancy of technical coefficients in the 1961, 1965, 1969, and 1974 I-O tables, those coefficients listed under the three later tables show sufficient consistency with each other such that they may be used for comparative analysis over time, provided that enough caution is exercised in interpreting the results.

Given the data on industrial output and the I-O coefficients for 1965, 1969, and 1974, it is then possible to consider applying Chenery's analysis. In order to do so, a number of preliminaries have to be attended to.

First, from the transactions table of each I-O, the portion of domestic demand that is domestically supplied is calculated. This is done by following the formula:

$$u_i = \frac{X_i - E_i}{W_i + D_i} \qquad (2.1)$$

where $X$ = total output

$E$ = exports

$W$ = intermediate demand

$D$ = domestic demand ($C + I + G$)

$i$ = a given industry

Second, the A matrix, which is the matrix of technical coefficients, is taken from the transactions table. Each element $a_{ij}$ in this A matrix is multiplied by its corresponding $u_i$ provided by the first step. This yields a uA matrix.

Third, the uA matrix is subtracted from an identity matrix, giving (I-uA), whose inverse is then taken, thus $(I-uA)^{-1}$

Having disposed of all these preliminaries, the following equations of Chenery can be applied.

A. The Direct Method takes into account only the direct effects on industrial production coming from various demand elements, as specified by equation (2.2).

$$(2.2) \qquad \Delta X_i = u_i^1 \Delta E_i + \Delta F_i + u_i^1 \Delta W_i + \Delta u_i (D_i^2 + W_i^2)$$

where $\Delta X_i$ = change in actual output

$\Delta D_i$ = change in domestic final demand

$\Delta E_i$ = change in export demand

$\Delta W_i$ = change in intermediate demand

$\Delta u_i$ = change in domestic content of production

and where the superscripts refer to time period and subscripts refer to the industries concerned.

As already noted, equation (2.2) accounts only for the direct effects on an industry's volume of production. However, the exogenous demand elements, in addition to such direct effects, can also have indirect effects on an industry's volume of production which are passed through the intermediate demand of other production sectors and industries. In order to take into account both direct and indirect effects, a slight modification of equation (2.2) is necessary.

B. The total method takes into account the total effects on industrial production coming from exogenous demand elements. This is specified by equation (2.3).

$$(2.3) \qquad \Delta X_i = \sum_j \bar{r}_{ij}^1 u_j^1 \Delta D_j + \sum_j \bar{r}_{ij}^1 \Delta E_j + \sum_j \bar{r}_{ij}^1 \Delta u_j (D_j^2 + W_j^2)$$

$$+ \sum_j \bar{r}_{ij}^1 u_j^1 \sum_k \Delta a_{jk} X_k^2$$

where $\bar{r}_{ij}$s are the elements of the inverse matrix cited in the third preliminary step. All the elements on the right

hand side refer to the following: (a) the changes in domestic final demand; (b) the changes in export demand; (c) the changes brought about by import substitution; and (d) the changes in technical coefficients. In contrasting equation (2.3) with equation (2.2), it is apparent that intermediate demand in equation (2.2) is replaced by the change in technical coefficients in equation (2.3).

While equation (2.3) measures the total effects coming from all the exogenous demand elements upon the changes in the production volume of a given industry, its focus is only upon growth. However, despite such a focus, equation (2.3) does bring out the effect of structural changes upon growth. Thus, the third element on the right hand side of the equation points to the change in domestic content, and the fourth element points to the change in technical coefficients--both of which reflect changes in parameters and can therefore be considered as structural changes--as probable sources of industrial output growth.

In order to shift the focus to structural change, Chenery proposed a formula which measures the deviations from proportional growth, the reference growth being that of the whole economy. Thus:

$$(2.4) \quad \partial X_i = \sum_j \bar{r}_{ij}^1 u_j^1 \partial D_j + \sum_j \bar{r}_{ij}^1 \partial E_j + \sum_j \bar{r}_{ij}^1 \Delta u_j (D_j^2 + W_j^2) + \sum_j \bar{r}_{ij}^1 u_j^1 \sum_k \Delta a_{jk} X_k^2$$

where $\partial X_i = X_i^2 - \lambda X_i^1$

$$\partial D_i = D_i^2 - \lambda D_i^1$$

$$\partial E_i = E_i^2 - \lambda E_i^1$$

and where $\lambda$ is the growth rate of GDP and $\partial$ is the measure of the deviation from proportional growth with GDP.

In equation (2.4) the deviation from proportional growth of a given industry's output is being accounted for by exactly the same exogenous demand elements as those cited in equation (2.3). However, here the first two elements on the right hand side of the equation are now expressed also in terms of their deviation from proportional growth of GDP and in this sense the structural change in final domestic demand and in export demand can be said to have an impact upon the structural change of a given industry.

In applying such equations to Philippine data from 1956 to 1978, Estanislao (1981) found that under the direct method (equation 2.3), the expansion of domestic final demand can account for 45% of all output growth. An additional 33% can be accounted for by the growth of intermediate demand. Thus, the expansion of the home market alone, either in the form of increased demand due to higher production in other sectors and industries of the economy or of increased market requirement for finished goods and services, can be tagged as having been responsible for approximately three-fourths or even four-fifths of total output growth. On the other hand, export expansion con-

tributed only about 13% to total output growth; import substitution had an even smaller contribution at roughly 9%.

Table 2.1.--Relative Contribution of Different Demand Elements to Output Growth and Structural Change in the Philippines, by Decades

| Method | Final Domestic Demand | Exports | Import Substitution | Intermediate Demand*/Technological Change** |
|---|---|---|---|---|
| Direct | | | | |
| 1956-58/66-68 | 45 | 13 | 9 | 33* |
| 1966-68/76-78 | 57 | 9 | 9 | 25* |
| Total | | | | |
| 1956-58/66-68 | 68 | 14 | 11 | 7** |
| 1966-68/76-78 | 63 | 12 | 10 | 15** |
| Non-Proportional Growth | | | | |
| 1956-58/66-68 | 53 | 21 | 15 | 11** |
| 1966-68/76-78 | 53 | 12 | 13 | 22** |

Source: Estanislao (1981).

*Intermediate Demand appears as an element only under the Direct Method. Thus, only the percentages listed under the Direct Method can be attributed to it.

**Technological change takes the place of intermediate demand in the total method and in the method involving non-proportional growth. The percentages listed under these methods and under the last column should refer only to technological change.

The dependence of total output growth upon the expansion of the domestic market is also highlighted by the results of the total method (equation 2.3). Slightly more than two thirds of the expansion in output can be traced to the direct and indirect effects of domestic final demand

expansion. On the other hand, the relative neglect of export markets is highlighted by the small contribution to output growth by the total effects of export expansion. Moreover, from the first decade to the second decade, there is no evidence that such small contribution by export expansion has risen, which is true in the case of technological change. Such change contributed little (around 7% only) to output growth during the first decade but doubled its contribution during the second decade.

Similar results can be cited from the use of the last formula (equation 2.4) where the fact of structural change is given the focus. Expansion of final domestic demand still accounts for more than half of deviations from proportional growth of GDP; export expansion shows declining relative importance; while technological change shows increasing relative importance, although this may not have been truly progressive. Import substitution, on the other hand, even during the first decade, does not appear to be an overly important factor either in the growth of output or in structural change, in the sense that the latter is taken by Chenery.

Such results provide further quantitative evidence to what has been generally said about the pattern of Philippine economic growth. The marketing orientation of Philippine economic operations has been largely inward; the need for thrusting outward in order to get a boost from export markets has not beenly keenly felt; technological change,

which is associated with the prospects for increases in productivity levels, while probably moving upwards, has been too small a factor to make any significant difference as yet; and import substitution is a process that may have boosted output growth in decades past, but much of the shove it may have given the economy has long been gone.

2. Results for Industries

In the manufacturing sector, the results point to the same general conclusions. Taken as a whole, and as a broad frame of reference, the growth of output in manufacturing can be traced to the following: some 50% to the increase in domestic demand, another 25% to the increase in intermediate demand, still another 15% to import substitution, and only about 10% to export expansion.

The results from the difference methods do differ, but on the whole, the above statements can be used as a convenient although grossly simplified reference for the results cited for specific industries.

Whichever method is used in accounting for growth of output in the manufacturing sector does highlight the importance of the increase in domestic demand. On the other hand, the relative contribution of either import substitution or export expansion to manufacturing output growth has not been very high. Moreover, there is no immediate evidence of any significant change in the magnitude of the relative contribution of each of the demand elements

Table 2.2.--Relative Contribution of Different Demand Elements to the Growth of Output in Manufacturing

| Method | Domestic Demand | Export Expansion | Import Substitution | Intermediate Demand*/ Technological Change** |
|---|---|---|---|---|
| Direct | | | | |
| 1956-58/66-68 | 50.0 | 8.0 | 17.4 | 24.6 |
| 1966-68/76-78 | 49.5 | 8.7 | 15.9 | 25.9 |
| Total | | | | |
| 1956-58/66-68 | 64.6 | 9.0 | 18.2 | 8.2 |
| 1966-68/76-78 | 60.4 | 10.3 | 15.4 | 13.9 |
| Non-Proportional Growth | | | | |
| 1956-58/66-68 | 53.9 | 8.5 | 25.9 | 11.7 |
| 1966-68/76-78 | 42.2 | 10.9 | 24.8 | 22.1 |

Source of Basic Data: I-O Tables of the Philippines

*The contribution of intermediate demand applies only to results from the direct method.

**The contribution of technological change applies to results from the total method and non-proportional growth.

to industrial growth from the first decade to the second decade. For instance, the contribution of import substitution to industrial growth has remained more or less the same between 1956 and 1978, if decade averages are used as a basis for the computation.

On the other hand, however, "technological change" does show a discernible increase in its contribution to industrial growth. The results from the application of the formula for the total method show that while technological change contributed less than 10% to industrial growth during the first decade, the corresponding figure for the second

decade is significantly above 10% Although these results have to be interpreted in a specific way, it must be noted that they support the results for the whole econo

Indeed, the results of growth account from the demand side that were cited for the whole eco y are generally confirmed by similar results for the anufacturing sector however, such broad results can be gi n more specific content by applying the same analysis nd bringing it down to the level of individual industries

At the level of individual industries, t e relative importance of final domestic demand and export expansion confirms the general results cited for the entire manufacturing sector, except for the three base industries that are export-oriented

The weighted average of three specific consumer-oriented industries--textile, tobacco, and beverage--shows the contribution of export expansion to be negligible Moreover, no significant improvement can be observed in this regard from the first period to the second period

These three consumer-oriented industries have been dependent upon the growth of domestic final demand for growth in their own output On average, more than three fourths of the increase in their output can be accounted for by the growth of domestic final demand While changes can be observed in the computed results for each industry from one period to another, still their weighted average indicates the persistent importance of the domestic market

as an influencing factor of their output growth. In the case of beverage and tobacco, this statement holds more strongly than for textiles.

In a similar situation, the investment-related industries exhibit a market orientation that was heavily tilted towards the domestic rather than the export markets. In their case, however, some improvement can be seen in that from the first period to the second period, a growing stress on export markets is discernible. This improvement, however, can be traced to one industry, the cement industry, which started export operations in a big way during the second period. While it is not necessarily an ideal example of an industry whose bearings can be easily redirected, still the cement industry has shown that export markets can be tapped. The results of the total method for the appliance industry show that it too has started to move in the same general direction; but those for iron and steel as well as for automotive show that export markets have yet to be considered as basis for growth of their output.

The petroleum industry, at least during the more normal period covered by the years 1956-58-1966-68, was processing products a small portion of which were exported. The remainder was for domestic demand, either final or intermediate. Thus, during the first period, the results from the total method suggest that more than 70% of the industry's output growth can be traced to domestic demand, and some 15% to export expansion. In this regard, the

Table 2.3.--Relative Contribution of Domestic Demand and Export Demand to the Growth of Output of Specific Industries, as Calculated Following the Total Method, by Decades[1]

| Industries | Domestic Demand | | Export Expansion | |
|---|---|---|---|---|
| | 1956/58-1966/68 | 1966/68-1976/78 | 1956/58-1966/68 | 1966/68-1976/78 |
| Base Industries[2] | 29.8 | 9.5 | 66.8 | 75.5 |
| Sugar | 19.8 | 5.4 | 81.4 | 111.0 |
| Coconut | 36.3 | 6.7 | 48.5 | 88.8 |
| Wood | 54.1 | 23.1 | 44.4 | (21.5) |
| Consumer-Oriented[2] | 101.6 | 96.0 | 2.2 | 3.3 |
| Textile | 67.0 | 54.0 | (9.4) | 12.5 |
| Tobacco | 114.2 | 81.7 | 2.7 | (6.6) |
| Beverage | 101.7 | 116.3 | 4.1 | 7.8 |
| Intermediate: Petroleum | 72.7 | 44.4 | 15.3 | (15.4) |
| Investment-Related[2] | 105.8 | 57.0 | 10.2 | 17.6 |
| Appliance | 213.3 | 69.8 | 15.5 | 25.4 |
| Cement | 114.8 | 44.4 | 8.0 | 59.0 |
| Iron & Steel | 113.6 | 68.4 | 16.0 | 10.0 |
| Automotive | 46.9 | 48.4 | 6.5 | (1.2) |

Source of Basic Data: I-O Tables of the Philippine for 1965, 1969, and 1974 as well as various industry reports.

[1]The total method used here is stated in equation (2.3). The first decade refers to 1956/58-1966/68, and the second decade to 1966/68-1976/78. It will be noticed that the beginning and end years are three-year averages.

[2]Industry group results are weighted averages of the specific industries included in this table. The weights used are the average of beginning and end year shares of each industry in the value added of the relevant group.

petroleum industry was slightly more export-oriented than the manufacturing sector as a whole. However, during the second period, the abnormal situation shut out export expansion as a basis for industry growth.

The base industries, as a group of export-oriented sectors of the economy, naturally show the relative importance of export expansion behind their output growth. Their weighted average result from the total method shows that during the first period, as much as two-thirds of their output growth can be traced to the expansion of exports. Interestingly, during the second period, the corresponding percentage is higher since it reached three-fourths. This improvement is very clear in sugar and coconut oil processing--two industries whose exports in 1974, the time when I-O data were taken and formally listed down, rose dramatically. But wood processing, whose products were faced with difficult export markets at that time, showed a deterioration in the position of export expansion as a factor in output growth.

The results above for the three base industries are the expected ones. Indeed, their conformity with expectations does create confidence that the data used in solving the formulas cited in the first section of this chapter are not unrealistic. Such confidence is confirmed by the results for rice, which can be given only for the second period. Unlike the other three base industries, the rice industry has not been export-oriented. Thus, the contribution of domestic final demand (108.3%) to industry output

growth is the preponderant one. However, by 1974, a little exportation (0.8%) was already being made, and this is captured by the data used. No matter how small, still the result for export expansion under the total method for rice is positive.

On the whole, therefore, only the average of the three base industries shows a contribution on the part of export expansion to industry output growth that is higher than the overall result cited earlier for the manufacturing sector as a whole. The average of consumer-oriented industries shows a much lower export expansion percentage than the manufacturing average; the average of investment-related industries shows a percentage equal to the sector average, and during the first period, the petroleum industry showed a slightly higher percentage.

From the first period to the second period, while the sector average showed no significant change in the percentage contribution of export expansion, the average for base industries, for consumer-oriented, and for investment-related industries showed moderate gains in such percentage contribution. Understandably, the petroleum industry could not show similar gains. From the standpoint of those who would like to see a more aggressive export posture in Philippine industry, this development--while still not very significant--is most certainly welcome. By the same token, the slightly lower dependence on final domestic demand which can be observed for the entire manufacturing sector and for

each group of industries should also be welcome.

It is in this context of a slight shift in emphasis of market dependence that developments in the Philippine industrial sector have been positive. The pace is agonizingly slow, but the direction is correct and conforms with what is usually deemed as desirable. The trend is detectable, but it has not become very firm yet because it has not gone far enough. In other words, the turn-around from relying too strongly on the home market as a source of industrial growth has not been strong and decisive enough to make a significant difference as in the case of Korea (Kim and Roemer, 1979).

Another development facet where trends in Philippine industry do not appear to have been substantive is the relative importance of intermediate demand in industrial growth. While not all industries lend themselves easily to much closer inter-industry relations, still the process of development oftentimes leads to a widening of inter-industry dependence. Thus, the products at least of some industries progressively go into other industries so that linkages between industries are strengthened. This leads to the expectation that intermediate demand becomes a slightly more important basis for the growth of output in some industries.

The results of the direct method for the whole manufacturing sector have already shown that there has been a very slight increase from the first to the second period in

the percentage contribution of intermediate demand to overall industrial growth. However, those for specific industries show more encouraging developments.

In the wood industry, the trend has been definitely up. More than 55% of the growth of output of wood processing is due to the increased intermediate demand by other sectors of the economy, most especially by the construction sector. A similar trend can be cited for textiles. In more recent years, 35% of output growth is due to the increased demand by other industries, up from 23% during the earlier decade. This is reflective of the closer inter-action between the textile and garment industries. The results for cement also conform with common sense. More than 45% of the growth of cement output can be traced to increased intermediate demand, presumably stemming from the construction sector. Similarly, automotive equipment has grown in volume, and almost 60% of such volume growth is now attributed to the increased demand by business and other producing units of the economy. In all these cases, intermediate demand has increased in relative importance as a basis for industrial growth; moreover, such results are to be expected.

That intermediate demand is far from an important consideration behind the growth of output in sugar and coconut processing is an indication that further maturation of these industries has not yet started. Beyond the refineries that add value to sugar cane and to copra, very little else is on hand to process these products further. A chemical

industry based on these agricultural products has yet to be set up and made to operate; until this is done, after the first stage processing which is already done in this country, little economic advantage is extracted out of such economic base items as sugar and coconut. Eventually, when domestic oil production shall have been geared up to truly economical proportions, a similar issue will arise in the petroleum industry.

The other specific industries included here do not show high prospects for intermediate demand to become a major factor behind their output growth. Tobacco and beverage products are consumer industries that need no further processing. Appliances are no less consumer-oriented. Iron and steel, however, is in the same position as cement, and it is closely related with the construction sector. It needs further integration, however, and where scales permit, some degree of specialization. But unlike tobacco, beverage, and appliances, its linkage effects on other production units of the economy should be high and rising.

In sum, while the aggregative trends are not strong, there are enough cases, especially in industries where trends are expected, where intermediate demand has become a much more important source of industrial growth. This suggests that the process of strengthening inter-industry links has been going on in Philippine industry. It is substantive in a few industries such as wood, textiles, cement, and automotive. It has yet to begin in a serious

Table 2.4.--Relative Contribution of Intermediate Demand to Output Growth of Specific Industries, as Calculated under the Direct Method, by Decades[1]

| Industries | First Decade | Second Decade |
|---|---|---|
| Base | 1.3 | 12.6 |
| Sugar | 0.2 | - |
| Coconut | (9.1) | 3.0 |
| Wood | 4.3 | 57.5 |
| Consumer-oriented | 14.2 | 13.3 |
| Textile | 23.2 | 35.6 |
| Tobacco | (14.0) | 20.2 |
| Beverage | 26.6 | 3.0 |
| Intermediate: Petroleum | 52.9 | 18.0 |
| Investment-related | 54.4 | 41.4 |
| Appliance | 31.2 | 7.5 |
| Cement | 76.0 | 47.5 |
| Iron & Steel | 102.8 | 35.9 |
| Automotive | 42.7 | 39.7 |

Source of Basic Data: I-O Tables of the Philippines for 1965, 1969, and 1974 and various industry reports.

[1]Only the direct method, as stated in equation (2.2), can provide results for intermediate demand. The decades referred to are: the first decade, 1956-66, but with data for beginning and end years being an average of three years; and the second decade, 1966/68-1976/78.

[2]Results cited for groups of industries are weighted averages of the specific industries that are listed in this table as belonging to a particular group. Weights used vary from one decade to the next.

way in sugar and coconut processing, and in the case of iron and steel, the full integration of the industry has yet to be completed.

Still another facet of development that has been one of the major concerns of Philippine industrialization is import substitution. The results for manufacturing as a whole indicate that around 15% to 18% of output growth may well be due to substituting local industrial production for imported products.

At first glance, one does not expect this factor to remain a significant contributor to industrial growth. The data for $m_i$ and $u_i$, which in the equations formulated by Chenery play a big role in the determination of the relative importance of import substitution, show that in the Philippines the room for import substitution is no longer very big. Indeed, the domestic content listed for various specific industries in the 1965 and 1974 I-O tables is already substantial and is already close to the 90% level, if not beyond it. Significant exceptions are: textiles (75%), iron and steel (49%), electrical machinery and appliances (54%), motor vehicles (36%). Thus, except in these industries, the direct import content is already low and the possibilities for direct import substitution are limited.

But the results from the total method for specific industries point to a number of industries where the contribution of import substitution to their respective output gorwth has been higher than the 15% to 18% sector average for manufacturing.

Table 2.5.--The Import ($m_i$) and Domestic ($u_i$) Content of Specific Industry Operations in 1965, 1969, 1974

| Industries | Import Content ($m_i$) 1965 | 1969 | 1974 | Domestic Content ($u_i$) 1965 | 1969 | 1974 |
|---|---|---|---|---|---|---|
| Sugar | .0013 | .0085 | .0002 | .9987 | .9152 | .9998 |
| Coconut | .1052 | .2165 | .1591 | .8948 | .7835 | .8409 |
| Wood | .1067 | .0822 | .0088 | .8933 | .9178 | .9912 |
| Textiles | .4873 | .4061 | .2427 | .5127 | .5939 | .7573 |
| Tobacco | (.0208) | (.0867) | (.0031) | 1.0208 | 1.0867 | 1.0031 |
| Beverages | .0194 | .0381 | .0206 | .9806 | .9619 | .9794 |
| Petroleum | .1575 | .0683 | .0686 | .8425 | .9317 | .9314 |
| Appliances | .3910 | .4620 | .4580 | .6090 | .5380 | .5420 |
| Cement | .0307 | .0170 | .0685 | .9693 | .9830 | .9315 |
| Iron & Steel | .3908 | .5209 | .5110 | .6092 | .4792 | .4890 |
| Automotive | .8804 | .8057 | .6556 | .1196 | .1943 | .3444 |

Source of Data: I-O Tables of the Philippines.

The first of such results comes from the wood industry where the figure is more than 50%. Imported plywood and veneer used to be an anamoly, considering the resource endowment of the country, and it appears that such was being corrected during the later decade included in this study.

Tobacco and textile products report similar trends. Imported finished products used to be important, and local production has been trying to substitute for such imported items. During the second decade included in this study,

Table 2.5.--Relative Contribution of Import Substitution to Output Growth of Specific Industries, Total Method

| Industries | First Decade[1] | Second Decade[2] |
|---|---|---|
| Base | (2.6) | 11.7 |
| Sugar | 0.1 | - |
| Coconut | (10.0) | 2.4 |
| Wood | (1.1) | 53.9 |
| Consumer-oriented | (2.5) | 13.6 |
| Textile | 26.4 | 41.3 |
| Tobacco | (13.6) | 23.6 |
| Beverage | (2.3) | (0.2) |
| Intermediate: Petroleum | 9.4 | (2.5) |
| Investment-related | 16.8 | 24.1 |
| Appliance | (46.2) | (0.8) |
| Cement | 0.4 | (11.0) |
| Iron & Steel | (46.5) | 10.5 |
| Automotive | 59.1 | 64.3 |

Source of Basic Data: I-O Tables of the Philippines and various industry reports.

[1]The first decade is 1956/58-1966/68.

[2]The second decade is 1966/68-1976/78.

some 23% of the increase in tobacco production is probably due to such substitution, and in the case of textiles, the percentage is higher at 41%. On the surface, then, while the focus on import substitution as a rationale for industrialization has been under fire (Ranis, 1974), still for the tobacco and textile industries, it is difficult to deny that such substitution has had some beneficial effect. The contribution to output growth in these industries on the part of import substitution has to be weighed against its supposed disbenefits (Bautista, 1979).

Import substitution in all sectors of the economy has also helped boost the output of iron and steel as well as of the automotive industries. During the second decade, some 10% of output growth in iron and steel is attributable to import substitution in the economy. The corresponding percentage for the automotive industry is even higher, 64%. These two industries have gotten some mileage out of the domestic market, where local producers were being given som advantage over competitors whose operations consisted mainl of importing finished products. This is a partial vindication of those who have been proposing and pursuing import substituting industrial policies. While such vindication is not easily granted by others, especially those who are committed to a more liberal economic regime in the Philippines, still it can not be lightly dismissed. Here at leas is a measurable benefit that will have to be considered against the inefficiencies and inappropriateness in factor

proportions that import substituting policies are supposed to have introduced into the economy.

It is possible that the benefits of import substitution have been over-rated. In an economy that has been contingent upon the external sector to be able to sell its export products, from which foreign exchange could be earned, there has always been an element of doubt over the two-sidedness of import substitution policies. We needed the external sector, to which we wanted to sell exports, and therefore we were against restraints on our export trade. But industrialization policies based on import substitution required restraints on some segments of our import trade. This lack of two-sidedness could be justified by the very fact of our relative under-development. However, on a more practical basis, the justification has not served the purpose of fast economic and industrial growth (Balassa, 1980).

On the other hand, for some selected industries, even during the second decade, the contribution of import substitution in the economy to their output growth, as shown above, has not been negligible.

A final facet of development which must come together with industrial growth is a rise in productivity. Given the technical coefficients in the I-O tables, a rise in productivity in the different sectors of the economy, under the total method, can lead to a decline in demand for the product of a given industry in so far as this is used as an input in producing a unit of output. Thus, unlike the other

demand factors that have been considered whose contribution to industrial output growth is ordinarily positive, a rise in productivity or a progressive technical change can have a negative contribution to industrial output growth, or its contribution may be positive but declining over time.

It is in this regard that the result cited for the manufacturing sector has to be viewed with some concern. Under the total method, the contribution of technological change to output growth has been positive and rising. While the contribution is small, 8% during the first decade and 13% during the second decade, still the trend does not suggest that the character of technological change has been appropriate.

The weighted contribution of technological change in base industries' output growth is much more appropriate. It is smal. Moreover, it has declined from 6% in the first period to 3% in the second period. While it is not negative, it appears to be going in the right direction. Significantly, this is largely because of the results for and coconut processing industries, where technological change in all other sectors has contributed either negatively or a declining percentage to these industries' output growth. But the results for wood processing bear close watching. They suggest that the technological changes in the other sectors of the economy have led to increased demand for wood. This has been so during the second decade.

Among the consumer-oriented industries, the weighted average contribution of technological change to output growth has been negative. Appropriately, such negative contribution has risen from the first decade to the second decade. This result can be traced to the more specific results for textiles and beverages. In the case of textile, the percentage contribution cited for the first decade is positive, but it turned negative in the next decade; in the case of and beverages, it was already negative in the first decade, becoming bigger in the second decade. Substantively, the changes in the other sectors may have led to shifts such that as their output increased, less textile products and less beverages per unit of output are used up. The real-life implications are not difficult to imagine, and they are not senseless.

The other results are instructive, and the most revealing are those for petroleum products. Since the coefficients used were those reported for the 1974 I-O tables, it is possible that the unusual prices for petroleum products for that year not only affected industrial operations but also the calculated results from the use of the formula for the total method. Due to the increase in oil prices, industrial operations had to carry a much higher cost burden for the use of fuel. The I-O tables reflect this fact and bring out the result that such changes in industrial operations in the economy contributed a very high percentage, 73%, to total output growth in the

Table 2.7.--Relative Contribution of Technological Change on the Growth of Output of Specific Industries, Total Method

| Industries | First Decade[1] | Second Decade[2] |
|---|---|---|
| Base | 6.0 | 3.4 |
| Sugar | (1.3) | (16.4) |
| Coconut | 25.2 | 2.1 |
| Wood | 2.6 | 44.5 |
| Consumer-oriented | (1.3) | (12.9) |
| Textile | 16.0 | (7.8) |
| Tobacco | (3.3) | 1.3 |
| Beverage | (3.4) | (23.9) |
| Intermediate Petroleum | 2.6 | 73.5 |
| Investment-related | (22.2) | 1.2 |
| Appliance | (82.7) | 5.6 |
| Cement | (23.3) | 7.6 |
| Iron & Steel | 14.9 | 11.1 |
| Automotive | (5.5) | (11.5) |

Source of Basic Data: I-O Tables of the Philippines and various industry reports.

[1]The first decade is 1956/58-1966/68.

[2]The second decade is 1966/-1976/78.

petroleum industry. This result, however, is conditioned by the inability of the statistical system to use an appropriate price deflator.

Similar considerations may have to be made in interpreting the results for cement, which is an energy-intensive industry. In the case of iron & steel as well as automotive, however, the results are appropriate. They show the correct trends, and in the case of the automotive industry, the signs have been correct even during the first decade.

A rise in productivity should be one of the most serious concerns in industrial growth. Since industry is ordinarily a fast growth sector, and since productivity is more easily increased in the congenial atmosphere of fast growth, then it is in industry where rapid increases in productivity must be achieved.

Unfortunately, in this study, no direct measures of productivity changes have been taken. Indeed, only an indicator of productivity changes is considered in this chapter, and such an indicator is a very indirect one. Under the total method, it is the productivity increases in the other sectors of the economy which can help influence--adversely--the demand for the product of a given industry. Moreover, the results that could be reported here are conditioned by information taken from the 1974 I-O tables, and it is probable that at least in the case of the petroleum industry, some of the structural changes have not been adequately taken into account.

Nonetheless, in a sufficient number of industries, the indirect indicator shows that the trend of productivity has been appropriate. In other words, technological changes elsewhere in the system have conspired to press down the demand for the output of an industry, whose product is used as an input elsewhere. Thus, while the indirect indicators here have to be taken with some caution, still in a number of cases they show a trend that is in conformity with normal expectations from the process of development.

The general findings on demand elements as sources of growth that had been cited for the whole economy appear to be broadly confirmed by those for the manufacturing sector, and these in turn tend to be supported by the results for specific industries. Indeed, the dependence of industrial output growth on domestic demand--with the exception of selected base industries whose orientation is more external--has been significant, although at the level of specific industries, one finds that such dependence has lessened to a noticeable extent from the first to the second decade. On the other hand, the dependence on export demand--with the exception of the petroleum industry during the second decade--is rising in most specific industries. Again, here the trend is clear, although the increase has yet to achieve significant proportions. Import substitution, as a whole, does not contribute in any important degree to output growth, except in the case of investment-related industries as a group. However, for some selected industries, this is still

a significant push factor, as can be seen in the case of two consumer-oriented industries--textiles and tobacco--during the second decade. Finally, technical change appears to be moving in the right direction, as can be gleaned from the impact it has on the output growth of a number of specific industries.

The same factors can be cited as being responsible for the structural changes in the manufacturing sector. Since such changes are understood as the shifts in relative importance of each industry in the manufacturing sector and thus also in the economy, it is their proportional growth that would help determine such changes. Consequently, the same elements that determine the growth of an industry's output should determine the relative growth of an industry's output, since the standard with which such growth is related is common to all, i.e., over-all economic growth.

Thus, while the results from the non-proportional growth formula appear numerically different from the results cited for the total method, their general conclusions remain essentially the same. Growth and change at the level of specific industries therefore appear to be consistent with growth and change in the broader sectors as well as in the whole economy. The relative importance of the different demand elements is similar in all three levels: the economy, sectors, and specific industries. While interesting differences can be cited in the results for groups of industries as well as for specific industries, invariably

the results at the lower, more specific levels are supportive of those at the higher, more aggregative levels.

# CHAPTER III

## SOURCES OF INDUSTRIAL GROWTH FROM THE SUPPLY SIDE

At a time when supply-side economics is supposed to be in vogue, it is necessary to remind ourselves that accounting for the growth of an economy and of various sectors and industries, by highlighting the different factors of production ordinarily used in the supply of goods and services, has a long tradition in economics. Such tradition is longer than the growth accountancy from the demand side that had been proposed by Chenery (1979). This is partly due to the basic framework used by growth accounting from the supply side; it reaches back into conventional marginal productivity analysis and into standard analysis under competitive conditions in micro-economics.

Indeed, the elegance of analysis under competitive conditions is shown by the proofs given for equilibrium whereby the factors of production are paid according to their marginal productivity. The shares that are paid to labor and capital are merely the ratios between their respective marginal product and average product; moreover, these shares can completely account for and claim total net value added or the value of total output. The empirical results of Douglas which gave rise to the Cobb-Douglas

production function added quantitative substance to the analytical elegance (Jones, 1976).

Inevitably, such a framework invites further work, and work has been carried on in two fronts. Conceptual and mathematical refinements have been introduced, and empirical testing has been undertaken. Since Nadiri (1972 and 1974) has described efforts on both fronts, it is not necessary to do the same in this work. However, it may be necessary to go over the essential concepts in so far as these are made to guide the research being reported here, and to cite some precedents for similar work that had been done in the Philippines.

## 1. Basic Concepts and General Results

The relation between the changes in factors of production and the changes in the resulting volume of production is the basis for growth accounting from the supply side. It is difficult to escape the suggestion that at least a part or even perhaps most, if not all, of the increases in production volume can be traced to the increases in labor, capital, and other inputs used in the production process. It is not enough to accept this suggestion. It is helpful to quantify it.

The effort at quantification brings in the need for specifying a production function. The coefficients yielded by a production function are indicative of the change in total production that can be traced to the changes in the

factors of production. In the technical jargon, they are the partial elasticities of output to the changes in the factor inputs. Thus, such coefficients are extremely useful, at least conceptually. Given what they are supposed to be, and therefore by carefully considering the concept behind them, these coefficients can be used as weights against the measured changes in factor inputs. Thus, the growth of labor and capital used in the production process can be weighted, i.e. multiplied against their respective coefficients in order to measure their relative contribution to the increase in total production volume. By following this route, it is possible to arrive at the objective of being able to trace the growth of output to the growth of inputs.

In this sense, having to fit a production function is crucial to any effort at identifying the relative importance of the different factors of production as sources of economic and industrial growth. While crucial, such effort is oftentimes insufficient, where all the rigid conditions for competitive equilibrium are not satisfied.

Indeed, both conceptual and empirical considerations have suggested that normally after trying to account for output growth on the basis of the growth of the different inputs, there is a residual, often not inconsequential, which is left unexplained by the growth of inputs. Griliches and Jorgenson (1967) have shown that the size of the residual is determined by the failure to account

for changes in the quality of the different factor inputs. The increased health, education, training, motivation of the labor force, once considered together with the quantitative increase of the labor force, can help bring a large portion of the residual from the "unexplained" to the explained column. A larger portion is transferred from the zone of the unaccounted if similar effort is exerted to take note of the qualitative and other improvements that are embodied in the quantitative increase of capital. In general, there is a smaller residual that is left in the zone labelled as "disembodied technological change," the greater the effort to account successfully for quality improvements embodied in the different factor inputs.

Furthermore, markets are seldom left alone to work out according to competitive rules. Factor markets in particular are often far from the ideal conditions set forth by competitive mechanisms. Therefore, it is usual to find that factor inputs are not paid according to their marginal productivity, and that the wage rate is different from the partial elasticity of output to labor input, or the rate of return to capital from the partial elasticity of output to capital input. Bruno (1968) specifically accounts for such differences which are more common than the theoretical supposition. Thurow (1968) also argues that the exceptions to the theoretical assumptions behind factor payments under competitive equilibrium are the rule in empirical findings.

One is left in the same situation that confronted Chamberlin (1956) as he tried to relate theory with observed facts. He referred to competitive conditions as the "ideal" which are of course different from the actual. Therefore, while the coefficients taken from production functions can be used as the "ideal weights" in order to arrive at the contribution of factor input increases under ideal conditions, it is also necessary to use actual factor shares to arrive at actual contribution of factor input increases to output growth. The differences between the two sets of results can be taken as indicative of the biases in factor markets and of the distance from the ideal of actual conditions prevailing in a production sector or industry.

In this work, taking into account all of the above, an effort has been exerted to set up production functions for different industries in order to account for industrial growth. While the size of the residual is noted, no effort has been made to make it smaller as quality improvements embodied in the different factor inputs have not been accounted for. Finally, two sets of weights have been used, and consequently, two sets of results have been arrived at: one set describes the "ideal," as suggested by the coefficients taken from the fitted industrial production functions; another set describes the actual, as indicated by results reported out by the I-O tables of the Philippines.

In setting up industrial production functions for the

Philippines, one follows the lead that had been taken by Sicat (1963 and 1968) and uses the conventional Cobb-Douglas form. Furthermore, instead of limiting oneself to two factors of production, three factors are included, adding the third factor--raw materials--to the two traditional inputs of capital and labor. This imposes the need to measure output as total gross value or gross value added plus cost of raw materials. In this way, the comments of Domar (1967) and Carter (1970) on the importance of considering raw materials as an input in the analysis of output would be heeded, and the example of Syrquin (1970) would be followed.

Following Klein (1967), in order to take into account the interdependence of the different inputs in the production process the standard Cobb-Douglas production function (equation 3.1) is expressed in linearized logarithmic OLS form (equation 3.2):

$$(3.1) \qquad Q = A K^{\alpha} L^{\beta} T^{\gamma} e^{\mu t}$$

$$(3.2) \qquad \log Q = A + \alpha (\log K + \tfrac{\beta}{\alpha} \log L + \tfrac{\gamma}{\alpha} \log R) + \mu t$$

where A is a constant and $\alpha$ is the non-negative exponent of capital, K, and where the ratio of two parameters such as $\frac{\beta}{\alpha}$ and $\frac{\gamma}{\alpha}$ (both of which are geometric means) can be defined as:

$$(3.3) \qquad \left(\frac{\beta}{\alpha}\right) = \prod_{i=1}^{n} \left(\frac{\text{Cost of labor}}{\text{Cost of capital}}\right)_i^{1/n}$$

$$(3.4) \qquad \left(\frac{\gamma}{\alpha}\right) = \prod_{i=1}^{n} \left(\frac{\text{Cost of raw material}}{\text{Cost of capital}}\right)_i^{1/n}$$

and where t is time. By totally differentiating equation (3.1) with respect to t, and by manipulating the right hand side of the equation with the aim of eventually simplifying it, one arrives at the following:

(3.5) $gr\,(Q) = \alpha\, gr\,(K) + \beta\, gr\,(L) + \gamma\, gr\,(R) + \mu t$

where gr is growth rate, and as noted previously:

(3.6) $$\alpha = \frac{K}{Q}\,\frac{\partial Q}{\partial K}$$

(3.7) $$\beta = \frac{L}{Q}\,\frac{\partial Q}{\partial L}$$

(3.8) $$\gamma = \frac{R}{Q}\,\frac{\partial Q}{\partial R}$$

In viewing the results that are listed in this chapter, one must take into account their tentative character and the relative roughness of the results. The issues raised by Nadiri have not been faced, much less resolved. The data base of factor inputs has not been subjected to the same scrutiny as the one for output. Furthermore, not all the refinements available in the literature have been implemented. For example, those suggested by Bruno (1968) could not be carried out. Therefore, care must be taken to avoid making the statements derived from the results as basis for delicate policy decisions. They may however be indicative of the broad directions for general policy attention.

The results listed here differ from those taken from production functions made previously in the Philippines. Sicat's (1963 and 1968) production functions had to rely

on data available at that time and cross-section data had to be used. Encarnacion and others (1972) made useful estimates of production relationships at the sectoral level, but the variables used for the analysis of production vary from one sector to another. Here, time series data for each industry have been used, and the same three factor inputs have been consistently taken as the variables for the analysis of production for each industry.

The wider context against which the specific industry results for the Philippines can be considered had been presented by Estanislao (1981), who reported that for the economy as a whole, output increased by almost 5.7% per year during the period from 1956 through 1977. Simultaneously, the corresponding increases in factor inputs were: 4.2% for capital, 3.1% for labor, and 6.7% for raw materials In order to determine the relative importance of the contribution of input growth to output growth, he derived from production functions the following weights, which were found to be statistically significant: 59.26% for capital, 21.76% for labor, and 21.23% for raw materials. On this basis, he calculated that under ideal conditions, the relative contribution to total output growth in the economy would be the following: 43% for capital, 11% for labor, 25% for raw materials. However, since actual factor shares are different from the coefficients taken from fitted production functions, the calculated actual contribution to total output growth would be: 22% for capital, 12% for labor

55% for raw materials. In either case, whether ideal or actual conditions are assumed, the sum of contributions by factor input increases to output growth is high, being within the range of 78% and 90%, thereby leaving only a small residual which is within the range of 10% and 22%.

A number of elements deserve special attention.

The first is the relative growth of factor inputs. The rates quoted for capital and labor are well within normal bounds, but the growth of raw materials deserves much closer scrutiny because it appears to be very high. It is possible that the deflator for raw materials, which shows the highest rates of increase, is insufficient and is understated, thereby giving the bloated growth rates for the volume of raw materials used. It is to be hoped that this is the case, otherwise the conclusions that Estanislao (1981) derived would not stand.

The second is the difference in the calculated factor coefficients and actual factor shares. The ratio between the first and the second, as reported, would be the following: 0.51 for capital, 1.04 for labor, and 2.23 for raw materials, thereby suggesting that in the economy as a whole, disregarding sectoral differences for the moment, only labor is paid close to its level of marginal productivity. Capital appears to be underpaid, and raw materials overpaid to a significant degree. Furthermore, whichever weight is used, the contribution of labor input to output growth is the smallest among the three factor of production.

The lowest contribution to output growth that can be cited for capital (using actual weight) and for raw materials (using ideal weight) is about twice the percentage contribution of labor input.

The third is the small residual that has been reported. This means that close to 80% and perhaps as much as 90% of output growth can be explained by the mere quantitative increase in factor inputs. Little room is left for quality improvements embodied in the different factor inputs and for other technical changes outside the factors of production. In other words, while there has been an increase in productivity in the Philippine economy, there has not been much of it. While this is a justification for limiting the analysis to the traditional bounds, without entering into further work similar to what Griliches (1963 and 1964) and Denison (1974) had done, still this is a cause for concern from the standpoint of the long-term prospects of Philippine economic development. It is also a reason why it is hoped that the growth rate for raw materials, as reported by Estanislao (1981), would be overstated, because if it is, then the residual would be bigger and the increase in productivity would most probably be much higher.

## 2. More Specific Results for Industries

It may be useful to recall, while viewing the growth of factor inputs, that output growth in Philippine industry

in general has slowed down from the first to the second decade. This is true, in particular, for the consumer-oriented, for the intermediate, and for the investment-related industries. Any claim to the effect that the economic record in general has been improving in the 1970s will have to contend with this industrial slow-down, which is reported for many industries, and which can be checked through a variety of sources, both purely statistical and more comprehensive although merely anecdotal. Indeed, only the base industries as a group could show the second decade to be better, output growthwise, than the first decade.

Furthermore, especially during the first decade, there has been a tendency for the intermediate and investment-related industries to post higher output growth rates than the base and consumer-oriented industries. This observation is in accord with normal expectations out of the process of industrialization (Chenery, 1979). However, the industrial output record for the second decade points to some interesting exceptions. For instance: the phasing out of copra as an export product and the pressure to process it further may have helped to boost the output growth of coconut oil processing; and because of the relative importance of this industry in the first group of industries, the weighted average growth rate of base industries during the second decade has been reported to be high. On the other hand, the oil crisis and the policy of making market forces dictate the price of energy helped depress the growth rate

of output in the petroleum industry; and since this is the most important intermediate industry, the output growth of such a group of industries has been restrained as a consequence. Were it not for these exceptions, the normal pattern whereby intermediate and investment-related industries grow in output faster than the base and consumer-oriented industries would have been maintained also during the second decade.

Table 3.1.--Compounded Annual Growth Rates for Industrial Output

| Industry | First Decade[2] | Second Decade[3] |
|---|---|---|
| Base[1] | 5.0 | 8.6 |
| Rice | 2.8 | 3.6 |
| Sugar | 2.3 | 3.9 |
| Coconut | 7.8 | 16.8 |
| Wood | 16.7 | 6.2 |
| Consumer-Oriented[1] | 8.8 | 7.7 |
| Milk | 17.0 | 7.8 |
| Flour | 6.8 | 6.6 |
| Tobacco | 10.0 | 5.1 |
| Beverages | 7.5 | 7.6 |
| Meat | 7.5 | 10.9 |
| Textiles | 14.2 | 6.0 |
| Intermediate[1] | 17.8 | 6.5 |
| Paper | 19.9 | 11.2 |
| Petroleum | 17.6 | 5.8 |
| Investment-Related[1] | 13.5 | 8.6 |
| Iron & Steel | 23.5 | 9.9 |
| Cement | 26.4 | 8.1 |
| Appliances | 16.6 | 8.8 |
| Motor Vehicles | 4.0 | 7.7 |

[1]Group data are weighted averages of component industries.

[2]Refers to period 1956/58-1966/68.

[3]Refers to period 1966/68-1976/78.

Unfortunately, factor input data in the Philippines still are in serious need of cross-checking and of correcting for purposes of consistency. Until such an effort is made successfully, statements about the growth of factors of production especially at the industry level, must remain tentative and can be made with no solid confidence. In the meanwhile, however, the demands of growth accounting from the supply side of industry require that the following observations below are made.

With the exception of investment-related industries, there is no noticeable slow-down in the growth of employed labor in the major groups of industries. Employment in base industries grew at roughly the same average annual rate of under 4% during the two decades under study, and the corresponding average annual race for consumer-oriented industries is between 5.5% to 5.8%. While understandble divergences exist in the rate of employment growth in various industries, still there is no discernible pattern pointing to either a speed-up or a slow-down in employment by groups of industries.

But even in these admittedly rough employment data, by industries, one sees an evidence of slow-down during the second decade. The investment-related industries, which generated employment at an average annual rate of about 12% during the first decade, could continue doing the same but at a slower pace of only 4% during the second decade. Thus, while this last group of industries, consistent with its

high output record, was generating employment at a faster pace than other industries during the earlier period, when the period, for a relative slow-down in output growth came, it reacted with sharp sensitiveness and moderated its demand for new labor. It cut the growth of its employment down to a third of its previous job generation rate.

The growth of fixed assets in industry also points to a relative slow-down during the second decade. With the exception of the base industries, other groups of industries report the growth in the real value of capital to be at lower rates in the later than in the earlier period. For instance, in consumer-oriented industries, capital assets in real terms increased by more than 10% per year, on average, during the first decade; the corresponding rate during the second decade is 6.5% per year the investment-related industries, whose output had been increasing very fast during the earlier period, also saw the real value of their fixed assets rise by more than 20% per year; later, the rate was cut down to a little more than 10% per year.

While the investment-related industries, as a group, showed the highest increases in real value of fixed assets during the first period, still the faster increase in fixed assets relative to the increase in employment can be seen in all major groups of industries. Indeed, for base industries, the growth relative of fixed assets compared to the growth of employed labor can be placed at 2.9 for both

Table 3.2.--Compounded Growth Rates of Factor Inputs in Industry, by Decades[1]

| Industry | Labor | | Capital | | Raw Materials | |
|---|---|---|---|---|---|---|
| | $t_1$ | $t_2$ | $t_1$ | $t_2$ | $t_1$ | $t_2$ |
| Base | | | | | | |
| Rice | 2.4 | 2.5 | 5.0 | 6.6 | 4.2 | 4.6 |
| Sugar | 2.0 | 4.2 | 9.8 | 10.3 | 2.0 | 2.2 |
| Coconut | 7.1 | 6.3 | 14.9 | 25.0 | 7.2 | 12.2 |
| Wood | 3.7 | 2.8 | 15.5 | 4.5 | 5.0 | 3.0 |
| Consumer-Oriented | | | | | | |
| Milk | 7.9 | 10.9 | 10.2 | 5.1 | 20.2 | 5.9 |
| Flour | 3.3 | 4.6 | 13.1 | 6.6 | 4.4 | 6.2 |
| Tobacco | 3.3 | 3.1 | 12.2 | 4.8 | 4.7 | 3.9 |
| Beverages | 3.5 | 7.3 | 7.3 | 9.5 | 5.1 | 6.4 |
| Meat | 5.5 | 7.5 | 5.1 | 10.3 | 7.2 | 12.0 |
| Textiles | 2.6 | 1.4 | 16.7 | 2.4 | 9.4 | 7.8 |
| Intermediate | | | | | | |
| Paper | 10.4 | 12.1 | 17.4 | 12.6 | 17.4 | 12.7 |
| Petroleum | 0.7 | 5.6 | 17.2 | 7.5 | 17.2 | 7.5 |
| Invesment-Related | | | | | | |
| Iron & Steel | 13.8 | 9.3 | 22.8 | 18.5 | 20.8 | 12.4 |
| Cement | 7.2 | 5.2 | 21.9 | 8.4 | 7.8 | 5.4 |
| Appliances | 16.0 | 3.5 | 21.6 | 6.7 | 19.0 | 6.1 |
| Motor Vehicles | (3.8) | 6.9 | (1.0) | 16.6 | 5.2 | 5.9 |

Source of Data: Various Industry Reports.

[1]The first decade, $t_1$, refers to 1956/58-1966/68. The second decade, $t_2$, refers to 1966/68-1976/78.

decades. For consumer-oriented industries, the corresponding growth relative is only 1.9 during the first decade and 1.1 during the second decade. Surprisingly, the investment-related industries had a low corresponding growth relative of capital over labor during the first period (only 1.8), although this increased during the second period (to 2.8) as investments continued to be made at around 11% per year while additional employment could be generated at only 4% per year. In any case, for all groups of industries, it can be said that there has been a distinct preference to allow investment in capital assets to grow faster than employment.

Since the rise of raw materials should ordinarily be in step with the rise of output, nothing significantly new can be said about the different groups of industries outside of what had already been said regarding the growth of output (see Table 3.1). At this point however, it may be useful to indicate the serious need for closely looking into the information concerning raw materials used by industry. In any manufacturing enterprise, the raw materials represent the most important cost factor. While the indispensability of other factor inputs can not be subject to question, still there is no doubt, given the experience since 1973, how crucial raw materials and supplies are. In many instances, at least during the short run, there can be no easy substitute for their availability under predictable terms. Over the longer run, various facets of productivity

changes can be indicated by the inter-relation between the volumes of raw materials used and of outputs produced. And yet, despite their importance in the industrial production process, the data on raw materials, such as the ones used in this study, are in need of continuous monitoring and improvement.

Such need is not confined to data on raw materials. It extends to data on employed labor and fixed assets. Both are the basis for a well-founded discussion over a wide range of issues stretching from the purely technical aspects of appropriate technology to the more socially charged aspects of income distribution. Mangahas (1979) has rightly complained that most of our attention has been riveted upon output, while left in relative neglect are the inputs that are responsible for the production of output and the returns to such inputs, upon which measurements of welfare levels can be based.

A call for better data on factor inputs, however, does not mean abandoning any hope of working with whatever would be available and of coming up with tentative statements based on present data supply. Indeed, present data supply does make a conscientious analyst uncomfortable, but thus far the data do not point to any unreasonable results. The normal demands of industrialization, whereby investment-related industries make more strenuous demands upon labor and fixed assets, appear to have been captured at least during the first decade. The effects of industrial slow-

down on the growth of factor inputs also appear to be reflected quite reasonably by factor input data. The tendency of Philippine industry to exercise preference for fixed assets is shown up by the relative growth of capital and labor employed by various groups of industries. Thus, while there are enough instances to quibble over details, still the broad picture painted by detailed data on industry factor inputs is not unacceptable. Although many interesting refinements can be presented as more specific industry studies are conducted in depth, there is no prima facie evidence that the present data supply can not be used at all. Such specific industry studies must be undertaken in the future, but thus far there is nothing to hinder one from using presently available data to arrive at leads, no matter how tentative, on the supply sources of industrial output growth in the Philippines.

One of the uses to which factor input data can be put is the fitting of production functions for industries. The results, despite the initial reservations about input data, are promising. While they have to be taken with caution, still they appear to be well within bounds to serve as reference for initial discussion.

At first glance, the coefficients for labor ($\beta$) appear to be much lower than the general coefficient for labor cited for the entire economy. This is consistent with the general tendency for $\beta$ to be lower in manufacturing But here, the $\beta$'s for the different specific industries are

very much lower. Only the labor coefficient for wood and meat processing appear to be within hailing distance of the economy-wide labor coefficient that had been cited earlier.

Furthermore, the coefficients for capital ($\alpha$) also appear to be much lower than the general coefficient for capital cited for the entire economy. While the $\alpha$ for the whole manufacturing sector has also been reported to be on the low side relative to the $\alpha$ for the economy as a whole, still the $\alpha$'s yielded by the different production functions for specific industries are much lower still. No particular pattern for the various groups of industries is readily discernible. Within the group of base industries, rice and coconut oil milling have $\alpha$'s that are very low at around .020% while sugar and wood processing have $\alpha$'s that are higher at between .24 and .32. While the capital coefficients for consumer-oriented industries are higher, their spread is also wide, from a low of .13 for milk processing to a high of .50 for meat processing. By comparison, the $\alpha$'s for intermediate industries are much closer to one another, but also much lower than the $\alpha$ for the manufacturing sector, which is used as the reference: it is only .16 for paper and .19 for petroleum products. Finally, among the investment related industries, one notices two types of results: the first, where the $\alpha$'s are low as in the case of motor vehicles (.16) and appliances (.23); and the second, where the $\alpha$'s are higher as in the case of iron and steel (.46) and cement (.64).

Table 3.3.--Factor Coefficients from Industrial Production Functions

| Industry | Labor | Capital | Raw Materials | $R^2$ |
|---|---|---|---|---|
| Base | | | | |
| Rice | .004 (4.5) | .019 (3.4) | 1.019 (4.2) | 0.90 |
| Sugar | .014 (7.0) | .238 (6.0) | .256 (5.5) | 0.79 |
| Coconut | .007 (27.4) | .021 (3.7) | .958 (4.1) | 0.88 |
| Wood | .133 (11.9) | .317 (6.0) | .502 (2.1) | 0.91 |
| Consumer-Oriented | | | | |
| Milk | .029 (14.3) | .131 (3.1) | .833 (2.7) | 0.92 |
| Flour | .027 (36.1) | .187 (1.9) | .859 (2.7) | 0.98 |
| Tobacco | .055 (10.5) | .368 (1.5) | .404 (1.6) | 0.95 |
| Beverages | .015 (7.7) | .199 (7.1) | .091 (1.8) | 0.95 |
| Meat | .173 (2.1) | .505 (3.7) | .533 (2.3) | 0.98 |
| Textiles | .097 (2.5) | .262 (2.4) | .568 (2.4) | 0.95 |
| Intermediate | | | | |
| Paper | .029 (4.4) | .163 (2.3) | .254 (7.0) | 0.99 |
| Petroleum | .059 (4.2) | .197 (2.1) | .768 (2.5) | 0.96 |
| Investment-Related | | | | |
| Iron & Steel | .027 (11.4) | .468 (5.2) | .443 (6.7) | 0.95 |
| Cement | .016 (11.4) | .641 (5.2) | .054 (7.2) | 0.88 |
| Appliances | .040 (3.3) | .230 (1.8) | .262 (4.3) | 0.97 |
| Motor Vehicles | .045 (6.3) | .161 (2.0) | .686 (2.4) | 0.91 |

*Figures in parentheses are t-tests.

It must be observed, however, that the coefficients for capital are all much higher than the coefficients for labor in all industries included in this study. This is in conformity with the more general findings involving the major sectors of the economy. Since in the case of specific industries, the comparative coefficients appear to be in favor of capital without any exception, it is difficult to postulate, as is oftentimes done in other countries, about a much higher partial elasticity of industrial output to an increase of labor. The results of Philippine industrial production functions appear to be the exact opposite, when the labor and capital coefficients are directly compared with one another.

However, in Philippine industry, the coefficients for raw materials are the highest. This is not in accord with the general result for the entire economy, where the $\gamma$ come in between $\alpha$ (the capital coefficient, which is the highest of the three) and $\beta$ (the labor coefficient, which is the lowest). While the sectoral results indicate that for manufacturing as a whole, $\gamma$ is high at .51, the corresponding figures for specific manufacturing industries are so spread out that it is not possible to come suggest clear categories based on the broad groupings of industries that have been adopted here. Thus: among the base industries, the calculated $\gamma$ for sugar is only .23, but for wood, it is .50, and for coconut as well as rice, it is between .95 and 1.02. Among consumer-oriented industries, the calculated $\gamma$ starts

low at .09 for beverages (which is exceptionally low, taking into account the corresponding figures for other industries in this same group). Tobacco yields a $\gamma$ of .40; meat and textiles, .53 and .56. respectively; milk and flour, .83 and .85, respectively. The spread of results for $\gamma$ in intermediate and investment-related industries is wide, with motor vehicles and petroleum reporting high figures at .68 and .76, respectively, but with cement reporting a very low figure of .05 (which is exceptionally low).

The results cited above are so tentative and are based on factor input data that have yet to be more closely scrutinized that care should be tkaen to avoid making firm statements based on them. However, the broad pattern that emerges from all these results, despite questions and misgivings that can arise at the level of individual industries, is difficult to ignore. The pattern where $\beta$, the coefficient for labor, is very low, where $\alpha$, the coefficient for capital is by direct comparison much higher, and where $\gamma$, the coefficient for raw material, is higher still emerges in the majority of industries. Until other proofs to the contrary can be presented, it is this pattern which we will have to assume as prevailing in actual Philippine industrial operation

Indeed, such a pattern is broadly suggested by the last two I-O tables of the Philippines. In many instances, the distribution of gross value of industrial production between labor, capital, and raw materials supports the pattern brought out by the factor coefficients from industrial

production functions. Thus, the share of labor is ordinarily below 10%; that of capital is between 10% and 35%; and that of raw material is over 40%. Exceptions are not difficult to come by. For instance, the share of labor in industry

Table 3.4.--Average Shares Paid to Factor Inputs in Industry, As Reported by the 1969 and 1974 I-O

| Industry | Labor | Capital | Raw Materials |
|---|---|---|---|
| Base | | | |
| Rice | 2.26 | 9.24 | 88.50 |
| Sugar | 8.74 | 30.71 | 60.55 |
| Coconut | 3.53 | 10.43 | 86.04 |
| Wood | 11.12 | 18.99 | 69.89 |
| Consumer-Oriented | | | |
| Milk | 9.85 | 30.78 | 59.37 |
| Flour | 2.37 | 13.45 | 84.18 |
| Tobacco | 6.67 | 50.35 | 42.98 |
| Beverages | 18.78[2] | 13.07[2] | 68.15 |
| Meat | 5.71 | 15.97 | 78.32 |
| Textiles | 10.67[2] | 25.24[2] | 64.09 |
| Intermediate | | | |
| Paper | 13.15 | 34.65 | 52.20 |
| Petroleum | 3.95 | 33.82 | 62.23 |
| Investment-Related | | | |
| Iron & Steel | 9.25 | 25.29 | 65.46 |
| Cement | 13.63 | 21.91 | 64.46 |
| Appliances | 16.49 | 41.08 | 42.43 |
| Motor Vehicles | 18.77 | 34.34[2] | 46.89[2] |

Source: I-O Tables of the Philippines for 1969 and 1974.

[1]Figures are percent shares of gross value of output.

[2]The data for 1969 and 1974 are far apart so that these averages may not be as meaningful as the other figures cited here.

gross value is higher than 10% in wood, paper, cement, appliances, and motor vehicles. The share of capital in industry gross value is higher than 35% in appliances and tobacco. Despite these exceptions, however, it is striking how the shares going to capital are invariably higher than those going to labor, and also how the shares going to raw materials are generally higher than those going to capital. It is in this broad sense that the pattern reported by the I-O tables is in support of the pattern yielded by industry production functions.

If the former are taken as actual shares and the latter as ideal shares, then the broad coincidence in their general pattern suggests that the results yielded by industry production functions may be of some use. Indeed, the differences between actual shares and ideal shares could point to the relative distance of factor payments from the competitive ideal. The differences can be broadly indicative of the bias, or at least the direction of such a bias or at least the direction of such a bias (if not its magnitude), in factor payments.

Considering how low the labor coefficients are, it is not surprising that actual factor payments to labor in most industries exceed those indicated by the industry $\beta$'s. Where actual shares of labor are lower than ideal shares, they occur in the two industries where the calculated $\beta$'s are: wood and meat processing. The third industry where a similar phenomenon is observed shows the labor coefficient to be .06

while the actually reported share of labor is only .04. The difference between both numbers is not substantial in this case.

Indeed, despite these exceptions, it may be possible to postulate that either the calculated coefficients are much too low or the actual shares paid out to labor have been pushed up by a number of social and other welfare considerations. It is not possible to choose on solid basis which of these two alternatives is the more probable. However, until new and better industry producton functions shall have been fitted, based on much better factor input data, and reporting contrary results, it is difficult to take the first postulate at this time. It is customary, considering the political, administrative, legislative, and social realities in Philippine industry, to assume the second postulate to be more probable.

While there is the temptation to jump from this second postulate, concerning the share of labor, to its seemingly natural corollary that the actual share paid out to capital should be less than the ideal share, such a temptation must be resisted. In the first instance, not only labor and capital are competing for shares in industry gross value; there is a third factor input, and as it has turned out this is an input which lays an important claim on the total pie. In the second instance, even where three factor inputs are considered together, it is possible under decreasing returns to scale, that the sum of the coefficients of all three

factors would be significantly below unity. Thus, when such coefficients are compared with actual shares in industry gross value whose sums necessarily equal unity, it is likely that the actual shares of each factor input would be higher than their corresponding coefficients.

To cite examples of the first instance, the wood and meat processing industries have already shown themselves to be cases where actual shares paid out to labor are less than their labor coefficients. These two industries further show that this is also the case with their capital input. The shares actually paid out to capital are also lower than the capital coefficients. Here we see labor and capital being jointly underpaid, and we do not have the classic case where one party (labor) is necessarily exploited by the other (capital). Indeed, in these two industries, the differential appears to have benefited the suppliers of raw material actual payments to whom exceeded the ideal, as suggested by the raw material coefficient.

The second is shown in the case of sugar, tobacco, paper, and appliances. The sum of the calculated factor coefficients in their case is significantly less than unity and these industries may have been operating under decreasing returns to scale. When their factor coefficients are compared with the actual shares of each factor in industry gross value, one finds that the former are lower than the latter. Thus, ideally, the return to labor, capital and raw materials should be lower than the actual shares paid out to them. In

Table 3.5.--Percent Difference* Between Actual and Ideal Shares for Factor Inputs in Industry

| Industry | Labor | Capital | Raw Materials |
|---|---|---|---|
| Base | | | |
| Rice | 5.53 | 4.85 | 0.86 |
| Sugar | 6.19 | 1.28 | 2.36 |
| Coconut | 13.29 | 11.36 | 0.68 |
| Wood | 0.83 | 0.59 | 1.38 |
| Consumer-Oriented | | | |
| Milk | 3.32 | 2.34 | 0.71 |
| Flour | 0.88 | 0.71 | 0.98 |
| Tobacco | 1.20 | 1.36 | 1.06 |
| Beverages | 12.27 | 0.65 | 7.51 |
| Meat | 0.32 | 0.31 | 1.46 |
| Textiles | 1.10 | 0.96 | 1.12 |
| Intermediate | | | |
| Paper | 4.44 | 2.12 | 2.05 |
| Petroleum | 0.65 | 1.72 | 0.80 |
| Investment-Related | | | |
| Iron & Steel | 3.46 | 0.54 | 1.47 |
| Cement | 8.51 | 0.34 | 11.93 |
| Appliances | 4.12 | 1.77 | 1.62 |
| Motor Vehicles | 4.21 | 2.13 | 0.68 |

Source: I-O Tables for 1969, 1974 and Various Industry Reports.

*The figures included in this table are ratios of actual shares paid out to the different factor inputs, as reported by the 1969 and 1974 I-O tables, and the factor coefficients that result from fitted production functions.

these industries, it is not possible to find any classical "exploited party" even among the three factor inputs. Indeed, if the issue is to be forced, and an attempt must be made to find out which factor input has been relatively underpaid or overpaid, the factor coefficients calculated off production functions must be corrected so that in each case their sum would equal unity.

On the basis of such adjusted coefficients, one finds that in many industries, capital is actually paid less than its ideal share. This can be said, with varying degrees of firmness, for 10 out of the 16 specific industries included here. The six industries where capital appears to be paid more than the corrected ideal share are: rice and coconut among the base industries, milk and tobacco among the consumer-oriented industries, petroleum among intermediate industries, and motor vehicles among investment-related industries.

A similar observation can be made concerning payments to raw materials. In 11 out of 16 industries looked into in this study, raw materials appear to be paid less than the ideal. The five industries where the reverse is true, i.e. where raw materials are paid more than the corrected ideal share, include the following: sugar and wood among the base industries, meat among the consumer-oriented industries, iron & steel as well as cement among the investment-related industries. It is of interest to note that the raw materials for sugar, wood, and meat are mostly drawn from within the

Table 3.6.--Percent Difference Between Actual Shares Paid to Factor Inputs and Corrected Ideal Shares, by Industry*

| Industry | Labor | Capital | Raw Materials |
|---|---|---|---|
| Base | | | |
| Rice | 5.82 | 5.07 | 0.60 |
| Sugar | 3.16 | 0.65 | 1.21 |
| Coconut | 13.12 | 11.21 | 0.67 |
| Wood | 0.79 | 0.56 | 1.32 |
| Consumer-Oriented | | | |
| Milk | 3.30 | 2.32 | 0.71 |
| Flour | 0.94 | 0.76 | 1.05 |
| Tobacco | 0.99 | 1.13 | 0.87 |
| Beverages | 3.74 | 0.19 | 1.29 |
| Meat | 0.39 | 0.38 | 1.77 |
| Textiles | 1.02 | 0.89 | 1.04 |
| Intermediate | | | |
| Paper | 1.98 | 0.95 | 0.91 |
| Petroleum | 0.67 | 1.76 | 0.85 |
| Investment-Related | | | |
| Iron & Steel | 3.24 | 0.50 | 1.38 |
| Cement | 6.05 | 0.24 | 8.58 |
| Appliances | 2.19 | 0.94 | 0.86 |
| Motor Vehicles | 3.76 | 1.90 | 0.60 |

Source: I-O Tables of the Philippines for 1969 and 1974 and various industry reports.

*The figures cited in this table are the average ratios between actual shares paid out to factor inputs, as reported by the 1969 and 1974 I-O tables, and the corrected factor coefficients taken from the industry production functions. The factor coefficients were corrected so that in each case their sum would equal unity.

economy. This can be said of cement too, although perhaps less authoritatively. In these industries, it is difficult to suggest that the exploiting hand, if any really exists, is necessarily a foreign hand. Despite the importance of raw materials in the industrial production process and in industry cost structure, Philippine industrial data, as they stand, do not support any direct claim or indirect hint that foreign suppliers of raw materials have been conspiring to exploit the Philippine economy.

The calculated coefficients for the different factor inputs can be broadly indicative of the direction of relative bias in factor payments. While no iron-clad general statement can be made at this time, still it is difficult to escape the impression given by the results from the fitted industrial production functions that in most industries, the share paid out to labor has not been below the levels suggested by the labor coefficient, while the shares paid out to capital and raw materials have not been above the levels suggested by their coefficients.

Furthermore, the same calculated coefficients can be used as weights in accounting for the supply sources of industrial growth. In this regard, the general impression given is that the increase in labor input in most instances has been responsible for 6% or less of the increase in industrial output; capital for 35% or less of such increase in industrial output; and raw materials have a variable but high percentage contribution to the growth of industry output.

Among base industries, the contribution of the increase in labor input to output growth has been uniformly low for rice, sugar, and coconut. It is only in wood processing where such contribution reached almost 3% during the first decade and 6% during the second decade. The contribution of the increase in capital input has also been low in rice and coconut, barely exceeding 4% but never falling below 3% during the two decades. In the case of wood, the corresponding figure is much higher at 29% during the first decade and 23% during the second decade. It is in sugar where the increase of capital input contributed more significantly to industry output growth, but in this case the figure is much more volatile. On the other hand, the contribution of raw material input increases is high in rice and coconut, and is moderate in sugar and wood. In the case of rice, where the green revolution involving the use of more chemicals and more specifically of fertilizers has been launched, this result does not appear to be unreasonable, if taken broadly.

The calculated contribution of the increases in different factor inputs in consumer-oriented industries appears to be more stable during the two decades studied here than in the base industries. The figures for labor are between 4% and 5%, such having been pulled up by the high figures for textiles (8.5% during the first decade) and for meat (12.5% also during the first decade). With the exception of these two industries, there is an evident tendency for

Table 3.7.--Contribution[1] of the Growth of Factor Inputs to Industry Output Growth, by Decades[2]

| Industry | Labor | | Capital | | Raw Materials | |
|---|---|---|---|---|---|---|
| | $t_1$ | $t_2$ | $t_1$ | $t_2$ | $t_1$ | $t_2$ |
| Base | 1.05 | 1.29 | 44.90 | 24.20 | 74.95 | 31.71 |
| Rice | 0.35 | 0.29 | 3.39 | 3.48 | 152.85 | 130.21 |
| Sugar | 1.23 | 0.72 | 101.41 | 62.86 | 22.29 | 14.46 |
| Coconut | 0.67 | 0.28 | 4.05 | 3.16 | 88.47 | 69.60 |
| Wood | 2.94 | 5.99 | 29.44 | 23.02 | 15.02 | 24.27 |
| Consumer-Oriented | 4.47 | 3.97 | 29.61 | 30.12 | 28.49 | 38.70 |
| Milk | 1.38 | 4.14 | 7.88 | 8.59 | 99.03 | 63.04 |
| Flour | 1.31 | 3.87 | 36.06 | 18.72 | 55.63 | 80.76 |
| Tobacco | 1.83 | 3.38 | 44.90 | 34.64 | 18.99 | 30.89 |
| Beverages | 0.72 | 1.47 | 19.41 | 24.93 | 6.16 | 7.63 |
| Meat | 12.71 | 11.93 | 34.33 | 47.70 | 51.16 | 58.67 |
| Textiles | 8.56 | 2.25 | 30.75 | 10.46 | 37.53 | 73.89 |
| Intermediate | 0.99 | 5.45 | 18.67 | 24.57 | 69.04 | 90.58 |
| Paper | 1.53 | 3.20 | 14.29 | 18.38 | 22.24 | 28.84 |
| Petroleum | 0.24 | 5.77 | 10.23 | 25.45 | 75.66 | 99.32 |
| Investment-Related | (0.75) | 2.61 | 20.53 | 51.36 | 56.74 | 45.29 |
| Iron & Steel | 1.57 | 2.51 | 45.37 | 87.38 | 39.21 | 55.49 |
| Cement | 0.44 | 1.03 | 53.20 | 66.51 | 19.32 | 43.60 |
| Appliances | 3.86 | 1.59 | 29.98 | 17.54 | 29.94 | 18.13 |
| Motor Vehicles | (4.23) | 3.99 | (4.02) | 34.64 | 89.16 | 52.55 |

[1]The contribution of each factor input is expressed in percentage form. It has been calculated by applying the factor coefficient, obtained from industry production functions, to the compounded growth of the factor input. The resulting product is then divided by the compounded growth of industry output. The sum of the contribution of the three factor inputs does not equal unity ordinarily. The residual is attributed to disembodied technological change.

[2]The decades, $t_1$ and $t_2$, refer to the two decades referred to in this work.

the figures for labor to increase during the second decade. The figures for capital are in the neighborhood of 30%. While such an average for this group of industries has not changed between the two decades, in specific industries, there have been changes. During the first decade, the figures for milk and beverages appear to be much too low in relation to the group average; and during the second decade, the industries with relatively low figures are milk (again), textiles, and flour. Finally, the figures for raw materials were just below 30% during the first decade, and just below 40% during the second decade. The corresponding figures for the component industries are widely spread out, but the tendency for the figures to rise during the second decade is true in most cases.

The same pattern holds for both the intermediate and investment-related industries. Labor is given the smallest contribution, capital, a much higher but still a moderate role, and raw materials, the highest. Again, the spread of the figures at the level of specific industries is sufficiently wide to make such average figures less firm; however, despite such a spread, the general pattern, as described, does apply in the great majority of cases.

The spread of the results concerning the residuals at first glance does not permit any generalization. Indeed, considering how important disembodied technological change is, which is what is implied by the residual, the inability of the results to point to any clear direction is particularly

disconcerting.

In more aggregative production functions involving sectors, it was possible to justify limiting the bounds of the anlaysis, leaving for future work further attention to various qualitative facets of factor inputs, because the size of the residuals in most cases was small. In other words, the mere quantitative increase in factor inputs was for the most part an adequate explanation for output growth. As much as three fourths to nine-tenths of the latter could be explained by the former. However, at the level of specific industries, the size of the residuals is not invariably small, and the percentage of total output growth which could be explained by factor input increases is not invariably big. In the case of wood, the residual is approximately 50%; in paper and appliances, at least for one decade, it is closer to 60%; and in beverages, taking the two decades together, it is even higher at almost 70%. Clearly, in these cases, there is a need to go beyond the mere increases in factor inputs; some of the qualitative facets in factor inputs, which may have helped push productivity upwards, should be taken into account. But in order to do this, more detailed work at the industry level is called for, and more refined treatment of factor input data, involving not only the quantitative but also certain important qualitative features, is imperative.

Nonetheless, even given the results as they are, two observations do point to the need for greater concern for

productivity.

The first of these is the low value of the residual in many industries outside of the four exceptional ones that had been mentioned. Even if the negative residuals are to be disregarded, still there are enough industries where room for disembodied technological change is limited, and where output growth is almost completely explained by the mere quantitative increase in factor inputs. Particularly striking in this regard are: milk, flour, meat, petroleum, motor vehicles, and to some extent also iron & steel, textiles, and coconut at least during one of the two decades under study. In this sense, the general finding at the more aggregative, sectoral level regarding the small size of the residual is confirmed at the level of some specific industries.

The second observation is the tendency of the residual to become smaller during the second decade. Without counting rice and sugar whose residual is negative during the first decade anyway, only three industries have proven themselves to be an exception to this more general tendency. Only in coconut, milk, and appliances does the residual of the second decade become bigger than that of the first decade; in all the others, the reverse holds. The residual becomes smaller instead.

While these observations can be taken as a weak, indirect indicator of the general movement of technological change in the economic and industrial environment, and their significance is limited--after all, some technological change

Table 3.8.--Size of the Residual[1] in Industry Output Growth

| Industry | First Decade[2] | Second Decade[2] |
|---|---|---|
| Base | (20.90) | 42.80 |
| Rice | (56.59) | (33.98) |
| Sugar | (24.93) | 21.96 |
| Coconut | 6.81 | 26.96 |
| Wood | 52.60 | 46.72 |
| Consumer-Oriented | 37.43 | 27.21 |
| Milk | 8.29 | 24.23 |
| Flour | 7.00 | (1.35) |
| Tobacco | 34.28 | 31.09 |
| Beverages | 73.71 | 65.97 |
| Meat | 1.80 | (18.30) |
| Textiles | 23.06 | 13.40 |
| Intermediate | 11.90 | (20.60) |
| Paper | 61.90 | 49.58 |
| Petroleum | 5.47 | (30.54) |
| Investment-Related | 23.48 | 0.74 |
| Iron & Steel | 13.85 | (45.38) |
| Cement | 27.04 | (11.14) |
| Appliances | 36.22 | 62.74 |
| Motor Vehicles | 19.09 | 8.82 |

[1]The residual is the difference between 100.00 and the sum of the weighted contribution of factor input increases to total industrial output growth. The figures cited are in percentag

[2]The first and second decades correspond to the earlier and later decades included in this study.

is embodied in the increase in raw material inputs--still these seem to be in general support of the sectoral results, which pointed to the need for greater attention paid to productivity improvement. Especially since economic development is closely bound up with industrialization and depends heavily upon productivity increases, industries should take the lead in posting high rates of productivity increases. There is scant and very limited evidence thus far that this has been happening in many Philippine industries.

In summary, the findings cited here point to an increase in factor inputs in Philippine industry, and to a greater rate of increase in capital than in labor inputs. A comparison of actual and ideal shares paid out to factor inputs shows that in many industries labor is not paid lower than the ideal as suggested by the labor coefficients taken from industry production functions; on the other hand, capital in many industries is not paid higher than its corresponding ideal. A consequent attempt to quantify the relative contribution of the different factor input increases to industrial output growth shows that labor has the lowest contribution; capital, a moderate one; raw materials, the highest. Furthermore, this attempt shows that in a number of industries, the increase in factor inputs explains a high percentage of industrial output growth, leaving a small and decreasing role for disembodied technological change.

CHAPTER IV

# VARIABILITY OF INDUSTRIAL GROWTH RATES

It is one thing to account for the broad sources of industrial growth over a long period. It is another matter to explain the variability of industrial growth over much shorter sub-periods. After all, the classical differentiation between the longer and the shorter run still holds.

The long view that had been taken about Philippine industrial growth took note of both the demand and supply sides. Since the period covered, 1956 to 1978, is not long enough, probably the attempt to look for sources of industrial growth on both sides of the market mechanism is justified. It must be recalled however that in most long-run theories of growth, the sources of growth from the supply side are given more importance, and more specifically, the natural rates of growth of population or of the labor force as well as the rate of productivity increases are highlighted (Jones, 1976). Keynesian tradition, on the other hand, highlighted the demand elements in short-run income determination.

The major supply sources of growth that have been identified for the Philippines are the increases in capital stock and in the availability of raw materials. The first

shows up the importance of investment, the second--in so far as many industries are concerned--of foreign exchange and therefore of exports. On the other hand, the major demand source of growth under the total method has been final domestic demand, which shows up the importance of effective income in promoting industrial growth. But investments and exports are exogenous elements in the income determination process. Furthermore, since government orchestrates various key elements of such a process, once it is introduced as a third exogeneous element, then the standard formulation of income determination is vindicated, and the close inter-relation between supply and demand elements is indicated.

It is not surprising, therefore, that in Chenery's schema, income levels take a central position. From such levels, he derives through established logistic curves the different components of demand. From these, he in turn--through the I-O tables--derives the levels of production, whence the levels of employment and capital use are specified. It is a short step from here to get back to income.

In view of the above, it is proposed that in explaining the variability of industrial growth from one short sub-period to another, the cyclical movements of income in the Philippine economy be used as a reference. But at the level of industries, because of its more specific character which allows one industry to compete against other industries for the consumer peso, it is advisable to

include the movement of an industry's relative prices in the reference. Therefore, the movement of an industry's volume of production is related through time with the movement of the level of income in the economy and of its own relative prices.

While such specification appears to highlight market forces since the resulting coefficients would be indicative of standard elasticities of industry output to income and to prices, still the conceptual links with the analysis previously undertaken (where sub-period differences were disregarded and only the broad sweep of developments throughout one long period was considered) must be preserved and kept in mind.

In sum, sub-periods within the period covered by this study do exist, and some cyclical elements in the growth of industrial production can be identified. Therefore, it is necessary to face up to these facts and seek to explain them in a manner that would not be inconsistent with the growth accounting that had been undertaken both from the demand and supply sides. Since the results of such growth accounting point to the exogenous elements in income determination and to income itself as the most probable sources of growth and therefore also of the cyclical elements in the economy, then the lead set out by Chenery in putting income in a central position is followed in this chapter.

Following the indications given in Chapter I concerning

consistency, it is necessary to set out first the cyclical elements in economic growth, and to use these as the reference for whatever cyclical elements that can be observed in industrial growth.

1. Sub-Periods in the Philippine Economic Record

Changes in prices and in interest rates are tell-tale marks of changes in the rate of economic performance. The first would ordinarily suggest the extent--whether moderate or exceptional--of the changes in circumstances to which the economy would have to adapt itself, and the second would be broadly indicative of the relative quickening or slowing down in the pace of economic growth as the economy makes the necessary adaptations. Together, they can be taken as readily available indicators of possible changes in the economic record (Estanislao, 1981). This is suggested by the following equations:

(4.1) $\Delta D = a_0 - a_1 \Delta P + a_2 \Delta Y^*$

(4.2) $\Delta S = b_0 + b_1 \Delta P + b_2 \Delta MS$

(4.3) $\Delta L = c_0 + c_1 \Delta Y^* - c_2 \Delta i$

where changes in demand are inversely related with the changes in price levels but functionally with changes in real income, Y*; where changes in supply are positively related with the changes both in prices and money supply; and where changes in the demand for money are functionally related with those in real income but inversely with those in interest rates. By setting the usual equilibrium

conditions $\Delta MS - \Delta L$ and $\Delta S = \Delta D$, it is therefore possible to obtain from all of the above the following:

$$(4.4)\quad \Delta Y^* = \frac{b_0 - a_0 + b_2c_0 + (a_1 + b_1)\Delta P - b_2c_2\Delta i}{a_2 - b_2c_1}$$

which can be expressed in reduced form as:

$$(4.5)\quad \Delta Y^* = f(\Delta P, \Delta i)$$

where real income changes are indicated by price changes (proportionally) as well as by interest rate changes (inversely).

Guided by such a framework, it has been possible to set forth sub-periods in the Philippine economic record based on relative price changes mainly, but confirmed by changes in interest rates (Estanislao, 1981).

In order to confirm the sub-periods that are set off from each other on such basis, it is also necessary to consider the changes in the exogeneous variables in the income determination process. While three are ordinarily cited--with investments included as the third--only two are used, i.e. exports and current government expenditure, because of the relative ease with which data on these two exogeneous items can be obtained. The other justification for this may well be the following:

$$(4.6)\quad Y = C + I + G + X - M$$

$$(4.7)\quad C = e_0 + e_1Y$$

$$(4.8)\quad I = f_0 + f_1MS + f_2Y$$

$$(4.9)\quad M = g_0 + g_1Y$$

$$(4.10)\quad T = h_0 + h_1Y$$

where all the specifications for income, consumption, investment, imports, and taxes are the simplest and the most standard. The key equation is equation (4.8) which relates investment positively with money supply, which under Philippine empirical context, can be said to be closely related to the net flows in the external and fiscal sectors, as follows:

(4.11) $MS = M_0 + m_1 (X - M) + m_2(G - T)$

Equation (4.8) can be expanded taking into account equation (4.11) and after substitution and simplification, one arrives at an equation which in reduced form can be expressed as follows:

(4.12) $Y = f (X, G)$

On the basis of the equations cited above, it has been possible to obtain a combined index of the current values of export receipts and of government expenditures for current purposes, and to calculate the growth relative of such an index. It is of interest to note that the sub-periods initially indicated by the relative changes in prices and interest rates are similar to those indicated by the growth relatives to mean of the combined index of X and G.

It is not surprising that GDP estimates arrived at on the basis of economic considerations rather than of strict accounting conventions should bring out average real growth rates that would show variabilities that are consistent with the sub-period classifications made in Table 4.1.

Table 4.1.--Sub-Periods Suggested by Broad Economic Indicators

| Sub-Period | Average Inflation Rate* | Growth Relative of Combined X and G Index** |
|---|---|---|
| 1957-60 | 7.0 | 38.9 |
| 1961-63 | 13.5 | 137.4 |
| 1964-66 | 10.2 | 63.3 |
| 1967-69 | 8.3 | 21.8 |
| 1970-72 | 19.2 | 150.4 |
| 1973-74 | 29.9 | 222.0 |
| 1975-78 | 14.0 | 66.2 |

Source: Estanislao (1981).

*The figures shown here are those of inflation rates alone. On such a basis, it has been shown by the F statistic that the variations between sub-periods are indeed significant and that the sub-periods are significantly different from each other. It must be noted, however, that the movement of interest rates must be considered simultaneously in order to obtain an indication of the direction that the growth rate of real income can take.

**The figures included in the combined index refer to current values of exports and current government expenditures. This column can not be used as an indicator of the relative movement of real income, without taking into account other indicators of production movement. It can be used however to suggest that the sub-periods set off from each other can be taken as a basis for looking at the cyclical variations of growth around the basic trend growth.

Thus, the average real GDP growth for the entire period, 1956-1978, would come to 5.7% per year. The corresponding rates for the different sub-periods are consistent with the sub-period classifications in the sense that they would vary from such a period average according to expectations suggested by all the equations cited earlier.

In this regard, the first period, 1957-60, is considered as a moderate one with real economic growth tending to be slightly above average (thus, 6.0% per year). The second sub-period is generally regarded as one of relative boom, and the average growth rate is much above the average, being 8.1%. The third, sub-period is also generally regarded as having been a difficult one, and the GDP rate is below average at 2.9% per year. The next sub-period, 1967-69, saw the government being very active in pushing the economy even beyond the point of strain (average real GDP growth, 7.5%) thus helping to bring about the 1970-72 sub-period, which is also generally regarded as an economically weak one (average real GDP rate, 2.4% per year). The boom years of 1973 and 1974 show average real GDP to have grown at 9.4%, with the last sub-period finally showing how the ill-effects of oil inflation and world recession caught up with the Philippine economy (real GDP grew by 5.9%).

The sub-periods shown above, may be used as reference for evaluating the cyclical elements in the movement of production at the level of industries.

2. Change in Growth Rates of Philippine Industries

The movement of income and prices is subject to some variation from one sub-period to another. Such variation can only have an influence upon the variability of industrial output growth, considering the usual response of industrial

production to market elements, the most significant of which are naturally the effective purchasing power available in the economy and the prices of specific industrial products relative to over-all price levels.

Indeed, the measured elasticity of industrial output to real income changes in the economy shows that with the exception of rice and coconut, the income-elastacity of most industries is above unity. In general, the figures for Philippine industries are not surprising. They appear to be in broad accord with expectations. Thus, while exceptions can be cited, the income-elasticity figures for a number of base and consumer-oriented industries are lower than the corresponding figures for some intermediate and investment-related industries.

For instance, the income-elasticity figure for rice and coconut indicate that these are basic items, which are not heavily influenced by a rise in real income. Similarly, the figure for beverages, which is close to unity, suggests that income movement has a big say on the pace of production in this industry. The figures for other industries such as tobacco, milk, flour, and meat also point to their somewhat lesser basic character in the Philippine context: they are much higher than unity, and the production in these industries responds more than proportionately to an increase or decrease in real income. The figure for textiles is similar to that of these industries just mentioned, and although a good portion of textile production is intended

for basic consumption, still after a certain threshold has been reached a less basic demand for textile products gradually becomes important, and it is this that has probably made textile production elastic to the movement of real income.

The figure for petroleum of 1.27 is well within bounds and in recent years as petroleum prices leaped, the elasticity may have gone down so that it is no longer necessary to increase petroleum output by 1.27% for every 1% rise in real GDP. On the other hand, the figures for the other intermediate and investment-related industries are much higher, as they should be. Cement and motor vehicles have a high income leasticity at 1.9, while paper and appliances have a correspondingly higher elasticity at 2.0 and 2.2, respectively. Thus, while these industries grow at high rates under normal conditions of positive economic growth, their rates tend to be more variable as they appear to be more sensitive to changes in the pace of growth in the economy.

By contrast, the negative elasticity figures with respect to relative prices do not follow any neat pattern. Three industries, coconut, motor vehicles, and meat, show a price elasticity figure that is higher than unity. The figure for coconut appears to be very high, and despite the wide possibilities for substitution, still it is not easy to present any substantive justification for it. In the case of motor vehicles, the figure appears to be also high enough to render production extremely sensitive to industry

pricing decisions. Similarly, although to a more limited extent, processed meat products also are so sensitive to their own prices relative to the over-all inflation levels that production could be more than proportionately affected--adversely--by an increase in relative prices.

At the other extreme, with low price elasticity figures, are petroleum, appliances, and tobacco. A 100% rise in relative prices of petroleum, according to the figure reported here, could lead to a fall of almost 16% in volume. Considering what had happened in the past, such a figure may not be wide of the mark. On the other hand, the figures for appliances and tobacco appear to be much too low. A strong commitment to purchase appliances and an equally strong addiction to tobacco seem to be implied by the price elasticity figures: the relative prices of such products have to rise so steeply before they can have a small adverse impact upon production volume.

The figures for income and price elasticity have to be taken together. By their signs--positive for income and negative for relative prices--they can be taken as appropriate. While there can be some qualms about their magnitude, still the equations suggest that both income and relative prices, together, can help account for a high percentage of the changes in industry production volumes. Moreover, while the t-tests are not uniformly high, in most instances they are close enough to 2 or even much higher, suggesting that the relationship postulated by the equation may well be

significant.

In view of these results, it is not possible to disregard the importance of keeping economic growth high and relative prices low in order to help ensure that industrial output keeps on moving upwards at a high rate. Furthermore, both real economic growth and inflation rates have to be kept within narrow bounds if a premium is put upon stability of industrial growth. Unfortunately, while there can be a broad consensus regarding such ideal situations, it has not always been possible to get near them. As a consequence, variations in growth rates of real income and prices have led to some variability in industrial output growth rates. While a basic underlying trend growth of industry output is discernible, still through time some sub-periods are differentiable from each other.

The growth of trend values in Philippine industry has been between moderate and high. In general, the base and consumer-oriented industries have growth rates that are only moderate (close to 7%-8%), while the intermediate and investment-related industries have higher rates (close to 11%-15%). These had been noted previously (see Chapter III), although the figures cited now are slightly different because they refer to the growth of trend values. Since they are in accord with usual expectations from the process of industrialization, they need no further comment. However, since they are the frame of reference for cyclical variations by sub-periods, their specific magnitudes must be cited.

Table 4.2.--Income and Price Elasticities* of Philippine Industries

| Industry | Income Elasticity | Price Elasticity | $R^2$ |
|---|---|---|---|
| Base | | | |
| Rice | 0.5099 | 0.2660 | .80 |
| | (6.05) | (7.72) | |
| Sugar | 6.1502 | 0.9811 | .86 |
| | (7.94) | (11.43) | |
| Coconut | 0.8794 | 3.3582 | .93 |
| | (6.43) | (2.35) | |
| Wood | 1.1679 | 0.3327 | .91 |
| | (13.0) | (1.70) | |
| Consumer-Oriented | | | |
| Milk | 1.7480 | 0.5085 | .91 |
| | (5.92) | (3.16) | |
| Flour | 1.6064 | 0.4682 | .79 |
| | (6.26) | (3.85) | |
| Tobacco | 1.2642 | 0.0578 | .93 |
| | (12.21) | (2.16) | |
| Beverage | 0.9673 | 0.5274 | .90 |
| | (13.30) | (3.00) | |
| Meat | 2.1345 | 1.2514 | .95 |
| | (15.02) | (2.95) | |
| Textiles | 1.3310 | 0.8290 | .90 |
| | (9.30) | (2.50) | |
| Intermediate | | | |
| Paper | 2.0519 | 0.3372 | .99 |
| | (6.87) | (4.15) | |
| Petroleum | 1.2753 | 0.1585 | .90 |
| | (3.81) | (1.97) | |
| Investment-Related | | | |
| Iron & Steel | 1.9835 | 0.1826 | .88 |
| | (6.83) | (1.65) | |
| Cement | 1.9621 | 0.7307 | .92 |
| | (10,37) | (5.78) | |
| Appliances | 2.2003 | 0.0887 | .94 |
| | (1.690) | (1.53) | |
| Motor Vehicles | 1.9200 | 1.9700 | .95 |
| | (15.05) | (4.23) | |

*Income elasticities have positive signs, while price elasticities have negative signs. Figures in parameters are t-test

Among the base industries, the growth of trend values comes to only 7.1% per year. Expectedly, the corresponding rate for rice and sugar, the two traditional processing industries, is lower than this group average: for rice, the rate is close to the previous population growth rate of around 3%; and for sugar, it is not much higher at 4.6%. However, for two relatively new processing industries such as coconut oil processing and the further treatment of logs and lumber into plywood and veneer, the growth of trend values has been much higher: 10.4% for wood, and 13.2% for coconut. As had been noted, the determination to add more value to coconut and wood basic products has helped boost the activity of these segments of the manufacturing sector.

Among consumer-oriented industries, flour and meat show the lowest growth rates in trend values, these being only 4.5% and 5.6%, respectively. While they are much higher than population growth rates, which show that the markets for these products were still below their saturation point, still they are much lower than the growth rates for others. Beverage (8.0%), textiles (9.2%), and tobacco (9.8%) showed much higher rates, which may have been due to the character of their products as well as to the smaller market penetration that had been achieved by them. The growth rate for milk products has been very high (at 20.9%) reflecting the small base from which it started.

If the growth rates cited for the consumer-oriented industries already appear high, those for the trend values

Table 4.3.--Average Growth of Trend Values* of Industry

| Industry | Growth Rate |
|---|---|
| Base | 7.1% |
| Rice | 3.1 |
| Sugar | 4.6 |
| Coconut | 13.2 |
| Wood | 10.4 |
| Consumer-Oriented | 7.7 |
| Milk | 20.9 |
| Flour | 4.3 |
| Tobacco | 9.8 |
| Beverage | 8.0 |
| Meat | 5.6 |
| Textiles | 9.2 |
| Intermediate | 15.5 |
| Paper | 16.2 |
| Petroleum | 14.8 |
| Investment-Related | 11.3 |
| Iron & Steel | 20.1 |
| Cement | 16.5 |
| Appliances | 15.7 |
| Motor Vehicles | 9.2 |

*Growth of trend values was calculated from constant value series.

of intermediate and investment-related industries are, as a group, higher still. Thus, petroleum products have been rising at a rate of 14.8%, and paper at 16.2% per year. These rates show that while Philippine industrialization may not have been fast by the standards of a few, more attention-catching developing countries, especially those from within the South-East Asian region, still it has been far from being at a snail's pace. Furthermore, the growth in trend values of appliances (15.7%) and cement (16.5%) complements this by indicating that personal and business asset acquisition has been moving at a past pace also. The trend growth of iron & steel reinforces this even further. Indeed, only motor vehicles, with a growth of 9.2%, among the investment-related industries showed a lower than double-digit advance, and this implies that the Philippines thus far has not reached the stage where mass ownership of automotive vehicles is possible.

Trend values may look impressive, but the harsh realities of economic life point to the ups and downs of economic cycles, which rob high trend figures of their euphoric suggestion. Swings in economic fortune are experienced, and while averages tend to hide and smooth out the highs and lows, still the fact is that considerable variation in economic and industrial performance is felt over time.

During the first decade, four sub-periods had been identified by the broad indicators of economic performance. These sub-periods are: (a) relatively slow growth before the

early 1960s; (b) a faster growth pace during 1961-1963; (c) a definite slow-down during 1964-1966; (d) a small improvement in pace, although generally still a slow one, during 1967-1969.

Practically all industry groups, based on their growth relatives to mean, show a broadly similar pattern of swings during the first decade. The only exception is the investment-related industries, which as a group registered a slow rate of growth during the early 1960s, i.e. from 1961 to 1963.

Thus, the base industries showed average growth rates during the 1961-1963 sub-period, which were followed by much lower rates in 1964-1966 and even by negative rates in 1967-1969. Indeed, the first sub-period posted average annual growth rates in industry production volume which were soon exceeded by the corresponding rates during the second sub-period. With the exception of rice, the other component industries showed an acceleration in growth rates during the second sub-period, i.e. 1961-1963. Then, the relative slow-down during the third sub-period, i.e. 1964-1966, can be seen in all the component industries. The last sub-period of the first decade shows that with the exception of coconut, all other industries improved their growth record and made a small recovery.

Among the consumer-oriented industries, tobacco and beverages follow the pattern of swings described above for the first decade. Milk goes out of step only during the

fourth sub-period when its average annual growth rates failed to register higher than those of the preceding sub-period; flour, on the other hand, goes out of step only during the second sub-period, when it failed to improve on the average annual growth rates of the preceding sub-period; similarly, textiles show very high average annual growth rates of production during the first period, when the broader indicators suggest that from 1956 through 1960, the market was not moving at a very brisk pace. Indeed, it is only the meat industry that seems to have gone on a pace of its own during the first decade. Even if the annual growth figure for one year, 1966, is disregarded, still the swings in growth rates around the basis trend appear to be the opposite of the more general pattern. Thus, during the first sub-period, the meat industry had higher than average growth, followed by a lower than average growth during the second and fourth sub-periods. A small recovery can be observed during the third sub-period, when the cyclical swing was upwards.

The exceptional behavior of the meat industry during the first decade points to a number of specific factors, which can be far stronger than the more general economic forces, and which can have such a decisive impact upon the movement of industrial production that the former can override the influence of the latter. At the level of specific industries, therefore, it is imperative that some knowledge of such factors as those that can have a strong determining effect upon key facets of industrial operations is used to

Table 4.4.--Average Growth Rate of Industrial Production by Sub-Periods During the First Decade

| Industry | 1956-1960 | 1961-1963 | 1964-1966 | 1967-1969 |
|---|---|---|---|---|
| Base | 1.28 | 13.49 | 3.50 | (0.09) |
| Rice | 3.59 | 2.05 | 0.92 | 3.14 |
| Sugar | 3.62 | 7.68 | (3.10) | 3.79 |
| Coconut | (14.47) | 57.27 | 14.83 | (10.11) |
| Wood | 23.06 | 27.18 | 4.36 | 13.49 |
| Consumer-Oriented | 5.50 | 11.17 | 5.29 | 7.42 |
| Milk | 20.70 | 21.10 | 17.30 | 8.44 |
| Flour | 7.01 | 6.45 | 6.37 | 7.64 |
| Tobacco | 4.53 | 62.31 | (9.41) | 29.76 |
| Beverage | 8.34 | 10.13 | 5.42 | 6.36 |
| Meat | 1.66 | (0.40) | 14.96 | (0.89) |
| Textiles | 25.98 | 13.30 | (0.03) | 15.77 |
| Intermediate | 17.71 | 35.54 | 4.74 | 14.27 |
| Paper | 22.46 | 27.33 | 9.29 | 20.44 |
| Petroleum | 16.91 | 37.46 | 3.91 | 12.92 |
| Investment-Related | 13.99 | 7.89 | 15.94 | 17.75 |
| Iron & Steel | 39.66 | 48.17 | 28.99 | 25.41 |
| Cement | 77.39 | 7.92 | 18.03 | 37.39 |
| Appliances | 33.43 | 20.23 | 1.81 | 7.17 |
| Motor Vehicles | 6.07 | 3.74 | 41.05 | 10.79 |

Source: Various Industry Reports.

interpret and analyze statistical data. It can bring out elements which are often missed out in more aggregative studies involving more macro-industrial and macro-economic information.

Among intermediate industries, the general pattern of swings can be observed. Considering the strategic importance of these industries, particularly of petroleum, the pattern of behavior of their industrial production during the first decade confirms the division into sub-periods that had been made on the basis of general economic indicators. Precisely because petroleum products in particular and intermediate products in general enter into other industries and sectors as raw materials, the variability of demand for them and presumably of their production in response to such demand can be taken as one more measure of the cyclical movement in industry and in the economy.

A similar statement can not be made for the investment-related industries. These are more subject to exogenous forces and their cyclical movements can be affected by specific forces that are peculiar to them. Thus, iron & steel shows the fourth sub-period during the first decade to be a slight let-down when compared with the third sub-period. Cement, after a roaring start just before the early 1960s, suffered from slow average growth during the second sub-period, when most other industries appeared to be growing fast. Appliances had such a low market penetration at the start of the first decade that during the first decade that

during the first sub-period, its growth--presumably from a small base--was exceptionally high. Finally, motor vehicles enjoyed a boom during the third sub-period, after suffering from low average annual growth rates during the second sub-period.

Clearly, at the level of specific industries, many exceptions can be cited to the general pattern of cyclical swings. But these exceptions can be taken as such: first, because in a greater number of cases, the more general pattern of cyclical swings still applies; and second, because in each industry, it should be possible to identify specific factors that help explain why the movement of industrial production relative to the industry's own average rate of growth is out of step with that of many other industries and sectors in the economy.

During the second decade, the general pattern of cyclical swings is as follows: (a) during the first sub-period, 1970-1972, a slow-down in growth of production; (b) this was followed by a boom in 1973-1974; (c) this boom was arrested in 1975-1978 as a result of the delayed effect of the oil crisis and of the measure taken to contain the consequences of such a crisis.

Among base industries, such a general pattern applies only to sugar. In the case of rice, coconut, and wood, the exact opposite appears to have been the pattern: high growth of production, followed by much slower growth, and finally by a recovery in production growth rates. In the case of

Table 4.5.--Average Annual Growth Rate of Industrial Production by Sub-Periods During the Second Decade

| Industry | 1967-1969 | 1970-1972 | 1973-1974 | 1975-1978 |
|---|---|---|---|---|
| Base | (0.09) | 13.50 | 4.02 | 15.53 |
| Rice | 3.14 | 6.61 | 2.51 | 5.42 |
| Sugar | 3.79 | 5.26 | 22.58 | (0.40) |
| Coconut | (10.11) | 31.02 | (3.74) | 31.79 |
| Wood | 13.49 | 12.65 | 0.75 | 14.63 |
| Consumer-Oriented | 7.42 | 2.17 | 3.29 | 14.03 |
| Milk | 8.44 | 5.23 | 7.89 | 9.73 |
| Flour | 7.64 | 1.68 | (18.81) | 7.66 |
| Tobacco | 29.76 | 4.05 | 19.27 | (2.29) |
| Beverage | 6.36 | 2.08 | 2.37 | 15.38 |
| Meat | (0.89) | 2.64 | 7.51 | 27.46 |
| Textiles | 15.77 | 2.28 | 4.26 | (0.44) |
| Intermediate | 14.27 | 14.84 | (2.79) | 7.43 |
| Paper | 20.44 | (2.12) | 37.00 | 14.62 |
| Petroleum | 12.92 | 18.74 | (7.78) | 5.90 |
| Investment-Related | 17.75 | 4.87 | 24.68 | 2.42 |
| Iron & Steel | 25.41 | 4.75 | 4.21 | 9.72 |
| Cement | 37.39 | 16.78 | 25.37 | 5.54 |
| Appliances | 7.17 | 11.60 | 9.82 | 6.10 |
| Motor Vehicles | 10.79 | 5.29 | 45.71 | (3.53) |

Source: Various Industry Reports.

coconut, the development is instructive. This is an industry that does not rely too much upon the volume it produces for the real income that it generates both for the farmers and for the economy as a whole. Instead, it relies more upon the price levels which its products can command. It is possible--as it often happens--that volume would be rising slowly or would even be declining, but the real income of coconut farmers and of the economy is pushed up by high coconut prices. Indeed, this happened in 1973 and 1974, at which time the coconut industry was helping to boost up the economy through its high export earnings, mainly attributable to price developments rather than to production volume increases. In the case of rice and wood, some effect of the averaging process is visible. Rice production was already recovering during the later part of 1973, but the industrial processing of this came with several months' lag and is thus reflected only in 1974. Similarly, in wood processing, the fluctuations in the growth of volume of production have been so severe between 1971 and 1974 that it is difficult to speak of sub-periods with two or three years' duration.

Among consumer-oriented industries, tobacco and textiles follow the general pattern of cyclical swings. Milk, beverages, and meat also show the first sub-period to be posting lower average annual growth rates in production volume than the second sub-period during the second decade. However, during the third period, instead of slowing down, production moved up at a faster rate. Again, special factors may have

Figure 1.--Variability of Growth for Base Industries

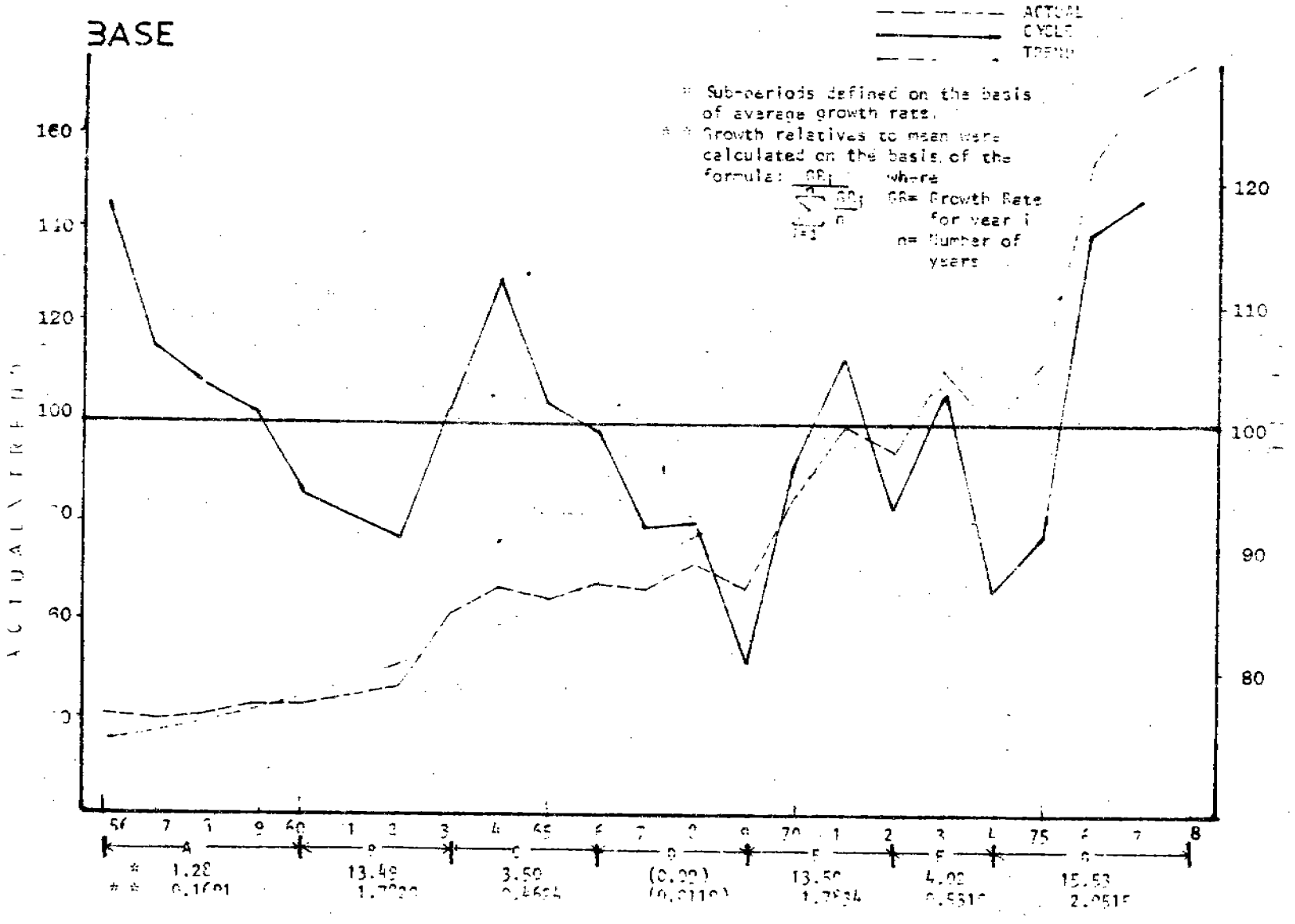
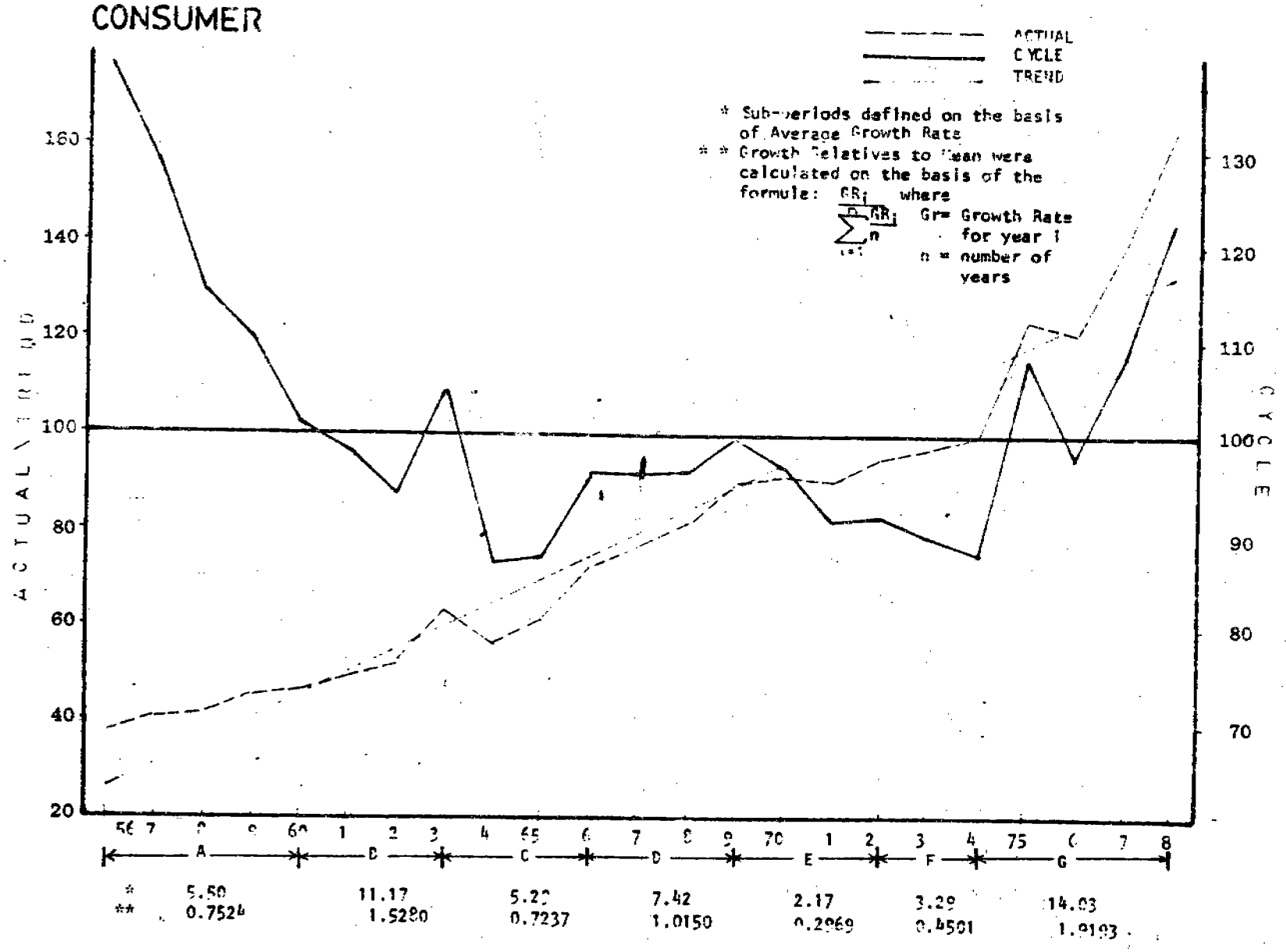


Figure 2.--Variability of Growth for Consumer Industries



influenced this record. The beverage industry did ride on relatively high coconut prices which prevailed during most of the third sub-period, and meat processing got a boost from new entry into the industry by relatively big concerns. On the other hand, flour, which registered negative growth rates in production during the second period, revealed its dependence upon external supplies, which at this time became relatively unavailable, both physically and economically, i.e. prices of external raw materials, if they could be bought at all, went up dramatically.

Paper, as an intermediate product, reflected the general economic situation and thereby showed the first and third sub-periods of the second decade to be dull in comparison with the second sub-period. However, petroleum products were clearly affected by the oil crisis of 1973-1974 such that during the second sub-period, a decline in production was recorded. Subsequently, during the third sub-period, although some recovery can be noticed, still the average annual growth rate of production during the third sub-period is much lower than the two-decade average.

Among the investment-related industries, cement and motor vehicles followed the general pattern of cyclical swings also. But iron and steel showed the immediate impact of the oil crisis; besides, during the second sub-period, it was physically difficult to obtain raw materials and supplies for the industry even at the very high prices then prevailing. The appliance industry, on its own, appears to have obtained

Figure 3.--Variability of Growth for Intermediate Goods Industries

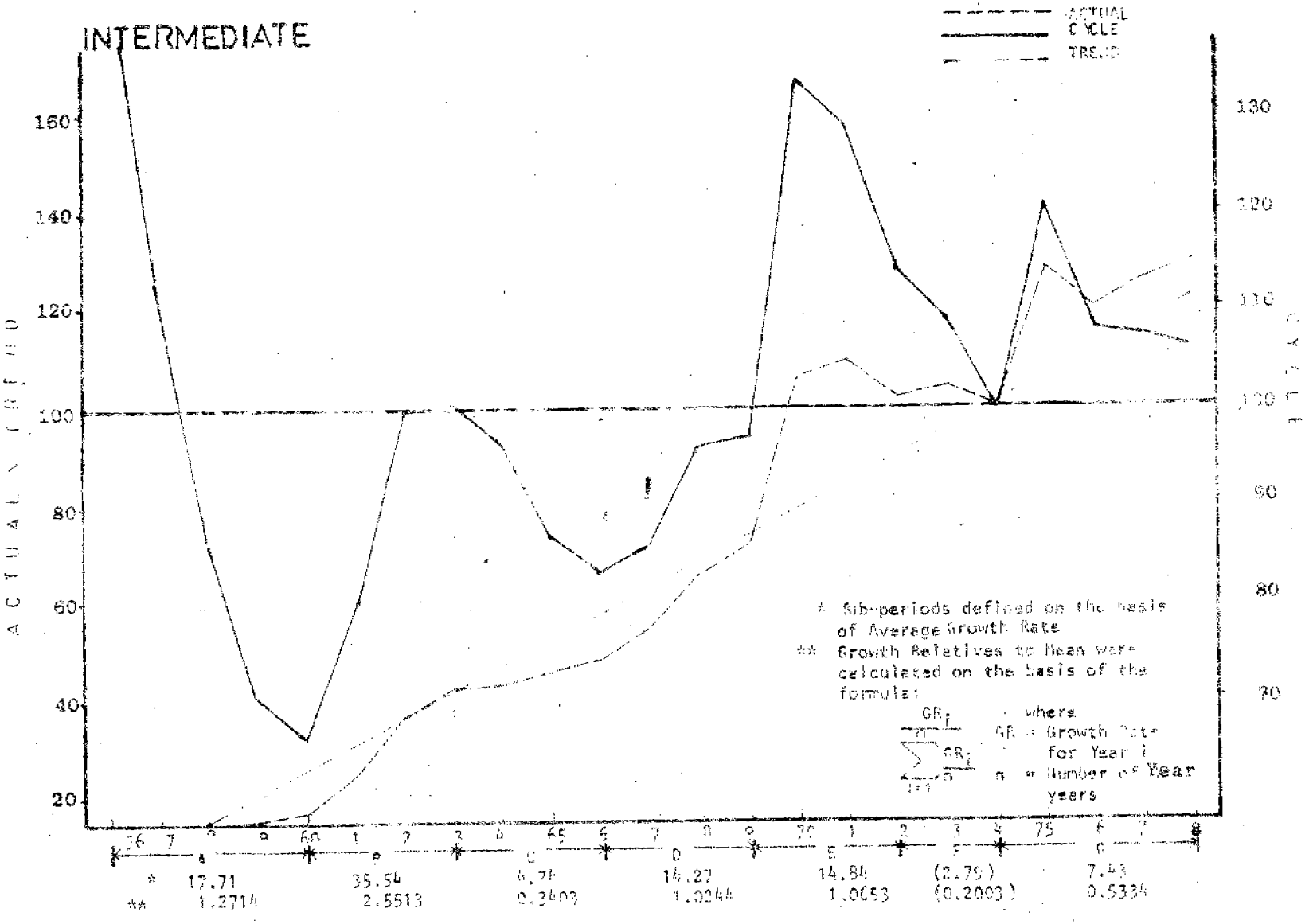
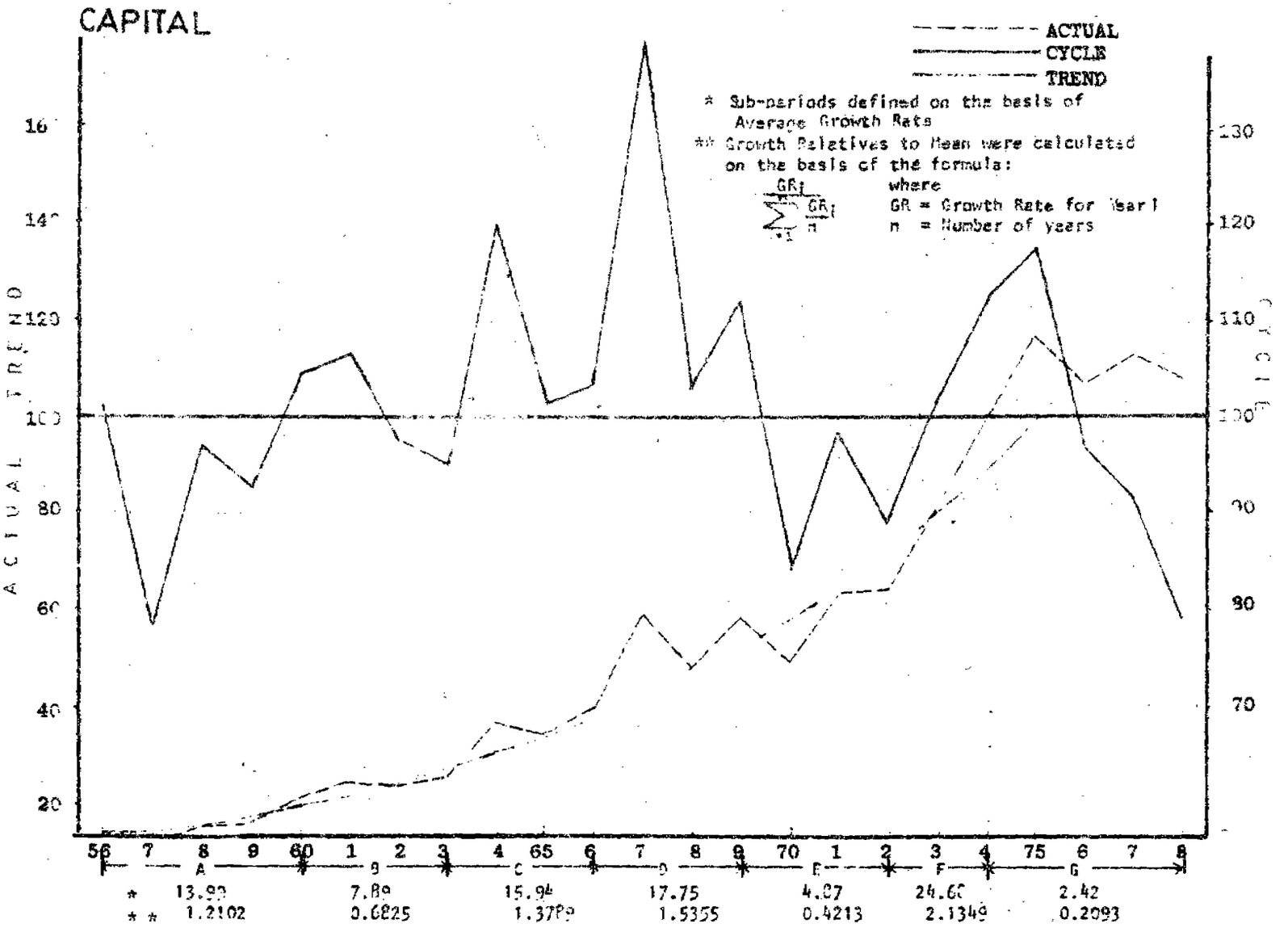


Figure 4.--Variability of Growth for Investment-Related Industries



a boost from forces specific to it during the first sub-period. But as a group, the investment related industries can be said to be in step with the cyclical movement of many other industries and sectors in the economy.

The growth of industrial production has been shown to be moderate in many cases and high in others. The effect of growth in real income and of relative prices on the general upward movement of industrial production has been found to be considerable. It is reasonable, therefore, to use the traditional concepts of income and price elasticities in viewing the growth of Philippine industries. While such simple concepts may not be commonly used, they can not be easily disregarded. Indeed, based on the limited results presented here for specific industries, much of the two-decade average growth of production in specific industries can be traced to and be explained by the rise in real income in the economy and by the movement of relative prices in industry.

Thus, it is not surprising that the relatively short-term variations in industrial growth follow the general cyclical variations that are suggested by broad economic indicators on real income and inflation. In many industries, a broad coincidence can be found between industry and economic cycles, where cycles are understood as the comparative levels of growth relatives to mean from one sub-period to another. However, at the level of specific industries, it is possible that other forces that are proper only to a given industry

can exert such a considerable influence on industrial production that the relative growth from one sub-period to another should prove to be an exception to the more general cyclical pattern. This should not be surprising, and it does happen in a few industries for at least a few sub-periods. These exceptions only prove, once again, that as one moves farther away from aggregative levels and closer into more specific cases, the role of individuating determinants becomes clearer and occasionally also more important. The more macro-economic influences from the broader economic environment still have their impact, but these can be partially or even more than fully offset by circumstances that are special to a given industry.

In sum, while macro-economic variables should be given their due importance, special measures and influences should not be disregarded at the level of industries.

# CHAPTER V

## CONCLUDING IMPRESSIONS

Three major elements stand out from the discussion of the preceding chapters. A hierarchy exists in the economy. Domestic demand is the main pull for industrial production. Raw materials are the major push factor in the production process of most industries. These elements are not new. They are well known. But their standing out has a reassuring value. They confirm what has been broadly accepted, although far from universally acknowledged tradition in economics in the Philippines.

However, since even within a broad consensus there continues to be discussion and debate about many side issues, and also since outside the field of economics there is no immediate grasp of the major points of agreement that could be inferred out of the results cited in this work, it may be necessary to elaborate on a number of crucial points. Undoubtedly, use of authors' discretion in determining which are the crucial points has been liberal, and this chapter is flawed by such indulgence.

### 1. An Economic Hierarchy

In Economics, as in many other sciences, there is a strong preference for neat categories, which follow a

structure, that is supposed to underlie a system. Implicit in any model-building exercise and in macroeconomic conceptualizing is the conviction that the economy is a system, with parts that are arranged with some order and that functionally relate with one another. In categorizing these components, invariably some are more broadly encompassing than others, i.e. some are more aggregative, others more specific. Indeed, the convention of dealing with the nation, then with sectors, with broad groups of industries, and finally with specific industries which comprise operating companies or business units is widespread. Economic accounting insists on this convention, and since practical economics can not do without data and accounts, such convention has been hallowed by use.

However, this work suggests that there is more to these hierarchical categories than just convention. The confluence of results cited for the whole economy, for sectors, for groups of industries, and for specific industries establishes the link that binds all these categories and the facts behind them. It is also the basis for insistence upon consistency, not only of specific data with the more aggregative ones, but also of the movement of economic behavior in all levels of the economic system.

The link binding the economy and its layered components as well as the operating business enterprises that ultimately make it up imposes serious obligations on all those thinking and operating on both sides of the line dividing the macro-

postulators and the micro-operators. It is a link that they can disregard at their own risk and for their mutual disbenefit.

On the side of those whose task is to think of and be responsible for the entire economic system, there can be no doubt that what they do to affect the whole economy does have a trickle-down effect on the various layers of components stretching from sectors down to specific industries. How else can one interpret the significance of figures purportedly measuring the responsiveness of industrial production to changes in real income and inflation rates? What other impression can one get from the broad harmonization of cyclical movements in various levels of the economy?

Indeed, the results cited in this work seem to suggest that one of the chief responsibilities of those who are managing the nation's economic affairs lies in assuring that high real income growth is maintained through time, and if a premium must be placed upon minimizing the shocks under which industrial growth is carried out, then real income growth rates must be kept within narrow bounds. This is a textbook prescription, repeated several times over, but insufficiently heeded in actual practice. The cause of higher and more stable industrial growth would be better served if greater attention is focused upon such a textbook prescription than if more effort is expanded upon a proliferation of specific industry policies, of specific industry rules and regulations, of specific industry rationalization programs.

There is nothing wrong with the latter, unless obsession with them leads to the neglect of the former, which appears to be much more basic.

On the side of those whose task is to run their own business, there should be no doubt that much of their business is not absolutely run by them; rather, external influences exert a lot of pressure on business developments and results, many of which are outside the control of business managers. The number of exceptions cited in this work, where specific industries moved in a different cyclical pattern from the one more generally prevailing in the broader segments of the economy, can be looked at in different ways. They can be taken to mean that specific factors, peculiar to a given industry, do matter more than the broader environmental forces. This is true, but the more general experience both in the 1960s and particularly in the 1970s does point out that the latter can not be easily disregarded. Or they can be taken to mean that while business managers should seek to understand the influence of the external environment on their business operations, they should view as their prime tasks anticipating and responding to business-affecting changes imposed from outside.

Despite the proclivity of macro-economists and general economic policy-makers to deal with aggregates and to operate with general categories, the results cited in this work still proclaim that there is room for specific influences that can be brought to bear on individual industries, and pari passu

an even wider room on individual corporations or business enterprises. Industrial and business management does have an important contribution to make. In the case of the former, needs, prospects, and policies can differ significantly from one industry to another, alhtough it is always imperative to view these in the wider context of the economy. In the case of the latter, opportunities for cost cutting, initiatives for new product launching, tactics for effective marketing must be tapped, undertaken, and adopted among the many options open to an alert and capable management team. But the choice of options is guided by taking a wider and longer-time perspective, which imposes on management the obligation to become truly entrepreneurial in the economic sense.

This brings us to the happy middle ground, which is the level with which this work has been concerned, the level of specific industries. Working down to this level is an imperative of macro-economic thinking and policy-making. Here, at the level of industries, the consequences of any action can be seen in flesh-and-blood reality. The effect of any decision can be seen not in some abstraction such as the level of production, but in tons of steel, bags of cement, cases of soft drinks--which by their very concreteness are easy to appreciate and identify with. The discipline of following through any decision down to its industry effects can help give light to its timing, to the length during which it is supposed to take effect, and to the possibility of reversing it's due course. As a side benefit, mainly

because this becomes imperative, the data-keeping machinery will be forced to render simultaneously consistent accounts of the economy and of industry.

Working up to the level of industries is necessary for business decision-making. No corporate plan can be made without reference to some external standards and without relevance to some external influences. Such standards and influences are meaningful when given for every industry. These are close enough to business operations for business managers to be comfortable with and knowledgeable in. On the other hand, they are already a step removed from specific cases to force the widening of perspective, which is crucial not only for corporate planning but also for corporate social responsibility.

Despite the present difficulty of continuing the information-gathering work and the analysis at the level of industries, such activities must be sustained. They can contribute to the discussion of economic policy. They can also help enlighten work, which business managers must do in their respective business operations. Indeed, here may well be a bridge that can help put together the concerns and interests of various parties operating on both sides of the macro-micro divide.

## 2. Market Base for Industrial Growth

To economists, the results cited here concerning the singular importance of the home market as the major demand basis for industrial growth serve only to reconfirm what has

been generally accepted. The quantification of the relative contribution ofthe different demand elements may be new, but the results conform with old knowledge.

It has been natural in some quarters, therefore, to propose that a new growth path will have to be trodden, and this is the golden way of exports. The arguments behind this proposal are well though out. Moreover, there are actual cases to show that export-oriented policies lead to higher industrial growth (Balassa, 1980).

Looking over the results cited in this work, the small contribution of export demand to Philippine industrial growth does put a pressure to introduce and instill much greater export consciousness and determination into Philippine industry. Export promotion as a policy and as an orientation has been correctly given wide lip service and in some notable cases has been actively pursued and seriously followed.

But there is a deus ex machina affect from over-insisting upon a single golden path to progress, especially one that is based on a thesis-antithesis type of thinking. "Exports are our salvation" is an attention-catching statement based on the facts derived from past policies, which have not really failed as much as they have brough a number of problems. Such problems are to be faced by giving importance to export markets, which had been neglected in the past. Conceptually, this is flawless. Tactically, it is much more multi-faceted than the simple slogans sometimes make it to be.

In the first, instance, not all industries have similar

capacity for assuming an export-oriented posture. A comparison of the demand sources of growth between Korean and Philippine sectors and industries shows that while more exports can be pushed by all sectors and industries, the degree by which this can be done varies significantly from one industry to another. Thus, generalized suggestions can have the effect of discouraging many sectors and industries whose capability is not suited to their full-hearted pursuit or compliance.

Moreover, such suggestions pointing to one golden path to faster industrial progress often forget realities other than the differential capability of different industries to go along a given track. The fact about Philippine industries is that their past orientation has been towards the domestic market. It will take time and effort to change this; unless this is recognized, there can be such a single-minded pursuit to change that in the meanwhile attending to other tasks that will help boost industrial growth can be neglected. Indeed, there are signs that this has been happening.

Any industrial structure whose major demand support has been the home market must rely for growth upon the country's internal population base, upon the use of its natural resources to generate its basic economic income, and upon productivity. Chenery and Syrquin have shown that the size of a country's internal population base does make a difference in industrial structure, particularly during the early stages of industrialization. Size may not be related

to per capita income levels, but for any income level, size can affect the pattern of industries. In a dynamized system of relationships, size can aid the process of industrial growth, especially if care is taken that food production is pushed and provision of basic needs is made as a basis for industrial and other economic activities. Indeed, at the level of industries, this system of relationships is highlighted. Pressure is put on greater productivity in the use of land and labor, as has been done in the case of rice in this country. Industrial production such as rice milling is boosted as a consequence, and this provides bigger opportunities for commercial activities such as wholesaling and retailing of rice. The examples can be extended to many cases; but they all show that given our present straits, there are other avenues to boosting industrial production.

Another such avenue is the appropriate use of natural resources as the basis for generating income. Coconut and wood are illustrative of what can be done. Instead of stopping at copra or logs, more value added can be generated by extending the processing further down the line: into coconut oil or lumber, veneer, and plywood; into coco-based chemicals or pulp and paper as well as other paper products. Under this process, natural resources are truly the base, on top of which a constantly widening industrial superstructure can be built and an ever-rising inverted industrial pyramid can be set up. They would be viewed as such, as natural resources that can be renewed, harnessed, and tapped

for their economic value. Marine and forest resources can be conceived of in this manner, and they can provide the basic infrastructure for a multitude of industries which our inventiveness and grit can make possible and realize.

Still another avenue is the rise in productivity, understood in the narrow sense under the demand sources of growth analysis conducted here as the use of less input volume for every unit of output. The results for the Philippines have not been pointing to any importance being given to the rise in productivity during the past two decades. But both the demands of economic and industrial development emphasize how critical increases in productivity levels are. Furthermore, in an era when materials and supplies are getting to be critical and expensive, they are not only crucial but also essential. Given the results of this study, and considering how important raw materials and supplies are in the industrial production process, attention to productivity increase is as called for as the export promotion panacea.

Provided that export promotion is pushed, with no disdain for these other avenues to industrial growth, it will be a proper tack to follow. While the tendency to intone the paeans for this new el dorado is natural and understandable, still other facts and needs can not be forgotten. These other avenues must be explored, especially in the light of the present industrial structure that we have inherited and of the limited capability to effect a new orientation and impose it on a structure, such as it is.

Similar to export promotion, labor-intensiveness is being touted up.

The small contribution of the increase in labor employed to industrial output growth reveals that the emphasis on labor-intensiveness is appropriate. In the past, industrial employment has been rising, but considering the technology that was employed, the coefficient for labor in the different industrial production functions was low. Lest this result is misinterpreted, it should not be understood as an indictment against the productivity of labor. Rather, it is the industrial technology that had been employed which has been appropriately subjected to intense questioning and criticism.

While more employment opportunities must obviously be generated in an economy whose factor endowment is tilted towards labor, in specific business enterprises and industries, there are varying possibilities for further job generation. While it is probable that in the case of all, more such possibilities can be found, still there are degrees of the extent to which business and industry can go in this regard. If the touting up of labor-intensiveness can serve the purpose of pushing everyone to go to the maximum level of jobs possible in each case, then it would have been worthwhile.

However, labor-intensiveness has to be placed in the wider context of social and industrial processes. If labor-intensiveness means that wages must be kept low and real wages pressed to ever lower levels, then it would have

forgotten the social and more humane aspects of wage policy. Wages, after all, are not merely an economic question. They also refer to the basic livelihood of masses of people. While there is considerable theoretical and empirical evidence concerning the adverse relation between wage levels and employment, still there is an ever wider ground for looking at such a relationship dynamically.

Indeed, people can be given a decent wage, provided they are made to work for it and therefore to produce correspondingly. This means that many basic needs that enter into the calculation of what a decent wage can satisfy can become the objects of industrial and other productive economic activities. Food production, involving the most basic foods, can be boosted so that it can adequately meet the needs of workers. Mass housing can also be promoted so that it can push the savings rate of workers as well as satisfy their legitimate desire of owning their places of residence. Mass education and transport can also be conceived not only as a set of services provided but also as a provider of jobs to as many people as possible. In the same way that natural resources can be a base for a set of many economic and industrial activities, the ordinary workingman's basic needs can be a provider of jobs, production opportunities, and economic initiatives.

Furthermore, as is indicated by the results cited here, it is incongruous to focus upon only one factor of production as though it were the only one that matters. Indeed, in the

case of the Philippines, unfortunately, labor has mattered only little. In view of this, there is the temptation to conclude that capital must have mattered a great deal, but this temptation lurks only for those who think in terms of a two-factor production process. There is no need to fall into this, considering the Philippine industrial production process.

Such a process does not give eary consolation to those who look for the exploiter and the exploited class. The fact is that there is a third, and perhaps even a fourth factor. As shown, the third factor is a very important one, and it refers to the raw materials and supplies used up by the production process. In the cost structure, this is widely known to be the most important. Not surprisingly, in a production structure that explicitly takes this third factor into account, it is revealed to be the most important of the three (labor, capital, raw materials). Despite the limitations on the factor input data used and the tentativeness of the results derived, some reaasonable although less authoritive conclusions can be set forth. In 11 out of 16 industries looked into in this study, raw materials appear to be paid less than the ideal. However, for the five industries where the reverse is true it is of interest to note that their raw materials are mostly drawn from within the economy. These industries are sugar, wood, meat, iron & steel, and cement. In this regard it is quite tempting to suggest that exploitation, if it exists, does not necessarily come from a foreign

source but rather from a conspiracy originating from and thriving within the local business environment. But no one would be so blatant as to put forth such a charge.

Indeed, the usual cry of exploitation from the different interests with claims to the production and income pie does not appear to be justified. Labor is not paid less than the ideal, given the technology that has been in use. Capital in many industries is not paid higher than its own corresponding ideal either. Where raw material inputs are overpaid, there does not seem to be a solid basis for thinking that this must be due to the manipulation of foreign interests, because mainly locally sourced raw materials are involved.

This brings us back to the critical importance of the external environment.

In a sufficient number of industries, much more than what can be discerned from broader sectoral studies, the relative importance of "disembodied technological change" is higher. At the level of specific industries, it is no longer possible to make a facile claim to the effect that since most of industrial output growth can be traced to the mere quantitative increases in factor inputs, growth accountancy from the supply side can stop with the derivation of factor coefficients from production functions, without an imperative need to account for the qualitative changes in factor inputs. In many industries, the numerical increase in factor inputs accounts for less than a predominant share

of industrial output growth, while improvement in factor quality appears to be significant enough to warrant further analysis and quantification. This task has to be carried out in subsequent industry studies.

Improvements in factor quality may well form only a part of the external economies that industries benefit from as they operate and grow through time. But Griliches may well have a point concerning improvements in factor quality pre-empting a significant portion of the whole range of possible external economies. Nonetheless, the fact is that external forces do appear to have a bearing upon the operations of an industry and consequently upon industrial growth. Whether it is education, increased health, better motivation, greater machine efficiency, more effective conservation in the use of energy, supplies, and other raw materials, or whether it is the mere environment of growth, better public facilities, high n-ach levels in society, conducive and liberal policy framework, or some other unknown, unquantifiable elements, it must be noted that their causation lies mostly outside a firm or an industry.

At the industry level, there may well be no point in looking for an exploiter even where a sense of exploitation prevails. This is because in many cases the finger would probably point towards forces external to the firm or an industry. Thus, it is advisable that sufficient importance is given, at first instance, to such external environmental forces in either corporate or industrial analysis of growth and change over time.

# APPENDIX A

## DERIVATION OF VOLUME AND VALUE INDICATORS

The growth of any manufacturing industry is recorded by various sources. The manner in which information is collected however, are so differentiated and perhaps crude that often, when a certain source is cited separately the results may conflict entirely with another or may even defy what is reasonably expected from past experience. It is for this reason that consistency among various records of industrial growth demands strict attention. The different sources that go against reasonable expectations may be sidelined while those that propose relatively similar statements about one and the same industry must be put together into a consistent record of growth.

Industry information can be obtained from many sources. Those that are the most commonly referred to are: the NCSO Annual Survey of Manufacturing Establishments, the Input-Output Tables of the Philippines, the Central Bank Statistical Bulletins, the National Income Accounts and the various industry associations such as the Automotive Manufacturer's Institute which put together data from their member companies.

For this work only two of these sources are utilized as a basis for a consistent record of industrial growth.

These sources are the Input-Output Tables and the different references to the records of industry associations. Other sources were given secondary importance mainly because of doubts cast upon the accuracy of their reports or missing observations in the period of interest which covers the years from 1956 to 1978.

The criteria of consistency takes two forms. The first consideration which is the generation of time series data for 16 manufacturing industries is done in this appendix while the second part of the consistency test is shown in Appendix B.

The generation of time series data for the 16 industries took into consideration the unit levels and the growth movements of these levels. Through the use of an Input-Output tables the levels and their-appropriate magnitudes are determined. These are all expressed in the same units, i.e. millions of pesos of value added in each industry. Inherent in the use of the input-output table is already an implicit justification of consistency since these levels are determined from inter-sectoral and inter-industry relationships before the final magnitudes for an industry are determined. The problem, however, that arises in the use of the tables is that these are published only once in every 5 years.

This then justifies the use of information available from various industry sources. From the different industry associations, annual reports, survey of the major companies within the industry and the cross reference with macroeconomic information, growth in terms of volume from 1956 to 1978 can

be determined.

The two sources of information are then put together to construct a volume series for the different industries. An input output table provides the uniformity of levels necessary for comparison and aggregation while the volume growth from various industry sources provides the movement of these levels.

The pooled information may be illustrated as follows:

$$(1) \qquad \left(\frac{I_i}{TM} \times TM_D\right) \quad I_{it} = I_{it}$$

where $I_i$ = Value Added of Industry i from 1974 Input-Output Table

$TM$ = Total Manufacturing Value Added from 1974 Input-Output Table

$TM_D$ = Total Manufacturing Value Added, CRC-Derived

$I_{it}$ = Growth of Industry i in time period to

$I_{it}$ = Value Added of Industry i in time period t at constant 1974 prices.

Eq. (1) points out that the input output table in 1974 is used to breakdown total manufacturing data (previously derived, see Estanislao, 1981) into the appropriate magnitudes for each of the 16 manufacturing obtained from the 1974 input output table serve here as adjustment factors. Once the levels in one year, in this case 1974, are determined, these are made to grow by the reported volume growth of the industries. The final data series is therefore expressed in terms of value added at constant 1974 prices.

Table A.1.--Value Added Shares and Levels as Derived from the Input-Output Table

| | (1) I-O Shares To Total Mfg. | (2) Derived Level For Total Mfg. 1974 (₱M Value Added) | (3) (1) X (2) |
|---|---|---|---|
| Rice | 0.037 | | 964.7 |
| Sugar | 0.096 | | 2503.1 |
| Coconut | 0.080 | | 2085.9 |
| Wood | 0.024 | | 625.8 |
| Milk | 0.014 | | 365.0 |
| Flour | 0.018 | | 469.3 |
| Textile | 0.032 | | 834.4 |
| Tobacco | 0.053 | | 1381.9 |
| Beverage | 0.044 | | 1147.3 |
| Meat | 0.043 | | 1121.3 |
| | | 26074 | |
| Paper | 0.039 | | 1016.9 |
| Petroleum | 0.124 | | 3233.2 |
| Cement | 0.011 | | 286.8 |
| Steel | 0.023 | | 599.7 |
| Appliances | 0.012 | | 312.9 |
| Automotive | 0.033 | | 860.4 |

Source: 1974 Input-Output Table, Estanislao, 1981.

Table A.2.--Derived Volume Series: Value Added at Constant 1974 Prices

Base Industries

| Year | Rice | Sugar | Coconut | Wood |
|---|---|---|---|---|
| 1956 | 601.0 | 1241.5 | 527.7 | 91.4 |
| 1957 | 613.5 | 1166.4 | 450.6 | 138.9 |
| 1958 | 587.5 | 1279.1 | 425.5 | 169.6 |
| 1959 | 676.3 | 1404.2 | 310.8 | 192.7 |
| 1960 | 685.9 | 1419.3 | 277.4 | 201.5 |
| 1961 | 680.1 | 1346.7 | 348.3 | 332.9 |
| 1962 | 717.7 | 1071.3 | 715.5 | 337.9 |
| 1963 | 728.3 | 1592.0 | 1007.5 | 388.0 |
| 1964 | 705.2 | 1722.1 | 1103.4 | 510.0 |
| 1965 | 733.2 | 1594.5 | 1159.8 | 437.4 |
| 1966 | 747.6 | 1434.3 | 1506.0 | 419.3 |
| 1967 | 751.5 | 1597.0 | 1122.2 | 576.4 |
| 1968 | 837.4 | 1634.5 | 1301.6 | 581.4 |
| 1969 | 816.1 | 1634.5 | 1030.4 | 593.9 |
| 1970 | 998.5 | 1972.4 | 1608.2 | 699.0 |
| 1971 | 1018.7 | 2107.6 | 1952.4 | 1060.7 |
| 1972 | 972.4 | 1859.8 | 2256.9 | 726.6 |
| 1973 | 761.1 | 3016.2 | 2063.0 | 1016.9 |
| 1974 | 964.7 | 2503.1 | 2085.9 | 625.8 |
| 1975 | 975.3 | 2453.0 | 2855.6 | 722.8 |
| 1976 | 1062.1 | 2948.7 | 4780.9 | 742.8 |
| 1977 | 1125.8 | 2748.0 | 5752.9 | 811.7 |
| 1978 | 1189.5 | 2390.5 | 6126.3 | 1063.2 |

Source: 1974 Input-Output Table, Estanislao, 1981.

Table A.3.--Derived Volume Series: Value Added at Constant 1974 Prices

| | Consumer Industries | | | | | |
|---|---|---|---|---|---|---|
| Year | Milk | Flour | Tobacco | Beverage | Meat | Textiles |
| 1956 | 37.2 | 289.6 | 143.5 | 493.3 | 608.1 | 186.1 |
| 1957 | 42.0 | 299.9 | 176.9 | 523.7 | 635.6 | 274.7 |
| 1958 | 47.1 | 309.7 | 203.6 | 550.0 | 633.3 | 390.2 |
| 1959 | 52.2 | 320.5 | 181.1 | 660.5 | 674.6 | 409.2 |
| 1960 | 76.7 | 377.3 | 164.4 | 674.4 | 652.8 | 446.2 |
| 1961 | 91.6 | 421.0 | 211.1 | 708.9 | 657.4 | 447.4 |
| 1962 | 100.0 | 432.0 | 196.9 | 797.4 | 659.7 | 506.8 |
| 1963 | 134.7 | 454.3 | 522.3 | 899.6 | 644.8 | 648.1 |
| 1964 | 176.3 | 511.1 | 236.1 | 800.1 | 660.8 | 612.2 |
| 1965 | 210.6 | 520.5 | 272.0 | 903.8 | 671.2 | 615.5 |
| 1966 | 213.9 | 545.3 | 302.9 | 1033.7 | 945.4 | 645.8 |
| 1967 | 209.1 | 596.9 | 360.5 | 1117.9 | 941.9 | 845.4 |
| 1968 | 244.9 | 634.5 | 448.9 | 1177.4 | 925.9 | 914.9 |
| 1969 | 270.5 | 680.0 | 654.2 | 1243.7 | 920.1 | 990.0 |
| 1970 | 277.4 | 667.8 | 667.5 | 1296.2 | 919.0 | 1019.2 |
| 1971 | 295.7 | 718.5 | 498.1 | 1369.5 | 929.3 | 1036.0 |
| 1972 | 315.0 | 711.9 | 675.0 | 1319.7 | 993.6 | 1059.5 |
| 1973 | 362.8 | 581.0 | 747.6 | 1314.2 | 1102.6 | 1284.9 |
| 1974 | 365.0 | 469.3 | 834.4 | 1381.9 | 1147.3 | 1121.2 |
| 1975 | 360.3 | 524.7 | 989.6 | 1687.3 | 1855.2 | 1112.2 |
| 1976 | 365.4 | 561.8 | 946.2 | 1829.6 | 1396.3 | 1078.6 |
| 1977 | 403.3 | 588.0 | 856.1 | 2048.0 | 1994.0 | 1092.0 |
| 1978 | 517.9 | 629.8 | 737.6 | 2439.1 | 2594.0 | 1101.0 |

Source: 1974 Input-Output Table, Estanislao, 1981.

Table A.4.--DerivedVolume Series: Value Added at Constant 1974 Prices

Intermediate and Capital Industries

| Year | Paper | Petro-leum | Iron | Cement | Appliances | Auto-motive |
|---|---|---|---|---|---|---|
| 1956 | 58.0 | 326.6 | 12.6 | 19.8 | 26.9 | 210.8 |
| 1957 | 65.1 | 426.8 | 13.8 | 70.8 | 36.9 | 111.9 |
| 1958 | 80.3 | 485.0 | 21.2 | 94.8 | 54.4 | 150.6 |
| 1959 | 94.6 | 501.1 | 41.9 | 101.3 | 74.5 | 124.8 |
| 1960 | 129.1 | 601.4 | 41.0 | 112.7 | 83.6 | 191.9 |
| 1961 | 160.7 | 947.3 | 105.0 | 141.5 | 107.0 | 131.6 |
| 1962 | 210.5 | 1341.8 | 42.7 | 148.7 | 129.9 | 174.7 |
| 1963 | 266.4 | 1519.6 | 63.1 | 138.5 | 144.2 | 191.9 |
| 1964 | 278.6 | 1558.4 | 84.0 | 182.3 | 154.3 | 335.6 |
| 1965 | 299.0 | 1642.6 | 99.8 | 214.1 | 151.4 | 242.6 |
| 1966 | 346.8 | 1705.0 | 134.8 | 224.9 | 151.8 | 292.5 |
| 1967 | 406.8 | 1909.6 | 150.0 | 533.1 | 160.5 | 360.5 |
| 1968 | 510.5 | 2291.5 | 158.9 | 328.6 | 169.9 | 337.3 |
| 1969 | 605.1 | 2447.3 | 252.7 | 373.0 | 186.8 | 289.8 |
| 1970 | 671.2 | 3850.7 | 310.9 | 221.3 | 216.2 | 267.6 |
| 1971 | 713.9 | 3920.2 | 251.8 | 459.4 | 236.2 | 362.2 |
| 1972 | 545.1 | 3806.1 | 277.6 | 383.2 | 259.4 | 405.2 |
| 1973 | 805.4 | 3618.0 | 353.1 | 448.6 | 282.9 | 591.1 |
| 1974 | 1016.9 | 3233.2 | 286.8 | 599.7 | 312.9 | 860.4 |
| 1975 | 1755.2 | 3698.8 | 341.6 | 778.4 | 346.1 | 936.1 |
| 1976 | 1367.7 | 3754.3 | 364.2 | 797.6 | 346.1 | 694.3 |
| 1977 | 1410.4 | 3927.0 | 360.8 | 828.2 | 381.1 | 756.3 |
| 1978 | 1478.6 | 4033.0 | 408.4 | 713.0 | 395.2 | 710.7 |

Source: CRC Staff Papers, 1974 Input-Output Table.

The data generated from Eq. (1) is then transformed into a value series through the use of price indices. This is best illustrated as follows:

(2) $I_{it} \times PI_{it} = IV_{it}$

where $PI_{it}$ = Price index of Industry i in time period t (1974 - 100)

$IV_{it}$ = Value Added of Industry i in time period t at current prices.

Having combined the different sources of industrial growth into a volume and value time series, the task that remained was to subject these new found data to the final criterion of consistency. The last and perhaps the most important consideration for the derived data is that these must be so clearly logical that they exhibit the most reasonable movement of industrial growth. A manufacturing industry whose growth has been faster than the total sector's average must show rising shares to the total value added generated by the whole sector throughout the time period under study. Such a test of consistency would go beyond merely pooling the different sources of information together. The appropriateness of the magnitudes and levels of the data would have to be verified and obviously the crucial element here may be the price inflators used to derive value levels. The price element as we can see from equations (1) and (2) serve as the crucial factor where the industry's volume growth (the levels being derived in equation (1)) would be consistent with its share to total manufacturing value (as determined

in equation (2)). An analysis of this price factor is then conducted in Appendix B.

Table A.5.--Derived Value Series: Value Added at Current Prices; Using Selling Prices as Inflators

| | Base Industries | | | |
|---|---|---|---|---|
| Year | Rice | Sugar | Coconut | Wood |
| 1956 | 95.0 | 117.9 | 35.9 | 15.6 |
| 1957 | 106.1 | 115.5 | 32.0 | 24.3 |
| 1958 | 110.5 | 131.7 | 41.7 | 28.7 |
| 1959 | 140.7 | 144.6 | 37.6 | 32.4 |
| 1960 | 156.4 | 159.0 | 29.4 | 38.5 |
| 1961 | 174.8 | 191.2 | 34.8 | 64.6 |
| 1962 | 174.4 | 193.9 | 85.9 | 70.6 |
| 1963 | 209.0 | 391.6 | 136.0 | 92.0 |
| 1964 | 241.2 | 334.1 | 160.0 | 126.0 |
| 1965 | 247.1 | 295.0 | 196.0 | 112.0 |
| 1966 | 251.2 | 315.5 | 222.9 | 116.1 |
| 1967 | 290.1 | 378.5 | 185.2 | 170.6 |
| 1968 | 306.5 | 402.1 | 256.4 | 174.4 |
| 1969 | 319.1 | 415.2 | 176.2 | 186.5 |
| 1970 | 425.4 | 654.8 | 408.5 | 244.0 |
| 1971 | 625.5 | 836.7 | 445.1 | 432.8 |
| 1972 | 621.4 | 857.4 | 410.8 | 308.1 |
| 1973 | 606.6 | 1547.3 | 961.4 | 602.0 |
| 1974 | 964.7 | 2503.1 | 2085.9 | 625.8 |
| 1975 | 980.2 | 2475.1 | 1162.2 | 631.7 |
| 1976 | 1072.7 | 2465.1 | 2084.5 | 803.0 |
| 1977 | 1159.6 | 1681.8 | 3584.8 | 1175.3 |
| 1978 | 1225.2 | 1462.9 | 4521.2 | 1667.1 |

Source: 1974 Input-Output Table, Estanislao, 1981.

Table A.6.--Derived Value Series: Value Added at Current Prices Using Selling Prices as Inflators

| | Consumer Industries | | | | | |
|---|---|---|---|---|---|---|
| Year | Milk | Flour | Tobacco | Beverage | Meat | Textiles |
| 1956 | 5.2 | 25.2 | 39.81 | 184.0 | 114.9 | 40.4 |
| 1957 | 5.9 | 24.9 | 54.3 | 173.3 | 120.8 | 64.3 |
| 1958 | 7.2 | 26.0 | 62.7 | 200.8 | 125.4 | 74.5 |
| 1959 | 9.9 | 34.9 | 61.4 | 243.7 | 138.3 | 82.2 |
| 1960 | 13.8 | 54.3 | 44.7 | 253.6 | 139.7 | 89.2 |
| 1961 | 16.0 | 90.9 | 57.4 | 275.1 | 145.9 | 99.5 |
| 1962 | 24.7 | 136.5 | 60.6 | 318.2 | 167.6 | 124.2 |
| 1963 | 35.4 | 125.4 | 175.0 | 358.9 | 190.9 | 167.2 |
| 1964 | 52.2 | 108.9 | 81.5 | 322.4 | 221.4 | 151.8 |
| 1965 | 70.3 | 115.0 | 103.1 | 374.2 | 230.2 | 144.6 |
| 1966 | 81.9 | 112.3 | 145.1 | 467.2 | 344.1 | 164.7 |
| 1967 | 75.2 | 131.9 | 172.7 | 501.9 | 363.6 | 229.9 |
| 1968 | 86.9 | 125.0 | 235.7 | 536.9 | 359.2 | 258.9 |
| 1969 | 89.8 | 158.4 | 418.7 | 600.7 | 360.7 | 256.4 |
| 1970 | 119.0 | 224.4 | 491.3 | 744.0 | 404.4 | 354.7 |
| 1971 | 171.5 | 264.7 | 388.5 | 880.6 | 506.5 | 462.1 |
| 1972 | 181.8 | 265.5 | 529.2 | 939.3 | 613.1 | 765.0 |
| 1973 | 298.9 | 254.5 | 591.4 | 1103.9 | 803.8 | 840.3 |
| 1974 | 365.0 | 469.3 | 834.4 | 1381.9 | 1147.0 | 1121.2 |
| 1975 | 399.2 | 572.5 | 1221.2 | 1854.3 | 1914.6 | 1314.6 |
| 1976 | 342.4 | 614.6 | 1337.9 | 2080.3 | 1457.7 | 1331.0 |
| 1977 | 379.9 | 627.4 | 1273.0 | 2398.2 | 2339.0 | 1391.2 |
| 1978 | 477.5 | 642.4 | 1166.8 | 3031.8 | 3330.7 | 1419.2 |

Source: 1974 Input-Output Table, Estanislao, 1981.

Table A.7.--Derived Value Series: Value Added at Current Prices; Using Selling Prices as Inflators

Intermediate and Capital Industries

| Year | Paper | Petroleum | Iron | Cement | Appliance | Automotive |
|---|---|---|---|---|---|---|
| 1956 | 8.9 | 70.9 | 2.3 | 7.3 | 7.4 | 47.6 |
| 1957 | 10.3 | 93.9 | 2.6 | 26.0 | 10.6 | 30.3 |
| 1958 | 13.6 | 108.2 | 4.0 | 33.7 | 16.4 | 62.5 |
| 1959 | 16.4 | 113.2 | 8.3 | 35.4 | 22.8 | 64.6 |
| 1960 | 22.2 | 138.3 | 8.9 | 37.3 | 26.8 | 110.5 |
| 1961 | 28.4 | 220.7 | 22.8 | 46.8 | 36.0 | 195.5 |
| 1962 | 41.0 | 318.0 | 10.1 | 50.9 | 46.5 | 128.8 |
| 1963 | 55.5 | 364.7 | 15.9 | 55.3 | 55.9 | 124.2 |
| 1964 | 58.8 | 380.2 | 22.5 | 78.6 | 61.7 | 261.4 |
| 1965 | 63.4 | 402.4 | 27.0 | 91.2 | 62.5 | 199.0 |
| 1966 | 77.3 | 433.1 | 30.6 | 94.9 | 65.4 | 123.1 |
| 1967 | 94.4 | 496.9 | 44.3 | 218.6 | 72.2 | 147.1 |
| 1968 | 118.4 | 584.3 | 46.9 | 134.7 | 78.2 | 139.3 |
| 1969 | 146.4 | 655.9 | 74.8 | 136.1 | 89.7 | 147.7 |
| 1970 | 236.9 | 1247.6 | 115.3 | 95.8 | 120.0 | 150.9 |
| 1971 | 279.8 | 1454.4 | 109.8 | 204.4 | 144.6 | 251.0 |
| 1972 | 229.5 | 1412.1 | 133.0 | 207.7 | 173.3 | 322.5 |
| 1973 | 489.7 | 1577.5 | 216.8 | 332.4 | 215.3 | 499.5 |
| 1974 | 1016.9 | 3233.2 | 286.8 | 599.7 | 312.9 | 860.4 |
| 1975 | 1592.0 | 4804.7 | 298.6 | 872.6 | 381.7 | 1281.5 |
| 1976 | 1330.8 | 5597.7 | 393.7 | 1024.1 | 434.4 | 1026.9 |
| 1977 | 1304.6 | 6518.8 | 522.4 | 1108.1 | 519.1 | 1176.1 |
| 1978 | 1438.7 | 6888.4 | 640.4 | 986.1 | 568.3 | 1235.2 |

Source: 1974 Input-Output, Estanislao, 1981.

## APPENDIX B

## DERIVATION OF THE PRICE INFLATORS FOR THE MANUFACTURING INDUSTRIES

From Appendix A growth of volume for the industries and the broad industrial groupings are obtained. The value shares to total manufacturing or the relative importance of each industry are also gathered. Before any conclusive statements of consistency are set forth, a reflection on the appropriate price series utilized to derive value shares is made. Comparable volume data for each industry are in terms of value added pesos at constant 1974-prices but the price inflators of this data used to generate value shares are noticed to be selling prices. Selling prices include the effect of increases in the cost of raw materials which might lead to overinflated value added figures at current prices. Such necessitated the use of a correction factor for whatever figures were generated from selling prices. The steps in deriving this factor can be outlined as follows:

(3) $SP = VAC + RMC$

where $SP$ = selling prices per unit output

$VAC$ = value added cost per unit output

$RMC$ = raw material cost per unit output

Selling prices, in this case envisioned to be prices per unit of output, can be said to be determined from the

cost of production as embodied by raw material cost per unit output plus a certain mark up factor which serves as the margin for income earned per unit of output. This markup factor is taken to be value added cost per unit of output, a measure of the income earned by various factors of production in the form of wages and salaries and profits.

Equation (3) points out the possible movement of this factor. Solving for VAC we have

(4) $$SP - RMC = VAC$$

This shows the movement of value added cost which is indeed, quite elementary. Should selling prices be increasing faster than raw material prices then value added must be increasing. Conversely, should raw material prices increase faster than selling prices then value added can be expected to decline. Such a movement can be similarly illustrated using the ratio of selling prices to raw material prices. Using the indices of both variables we can account for the movements of value added:

(5) $$\frac{SPI}{RMPI} = CFI$$

where SPI = index of selling prices (1974 = 100)

RMPI = index of raw material prices (1974 = 100)

CFI = correction factor index

An increase in selling price which is faster than the increase in raw material prices results in the increase of of the correction factor. On the other hand, an increase in raw material cost which is faster than selling price results in the decline of this factor. These movements are similar

to the movements of value added as illustrated in equation (4):

Volume levels expressed in value added pesos at constant 1974 prices are more properly inflated into value levels if value added prices (VAC) are used as an inflation factor. These levels may be approximated by utilizaing the correction factor (CFI) in equation (5) because both this factor and value added exhibit the same characteristic with whatever happens to raw material prices. Although volume is transformed into value by utilizing selling prices, the derived value series may be corrected for overinflation or underinflation if multiplied by this correction factor. Accordingly equation (2) in Appendix A is transformed into the final equation for deriving the value series for each industry:

(6) $CFI_{it} \times (I_{it} \times SPI_{it}) = IV_{it}$

where $CFI_{it}$ = correction factor index of Industry i at time period t (1974 = 100)

$SPI_{it}$ = selling price index of Industry i at time period t (1974 = 100)

The correction factor pulls the value series upwards or downwards depending on the movements of raw material prices. It should also explain why there is any incosistency between the volume growth and the value share of an industry to the manufacturing sector's total value added. An industry with a volume growth relatively higher than the sector average but with a value share which is declining must have had extremely high raw material prices which reduce value levels and shares relative to the total value generated in the sector.

Table B.1.--Price Indices of Base Industries

| Year | Rice | | | Sugar | | | Coconut | | | Wood | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SPI[1] | RMI[2] | Ratio[3] | SPI | RMI | Ratio | SPI | RMI | Ratio | SPI | RMI | Ratio |
| 1956 | 0.158 | 0.211 | 0.749 | 0.095 | 0.219 | 0.434 | 0.068 | 0.222 | 0.306 | 0.171 | 0.225 | 00.760 |
| 1957 | .173 | .217 | .797 | .099 | .225 | .440 | .071 | .229 | .310 | .175 | .232 | .754 |
| 1958 | .188 | .216 | .870 | .103 | .226 | .456 | .098 | .230 | .426 | .169 | .235 | .719 |
| 1959 | .208 | .221 | .941 | .103 | .230 | .448 | .121 | .235 | .515 | .168 | .240 | .700 |
| 1960 | .228 | .231 | .987 | .112 | .241 | .465 | .106 | .245 | .433 | .191 | .311 | .614 |
| 1961 | .257 | .236 | 1.089 | .142 | .246 | .577 | .100 | .252 | .397 | .194 | .257 | .755 |
| 1962 | .243 | .253 | .960 | .181 | .264 | .686 | .120 | .270 | .444 | .209 | .276 | .757 |
| 1963 | .287 | .281 | 1.021 | .246 | .290 | .848 | .135 | .298 | .453 | .237 | .304 | .780 |
| 1964 | .342 | .295 | 1.159 | .194 | .306 | .634 | .145 | .311 | .466 | .247 | .316 | .782 |
| 1965 | .337 | .308 | 1.094 | .185 | .320 | .578 | .169 | .325 | .520 | .256 | .329 | .778 |
| 1966 | .336 | .326 | 1.031 | .220 | .338 | .651 | .148 | .355 | .417 | .277 | .347 | .798 |
| 1967 | .386 | .354 | 1.090 | .237 | .365 | .649 | .165 | .370 | .446 | .296 | .373 | .794 |
| 1968 | .366 | .388 | .943 | .246 | .396 | .621 | .197 | .401 | .491 | .300 | .482 | .746 |
| 1969 | .391 | .419 | .933 | .254 | .426 | .596 | .171 | .430 | .398 | .314 | .432 | .727 |
| 1970 | .426 | .479 | .899 | .332 | .487 | .682 | .254 | .492 | .516 | .349 | .494 | .706 |
| 1971 | .614 | .566 | 1.085 | .397 | .570 | .696 | .228 | .575 | .397 | .408 | .576 | .708 |
| 1972 | .639 | .594 | 1.076 | .461 | .601 | .767 | .182 | .606 | .300 | .424 | .610 | .695 |
| 1973 | .797 | .732 | 1.089 | .513 | .734 | .699 | .166 | .737 | .632 | .592 | .739 | .801 |
| 1974 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| 1975 | 1.005 | 1.060 | .948 | 1.009 | 1.064 | .948 | .407 | 1.067 | .381 | .874 | 1.075 | .813 |
| 1976 | 1.010 | 1.105 | .914 | .836 | 1.119 | .747 | .436 | 1.126 | .387 | 1.081 | 1.141 | .947 |
| 1977 | 1.030 | 1.201 | .858 | .612 | 1.216 | .503 | .623 | 1.223 | .509 | 1.448 | 1.237 | 1.171 |
| 1978 | 1.030 | 1.261 | .817 | .612 | 1.276 | .480 | .738 | 1.286 | .574 | 1.568 | 1.300 | 1.206 |

Source: 1974 Input-Output Table, CRC Staff Papers.

[1]SPI, Selling Price Index 1974=100

[2]RMI, Raw Material Price Index 1974=100

[3]Ratio, SP/RMI

Table B.2--Price Indices of Consumer Goods Industries

| Year | Milk | | | Flour | | | Tobacco | | | Beverage | | | Meat | | | Textiles | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SPI[1] | RMI[2] | RATIO[3] | SPI | RMI | RATIO | SPI | RMI | RATIO | SPI | RMI | RATIO | SPI | RMI | RATIO | SPI | RMI | RATIO |
| 1956 | 0.140 | 0.252 | 0.556 | 0.087 | 0.212 | 0.410 | 0.278 | 0.245 | 1.135 | 0.373 | 0.268 | 1.392 | 0.189 | 0.217 | 0.871 | 0.217 | 0.255 | 0.851 |
| 1957 | .141 | .266 | .530 | .083 | .218 | .381 | .307 | .257 | 1.194 | .331 | .284 | 1.165 | .190 | .223 | .852 | .234 | .268 | .873 |
| 1958 | .152 | .279 | .545 | .084 | .218 | .385 | .308 | .268 | 1.149 | .365 | .300 | 1.217 | .198 | .224 | .884 | .191 | .281 | .680 |
| 1959 | .190 | .282 | .674 | .109 | .223 | .489 | .339 | .272 | 1.246 | .369 | .303 | 1.218 | .205 | .228 | .899 | .201 | .285 | .705 |
| 1960 | .180 | .295 | .610 | .144 | .233 | .618 | .272 | .284 | .958 | .376 | .318 | 1.182 | .214 | .238 | .899 | .200 | .298 | .671 |
| 1961 | .175 | .310 | .565 | .216 | .238 | .906 | .279 | .297 | .916 | .388 | .334 | 1.162 | .222 | .244 | .910 | .209 | .312 | .670 |
| 1962 | .247 | .331 | .746 | .316 | .255 | 1.239 | .308 | .319 | .969 | .399 | .356 | 1.121 | .254 | .262 | .969 | .245 | .334 | .734 |
| 1963 | .263 | .361 | .729 | .276 | .271 | 1.018 | .335 | .340 | .960 | .399 | .387 | 1.031 | .296 | .290 | 1.021 | .258 | .363 | .711 |
| 1964 | .296 | .370 | .800 | .213 | .297 | .717 | .345 | .356 | .964 | .403 | .396 | 1.018 | .335 | .304 | 1.102 | 248 | .373 | .665 |
| 1965 | .334 | .380 | .879 | .221 | .310 | .713 | .379 | .368 | 1.030 | .414 | .406 | 1.020 | .343 | .318 | 1.079 | .255 | .383 | .666 |
| 1966 | .383 | .395 | .970 | .206 | .328 | .628 | .[illegible] | .305 | 1.244 | .452 | .423 | 1.069 | .364 | .335 | 1.087 | .272 | .399 | .682 |
| 1967 | .360 | .415 | .867 | .221 | .356 | .621 | .[illegible] | .450 | 1.180 | .449 | .442 | 1.016 | .386 | .363 | 1.063 | .272 | .419 | .649 |
| 1968 | .355 | .429 | .828 | .197 | .389 | .506 | .[illegible] | .424 | 1.238 | .456 | .452 | 1.029 | .388 | .394 | .985 | .283 | .433 | .654 |
| 1969 | .332 | .452 | .735 | .233 | .421 | .553 | .[illegible] | .449 | 1.425 | .483 | .473 | 1.021 | .392 | .424 | .925 | .259 | .456 | .568 |
| 1970 | .429 | .531 | .808 | .336 | .481 | .699 | .736 | .524 | 1.405 | 1574 | .551 | 1.042 | .440 | .486 | .905 | .348 | .533 | .653 |
| 1971 | .560 | .594 | .976 | .367 | .567 | .647 | .780 | .592 | 1.318 | .643 | .604 | 1.065 | .545 | .568 | .960 | .446 | .595 | .750 |
| 1972 | .577 | .648 | .890 | .373 | .596 | .626 | .784 | .641 | 1.223 | .711 | .669 | 1.063 | .617 | .599 | 1.030 | .722 | .649 | 1.112 |
| 1973 | .824 | .751 | 1.097 | .438 | .732 | .598 | .791 | .750 | 1.055 | .840 | .761 | 1.104 | .729 | .733 | .995 | .654 | .751 | .871 |
| 1974 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| 1975 | 1.108 | 1.105 | 1.003 | 1.091 | 1.062 | 1.027 | 1.274 | 1.098 | 1.24 | 1.099 | 1.116 | .985 | 1.032 | 1.062 | .972 | 1.182 | 1.014 | 1.071 |
| 1976 | .937 | 1.246 | .752 | 1.094 | 1.109 | .986 | 1.414 | 1.221 | 1.158 | 1.137 | 1.274 | .892 | 1.044 | 1.118 | .934 | 1.234 | 1.243 | .993 |
| 1977 | .942 | 1.348 | .699 | 1.067 | 1.205 | .885 | 1.487 | 1.322 | 1.125 | 1.171 | 1.378 | .850 | 1.173 | 1.215 | .965 | 1.274 | 1.346 | .947 |
| 1978 | .922 | 1.415 | .652 | 1.020 | 1.265 | .806 | 1.582 | 1.300 | 1.138 | 1.243 | 1.454 | .855 | 1.284 | 1.276 | 1.007 | 1.289 | 1.414 | .912 |

Source: 1974 Input-Output Table, CRC Staff Papers.

[1]SPI, Selling Price Index 1974 = 100

[2]RMI, Raw Material Price Index 1974 = 100

[3]RATIO, SPI/RMI

Table B.3.--Price Indices of Intermediate Goods and Investment-Related Industries

| Year | Paper | | | Petroleum | | | Iron & Steel | | | Cement | | | Appliances | | | Motor Vehicles | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SPI[1] | RMI[2] | RATIO[3] | SPI | RMI | RATIO | SPI | RMI | RATIO | SPI | RMI | RATIO | SPI | RMI | RATIO | SPI | RMI | RATIO |
| 1956 | 0.154 | 0.264 | 0.583 | 0.217 | 0.214 | 1.014 | 0.184 | 0.262 | 0.702 | 0.368 | 0.259 | 1.421 | 0.470 | 0.274 | 1.715 | 0.226 | 0.275 | 0 822 |
| 1957 | .158 | .279 | .566 | .220 | .216 | 1.019 | .151 | .277 | .690 | .367 | .270 | 1.359 | .482 | .288 | 1.674 | .271 | .289 | .936 |
| 1958 | .169 | .294 | .575 | .223 | .217 | 1.028 | .191 | .293 | .652 | .356 | .279 | 1.276 | .392 | .302 | 1.632 | .415 | .304 | 1.365 |
| 1959 | .173 | .297 | .582 | .226 | .218 | 1.037 | .198 | .296 | .669 | .349 | .282 | 1.238 | .505 | .306 | 1.650 | .518 | .308 | 1.682 |
| 1960 | .172 | .310 | .555 | .230 | .219 | 1.050 | .217 | .310 | .700 | .331 | .295 | 1.122 | .517 | .321 | 1.611 | .576 | .322 | 1.789 |
| 1961 | .177 | .326 | .543 | .233 | .199 | 1.171 | .217 | .326 | .666 | .331 | .310 | 1.068 | .579 | .336 | 1.723 | .726 | .338 | 2.148 |
| 1962 | .195 | .348 | .560 | .237 | .209 | 1.134 | .223 | .348 | .678 | .342 | .336 | 1.018 | .543 | .356 | 1.517 | .737 | .360 | 2.047 |
| 1963 | .201 | .378 | .532 | .240 | .220 | 1.091 | .252 | .378 | .666 | .399 | .360 | 1.108 | .556 | .386 | 1.433 | .647 | .389 | 1.663 |
| 1964 | .211 | .386 | .547 | .244 | .206 | 1.184 | .268 | .385 | .696 | .431 | .370 | 1.165 | .570 | .400 | 1.425 | .779 | .399 | 1.952 |
| 1965 | .212 | .395 | .537 | .245 | .190 | 1.289 | .271 | .394 | .688 | .426 | .385 | 1.106 | .584 | .413 | 1.414 | .408 | .410 | .995 |
| 1966 | .223 | .411 | .543 | .254 | .186 | 1.366 | .286 | .410 | .698 | .422 | .409 | 1.032 | .595 | .431 | 1.381 | .421 | .428 | .984 |
| 1967 | .232 | .429 | .541 | .255 | .182 | 1.401 | .295 | .427 | .691 | .410 | .424 | .967 | .540 | . 50 | 1.200 | .408 | .446 | .917 |
| 1968 | .232 | .440 | .527 | .255 | .172 | 1.483 | .295 | .439 | .674 | .410 | .431 | .951 | .519 | .460 | 1.128 | .413 | .458 | .902 |
| 1969 | .242 | .461 | .525 | .268 | .169 | 1.586 | 296 | .452 | .645 | .365 | .453 | .806 | .535 | .480 | 1.115 | .379 | .477 | .795 |
| 1970 | .353 | .541 | .652 | .324 | .166 | 1.952 | .371 | .543 | .683 | .433 | .529 | .819 | .578 | .555 | 1.041 | .564 | .555 | 1.016 |
| 1971 | .392 | .600 | .653 | .371 | .206 | 1.801 | .436 | .601 | .725 | .445 | .570 | .781 | .684 | .612 | 1.118 | .693 | .615 | 1.127 |
| 1972 | .421 | .658 | .640 | .371 | .222 | 1.671 | .479 | .660 | .726 | .542 | .627 | .864 | .732 | .668 | 1.096 | .796 | .670 | 1.188 |
| 1973 | .608 | .755 | .805 | .431 | .267 | 1.633 | .614 | .757 | .811 | .741 | .766 | .967 | .802 | .761 | 1.054 | .84 | .763 | 1.101 |
| 1974 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| 1975 | .907 | 1.114 | .814 | 1.300 | 1.815 | .716 | .874 | 1.113 | .785 | 1.121 | 1.023 | 1.096 | 1.044 | 1.103 | .947 | 1.369 | 1.111 | 1.232 |
| 1976 | .973 | 1.266 | .769 | 1.493 | 2.012 | .742 | 1.081 | 1.272 | .850 | 1.284 | 1.148 | 1.118 | 1.127 | 1.255 | .898 | 1.479 | 1.264 | 1.171 |
| 1977 | .925 | 1.369 | .676 | 1.662 | 2.058 | .808 | 1.448 | 1.374 | 1.054 | 1.338 | 1.240 | 1.079 | 1.205 | 1.362 | .885 | 1.555 | 1.368 | 1.136 |
| 1978 | .973 | 1.439 | .676 | 1.729 | 2.070 | .835 | 1.568 | 1.443 | 1.087 | 1.383 | 1.321 | 1.047 | 1.307 | 1.438 | .909 | 1.738 | 1.443 | 1.204 |

Source: 1974 Input-Output Table, CRC Staff Papers.

[1]SPI, Selling Price Index, 1974 = 100.

[2]RMI, Raw Material Price Index, 1974 = 100.

[3]RATIO, SPI/RMI

Table B.4.--Total Raw Material Inputs Supplied by Major Production Sectors to Base Industries, in Levels and Percentages

A. Levels (₱'000)

| Output Sector / Input Sector | Rice | Sugar | Coconut | Wood |
|---|---|---|---|---|
| Agriculture | 4725462 | 2487706 | 327 | 773426 |
| Mining | 0 | 0 | 0 | 0 |
| Manufacturing | 666235 | 220976 | 521711 | 200751 |
| Utilities | 3543 | 15716 | 13976 | 12277 |
| Construction | 906 | 524 | 1006 | 0 |
| Commerce | 666235 | 488764 | 888983 | 114729 |
| Transport et al | 26119 | 34832 | 14381 | 25882 |
| Other Services | 9120 | 30202 | 67517 | 20466 |
| Total | 5496594 | 3279720 | 707901 | 1147531 |

B. Percentages (x 100)

| Output Sector / Input Sector | Rice | Sugar | Coconut | Wood |
|---|---|---|---|---|
| Agriculture | 0.859 | 0.759 | 0.722 | 0.673 |
| Mining | 0.000 | 0.000 | 0.000 | 0.000 |
| Manufacturing | 0.012 | 0.067 | 0.93 | 0.175 |
| Utilities | 0.001 | 0.005 | 0.003 | 0.011 |
| Consruction | 0.000 | 0.000 | 0.000 | 0.000 |
| Commerce | 0.121 | 0.149 | 0.138 | 0.100 |
| Transport et al | 0.005 | 0.011 | 0.022 | 0.023 |
| Other Services | 0.002 | 0.009 | 0.022 | 0.018 |

Source: 1974 Input-Output Table.

Table B.5.--Total Raw Material Inputs Supplied by Major Production Sectors to Consumer Industries, in Levels and Percentages

A. Levels (₦'000)

| Input Sector | Output Sector: Milk | Flour | Tobacco | Beverage | Meat | Textile |
|---|---|---|---|---|---|---|
| Agriculture | 71720 | 1958236 | 303833 | 327 | 2541508 | 307372 |
| Mining | 0 | 12 | 0 | 0 | 545 | 14 |
| Manufacturing | 365659 | 68148 | 638237 | 521711 | 242203 | 1523216 |
| Utilities | 5117 | 5235 | 6338 | 13976 | 3550 | 36696 |
| Construction | 7 | 0 | 496 | 1006 | 28 | 185 |
| Commerce | 68995 | 286821 | 134802 | 88983 | 537897 | 341996 |
| Transport et al | 7677 | 10758 | 10165 | 14381 | 13693 | 30840 |
| Other Services | 9120 | 9941 | 51494 | 67517 | 4689 | 75729 |
| Total | 529045 | 2339359 | 11459903 | 707901 | 3343933 | 2316028 |

B. Percentages (X 100)

| Input Sector | Output Sector: Milk | Flour | Tobacco | Beverage | Meat | Textile |
|---|---|---|---|---|---|---|
| Agriculture | 0.136 | 0.837 | 0.265 | 0.001 | 0.761 | 0.133 |
| Mining | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Manufacturing | 0.691 | 0.029 | 0.557 | 0.737 | 0.072 | 0.657 |
| Utilities | 0.010 | 0.002 | 0.006 | 0.020 | 0.001 | 0.016 |
| Construction | 0.001 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 |
| Commerce | 0.130 | 0.123 | 0.118 | 0.126 | 0.161 | 0.148 |
| Transport et al | 0.015 | 0.005 | 0.009 | 0.020 | 0.004 | 0.013 |
| Other Services | 0.017 | 0.004 | 0.045 | 0.095 | 0.001 | 0.033 |

Source: 1974 Input-Output Table.

Table B.6.--Total Raw Material Inputs Supplied by Major Production Sectors to Intermediate and Investment-Related Industries, in Level and Percentages

A. Levels (₱'000)

| Input Sector | Output Sector: Paper | Petroleum | Iron | Cement | Appliances | Automotive |
|---|---|---|---|---|---|---|
| Agriculture | 8057 | 000 | 000 | 000 | 000 | 000 |
| Mining | 195 | 4199010 | 5784 | 64189 | 000 | 000 |
| Manufacturing | 217480 | 171341 | 1013343 | 342911 | 87593 | 346261 |
| Utilities | 7211 | 9187 | 14025 | 27030 | 2413 | 7776 |
| Construction | 311 | 16456 | 45724 | 524 | 000 | 2154 |
| Commerce | 35374 | 762463 | 134071 | 78467 | 33775 | 87392 |
| Transport et al | 8508 | 100761 | 44906 | 14075 | 4193 | 31527 |
| Other Services | 5500 | 128787 | 16890 | 37383 | 16023 | 42199 |
| Total | 282636 | 5388005 | 1233593 | 564479 | 143997 | 577309 |

B. Percentages (X 100)

| Input Sector | Output Sector: Paper | Petroleum | Iron | Cement | Appliances | Automotive |
|---|---|---|---|---|---|---|
| Agriculture | 0.029 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Mining | 0.001 | 0.778 | 0.005 | 0.114 | 0.000 | 0.000 |
| Manufacturing | 0.769 | 0.032 | 0.821 | 0.607 | 0.608 | 0.669 |
| Utilities | 0.026 | 0.002 | 0.011 | 0.048 | 0.017 | 0.015 |
| Construction | 0.001 | 0.003 | 0.004 | 0.001 | 0.000 | 0.004 |
| Commerce | 0.125 | 0.142 | 0.109 | 0.139 | 0.235 | 0.169 |
| Transport et al | 0.030 | 0.019 | 0.036 | 0.025 | 0.029 | 0.061 |
| Other Services | 0.019 | 0.024 | 0.014 | 0.066 | 0.111 | 0.082 |

Source: 1974 Input-Output Table

Table B.7.--Final Derived Value Series for Base Industries: Value Added at Current Prices

| Year | Rice | Sugar | Coconut | Wood |
|---|---|---|---|---|
| 1956 | 71.2 | 51.2 | 11.0 | 11.9 |
| 1957 | 84.6 | 50.8 | 9.9 | 18.3 |
| 1958 | 96.1 | 60.1 | 17.8 | 20.6 |
| 1959 | 132.4 | 64.8 | 19.4 | 22.7 |
| 1960 | 154.4 | 73.9 | 12.7 | 23.6 |
| 1961 | 190.4 | 110.3 | 13.8 | 48.8 |
| 1962 | 167.4 | 133.0 | 38.1 | 53.4 |
| 1963 | 213.4 | 332.1 | 61.6 | 71.8 |
| 1964 | 279.5 | 211.8 | 74.6 | 98.5 |
| 1965 | 270.3 | 170.5 | 101.9 | 87.1 |
| 1966 | 259.0 | 205.4 | 93.0 | 92.7 |
| 1967 | 316.2 | 245.7 | 82.6 | 135.5 |
| 1968 | 289.0 | 249.7 | 125.9 | 130.1 |
| 1969 | 297.7 | 247.5 | 70.1 | 135.6 |
| 1970 | 382.4 | 446 6 | 210.8 | 172.3 |
| 1971 | 678.7 | 582.3 | 176.7 | 306.4 |
| 1972 | 668.6 | 657.6 | 123.2 | 214.1 |
| 1973 | 660.6 | 1081.6 | 607.6 | 482.2 |
| 1974 | 964.7 | 2503.1 | 2085.9 | 625.8 |
| 1975 | 929.2 | 2346.4 | 442.8 | 576.7 |
| 1976 | 980.5 | 1841.4 | 806.7 | 760.4 |
| 1977 | 994.9 | 845.9 | 1824.3 | 1376.3 |
| 1978 | 1001.0 | 702.2 | 2595.2 | 2010.5 |

Source: 1974 Input-Output Table, CRC Staff Paper, Estanislao, 1981.

Table B.3.--Final Derived Value Series for Consumer Industries: Value Added at Current Prices

| Year | Milk | Flour | Tobacco | Beverage | Meat | Textiles |
|---|---|---|---|---|---|---|
| 1956 | 2.9 | 10.3 | 45.2 | 256.7 | 100.1 | 34.4 |
| 1957 | 3.1 | 9.5 | 64.8 | 201.9 | 102.9 | 56.1 |
| 1958 | 3.9 | 10.0 | 72.0 | 244.4 | 110.9 | 50.7 |
| 1959 | 6.7 | 17.1 | 176.5 | 296.8 | 124.3 | 58.0 |
| 1960 | 8.4 | 33.6 | 42.8 | 299.8 | 125.6 | 59.9 |
| 1961 | 9.0 | 82.5 | 52.6 | 319.7 | 132.8 | 66.7 |
| 1962 | 18.4 | 169.1 | 58.7 | 356.7 | 162.4 | 91.2 |
| 1963 | 25.8 | 127.7 | 168.5 | 370.0 | 125.0 | 118.9 |
| 1964 | 41.8 | 78.1 | 78.6 | 328.2 | 244.0 | 101.0 |
| 1965 | 61.3 | 82.0 | 106.2 | 381.7 | 248.4 | 88.8 |
| 1966 | 79.4 | 70.3 | 186.5 | 499.4 | 374.0 | 105.2 |
| 1967 | 65.2 | 81.9 | 203.8 | 509.9 | 386.5 | 149.2 |
| 1968 | 71.9 | 63.3 | 271.8 | 541.7 | 353.8 | 169.3 |
| 1969 | 66.0 | 87.6 | 596.7 | 613.3 | 333.7 | 145.6 |
| 1970 | 96.2 | 156.9 | 690.3 | 775.2 | 366.0 | 231.6 |
| 1971 | 167.4 | 171.3 | 512.0 | 937.8 | 486.2 | 346.6 |
| 1972 | 161.8 | 166.2 | 647.2 | 997.4 | 631.5 | 850.7 |
| 1973 | 327.9 | 152.2 | 623.9 | 1218.7 | 799.8 | 731.9 |
| 1974 | 365.0 | 469.3 | 834.4 | 1381.9 | 1147.0 | 1121.2 |
| 1975 | 460.4 | 588.0 | 1312.6 | 1826.5 | 1801.0 | 1407.9 |
| 1976 | 257.5 | 606.0 | 1549.3 | 1835.6 | 1361.5 | 1321.7 |
| 1977 | 275.6 | 555.3 | 1432.1 | 2038.5 | 2257.1 | 1383.8 |
| 1978 | 311.3 | 517.8 | 1327.8 | 2592.2 | 3354.0 | 1294.3 |

Source: 1974 Input-Output Table, CRC Staff Papers, Estanislao, 1981.

Table B.9 --Final Derived Value Series for Intermediate Goods and Investment-Related Industries: Value Added at Current Prices

| Year | Paper | Petroleum | Iron | Cement | Appliances | Auto. |
|---|---|---|---|---|---|---|
| 1956 | 5.2 | 71.9 | 1.6 | 10.4 | 12.7 | 30.1 |
| 1957 | 5.8 | 95.7 | 1.8 | 35.4 | 17.9 | 28.4 |
| 1958 | 7.8 | 111.2 | 2.6 | 43.0 | 26.7 | 85.3 |
| 1959 | 9.4 | 117.4 | 5.6 | 43.8 | 37.6 | 108.3 |
| 1960 | 12.3 | 145.2 | 6.2 | 41.8 | 43.2 | 197.7 |
| 1961 | 15.4 | 258.4 | 16.2 | 50.0 | 62.0 | 205.1 |
| 1962 | 23.0 | 360.6 | 6.9 | 51.8 | 70.5 | 263.7 |
| 1963 | 28.5 | 397.9 | 10.6 | 61.3 | 80.1 | 206.5 |
| 1964 | 32.2 | 450.2 | 15.7 | 91.6 | 87.9 | 510.3 |
| 1965 | 34.1 | 518.7 | 18.6 | 100.9 | 88.4 | 98.5 |
| 1966 | 42.0 | 591.6 | 26.9 | 97.9 | 90.3 | 121.1 |
| 1967 | 51.1 | 682.2 | 30.6 | 211.4 | 86.6 | 134.6 |
| 1968 | 52.4 | 866.5 | 31.6 | 128.1 | 88.2 | 125.7 |
| 1969 | 76.9 | 1040.3 | 48.3 | 109.7 | 100.0 | 117.4 |
| 1970 | 154.3 | 2435.3 | 78.8 | 78.5 | 124.9 | 153.3 |
| 1971 | 182.7 | 2619.4 | 79.6 | 159.6 | 161.7 | 282.9 |
| 1972 | 146.9 | 2359.6 | 96.6 | 179.5 | 190.6 | 383.1 |
| 1973 | 399.2 | 2576.1 | 175.8 | 321.5 | 226.9 | 553.0 |
| 1974 | 1016.9 | 3233.2 | 286.8 | 599.7 | 312.9 | 860.4 |
| 1975 | 1295.9 | 3442.8 | 234.4 | 956.4 | 361.5 | 1578.8 |
| 1976 | 1023.4 | 4159.1 | 334.7 | 444.9 | 390.1 | 1201.5 |
| 1977 | 881.9 | 5273.6 | 550.6 | 1195.6 | 459.4 | 1337.2 |
| 1978 | 972.6 | 5822.5 | 696.1 | 1032.5 | 516.6 | 1487.2 |

Source: 1974 Input-Output Table, CRC Staff Papers, Estanislao, 1981.

## APPENDIX C

## AN EVALUATION OF THE SOURCES OF GROWTH FROM THE SUPPLY SIDE

In order to meet the increasing requirements of an expanding market, the factors of production must be tapped and organized in the most efficient means possible. Such would require the extension of the analyses of the growth of demand for industrial products (Chapter II) in terms of the production elements that may have helped sustain such a growth.

After due consideration of the relevant production variables, a Cobb-Douglas production function specifying the relationship between output and the factor inputs can be formulated (Chapter III) in order to arrive at the desired analytical framework. The Cobb-Douglas function becomes useful in analyzing manufacturing industies as outlined in the following:

a. The function allows the marginal product of a factor input (MP) to be expressed in the form of the derived production coefficients and the input's average product. Thus, using labor (L) as an example of a factor input, its marginal product is:

(1) $MP_L = \beta \times Q/L$

b. The marginal product of labor under perfectly

competitive and profit maximizing conditions is equal to the real wage rate (W/P). Thus,

(2) $MP_L = W/P$,

where P = price of output

c. $\beta$ and any of the other production coefficients may be taken as the "ideal" shares of factor inputs to total output value. Solving for $\beta$ in equation (1) we have:

(3) $\beta = MP_L \times L/Q$

Substituting equation (2) here leads to the ideal share of labor to total output value expressed in terms of $\beta$:

(4) $\beta = W/P \times L/Q$

$$= \frac{\text{wage bill}}{\text{Total Output Value}}$$

d. Interpreting the two other coefficients, $\alpha$ (referring to capital) and $\gamma$ (referring to raw materials) in a similar equilibrium condition where the price of a factor input is equal to its marginal product we have:

(5) $\alpha = \frac{\text{Payments to Capital}}{\text{Total Output Value}}$

(6) $\gamma = \frac{\text{Payments to Raw Material}}{\text{Total Output Value}}$

From fitting a production function to the different manufacturing industries and arriving at the factor coefficients we may cross-check these against the actual, realized shares of factor input payments to gross value of output. These can be readily found in the input-output tables. Thus, using the coefficients we obtain the ratios:

(7) $\frac{\text{Actual Share of Labor to Output Value}}{}$ 1

(8) $\frac{\text{Actual Share of Capital to Output Value}}{\alpha} \geq 1$

(9) $\frac{\text{Actual Share of Raw Materials to Output Value}}{\beta} \geq 1$

The ratios would serve as an indicator of whether the use of factor inputs are below, above or may just approximate ideal or competitive equilibrium conditions. A ratio over unity implies that a factor input is paid more than what its marginal product may warrant. A ratio less than unity would indicate the reverse, while a ratio approximating unity shows that a factor input is paid according to its marginal product.

The comparison of ideal versus actual factor payments must then obviously lead to an inquiry on just how much a factor input contributes to total output growth. The analysis made on this contribution is similar to those done by Robert J. Lampman (1967) and Anne O. Krueger and Baran Tuncer (1980). Lampman's work deals with the study of the post-war economic growth of the major sectors of the Philippines. On the other hand, Krueger and Tuncer have studied estimates of factor productivity growth in Turkish manufacturing industries. Although there is a big disparity in both works on the subject of study (i.e., the Philippines and Turkey) and even in the time in which they were made, the two are quite similar in the method used to arrive at their respective conclusions. The growth of each of the factor inputs are given weights and the share to the growth of output is taken. Any residual which is left unexplained by the growth of factor inputs is interpreted as "technological change." This is the increase

of output which is attributed outside of mere increases in inputs either through a change in the input mix, the introduction of new and sophisticated technology or an increase in productivity.

As an illustration of the approach taken we start with the type of analysis done by Krueger and Tuncer. The growth of inputs are taken and weighted. The weighted growth then serves as the effective contribution of an input to the increase in output. The residual between the rate of growth of output and the weighted rates of growth of input serves as the technological change factor. Thus, for each industry we have:

(10) $TC = \Delta Q - (\alpha^* \Delta K + \beta^* \Delta L + \gamma^* \Delta R)$

where $\Delta Q, \Delta K, \Delta L, \Delta R$

= rates of growth of output, capital, labor, and raw materials respectively;

$\alpha^*, \beta^*, \gamma^*$

= weights of capital labor and raw materials respectively;

TC = residual factor

Robert J. Lampman, whose approach is adopted in this work, expresses the contribution of increases in factor inputs in terms of weighted percentage shares to the growth of output. Technological change is therefore expressed as the residual from a 100% contribution of factor inputs. Thus,

(11) $TC = 100 - \left[100 \left(\frac{\alpha \Delta K}{\Delta Q} + \frac{\beta \Delta L}{\Delta Q} + \frac{\gamma \Delta R}{\Delta Q}\right)\right]$

where $\alpha, \beta, \gamma$ = weights of capital, labor, and raw materials respectively

A crucial factor in the analysis is the size of the residual that can be obtained. This obviously serves as the boundary of whatever elements were adequate explanations to output growth. If the size of the residual is small most of the increase in output can be delimited to the analyses of the growth of factor inputs. If the residual is large a credible qualitative explanation must be obtained which may be attributed to the growth of output.

Two important considerations now arise in the analysis. The first is that the size of the residual is to a great extent, conditioned by the growth of factor inputs. This of course relies heavily on the accuracy of the input data used. So far it would seem that at the level of specific Philippine industries, data is available in the National Census and Statistics Survey of Manufacturing Establishments. These are in peso values and since the concern is with real growth the different prices of factor inputs which serve as deflators must be obtained with a great degree of credibility. They can be derived easily for the whole economy but not so readily for specific industries. The recourse of the analyst is either to find some other source for the volume of factor inputs used by an industry or to use the factor input prices which are available for the whole economy. The latter is the more common recourse and is the one adopted in this work. However, here there is a good possibility that individual

nuances expected of any industry are not captured completely.

The second consideration concerns the weights used in the growth of factor inputs. In the case of Krueger and Tuncer, the actual shares of factor payments to gross value of output are used. The rationale here is that the actual shares themselves are equal to the factor coefficients as derived from the production function. The coefficients are not taken as a separate and ideal competitive environment where factor inputs are paid the value of their marginal products. In this work the approach adopted is to use the factor coefficients as the weights. That there is some reservation in the use of such cannot be simply brushed aside since the coefficients in their raw form do not necessarily equal unity when an industry operates in increasing or decreasing returns to scale. The fact that the weights are supposed to determine a composite measure of factor input increases requires that they be adjusted to equal unity. This however, can also be viewed with some reservation as then the analysis undertaken must reflect the true returns to scale of an industry. The residual in the case of using unadjusted production coefficients may in turn be too large or too small to be deemed as an exaggeration of the record of an industry.

Table C.1 and C.2 which follow show the size of the residual when unadjusted and adjusted coefficients are used as weights. Using unadjusted coefficients as weights leaves results for the residual which are indeterminate. The size

TABLE C.1.--Size of the Residual in Industry Output Growth Using Unadjusted Production Coefficients

| Industry | First Decade | Second Decade |
|---|---|---|
| Base | (20.90) | 42.80 |
| Rice | (56.59) | (33.98) |
| Sugar | (24.93) | 21.96 |
| Coconut | 6.81 | 26.96 |
| Wood | 52.60 | 46.72 |
| Consumer-Oriented | 37.43 | 27.21 |
| Milk | 8.29 | 24.23 |
| Flour | 7.00 | ( 1.35) |
| Tobacco | 34.28 | 31.09 |
| Beverages | 73.71 | 65.97 |
| Meat | 1.80 | (18.30) |
| Textiles | 23.06 | 13.40 |
| Intermediate | 11.90 | (20.60) |
| Paper | 61.90 | 49.58 |
| Petroleum | [illegible].47 | (30.54) |
| Investment-Related | 23.48 | 0.74 |
| Iron and Steel | 13.85 | (45.38) |
| Cement | 27.04 | (11.14) |
| Appliances | 36.22 | 62.74 |
| Motor Vehicles | 19.09 | 8.82 |

TABLE C.2.--Size of the Residual in Industry Output Growth Using Adjusted Production Coefficients

| Industry | First Decade | Second Decade |
|---|---|---|
| Base | | |
| Rice | ( 50.28) | (28.57) |
| Sugar | (153.68) | (44.17) |
| Coconut | 5.70 | 26.01 |
| Wood | 50.09 | 44.17 |
| Consumer-Industry | | |
| Milk | ( 8.92) | 23.60 |
| Flour | 12.89 | 5.61 |
| Tobacco | 20.35 | 16.56 |
| Beverages | 14.14 | (12.18) |
| Meat | ( 23.17) | 1.86 |
| Textiles | 16.89 | 6.52 |
| Intermediate | | |
| Paper | 14.73 | (12.51) |
| Petroleum | 7.91 | (26.96) |
| Investments-Related | | |
| Iron and Steel | 8.17 | (55.10) |
| Cement | 22.29 | ( 0.63) |
| Appliances | ( 19.88) | 30.03 |
| Motor Vehicles | 9.20 | ( 2.34) |

is not invariably small and the percentage of total output growth which could be explained by factor input increases is not invariably big. This is particularly true for wood where the residual is approximately 50%; in paper and appliances in one decade, where it is close to 60% and in beverages taking both decades it is even higher at almost 70%.

Using the adjusted production coefficients the exaggeration noted seemingly remains only for the wood industry which still records a residual which is about 50%. The residual of the paper industry in the first decade is now only 14% while being negative in the second decade. The record of appliances in the second decade is now trimmed down to only 30%. The same is true for beverages which shows a residual of only 14% in the first decade while being negative in the second decade.

In both cases, regardless of what coefficients are used the performance of most of the industries can be generalized as having residuals which are lower for the second decade.

LIST OF REFERENCES


Agdamag, F. "A Strategy to Assure the Stable Growth of the Philippine Manufacturing Sector." Masters Thesis, Center for Research and Communication, 1981.

Balassa, B. 1980. "The Newly-Industrializing Developing Countries after the Oil Crisis." World Bank Staff Working Paper No. 437 (October): The John Hopkins University and the World Bank.

Bautista R. and others. 1979. Industrial Promotion Policies in the Philippines. Manila: Philippine Institute for Development Studies.

Bruno. M. 1968. "Estimation of Factor Contribution to Growth under Structural Disequilibrium." International-Economic Review 9 (February): 49-62

Carter, A.P. 1970. Structural Change in the American Economy. Cambridge, Mass.: Harvard University Press.

Chamberlin, E. H. 1956. The Theory of Monopolistic Competition: A Reorientation of the Theory of Value, Harvard Economic Studies vol. XXXVIII: Harvard University.

Cheetham, R. 1976. The Philippine: Priorities and Prospects for Development. Washington D.C.: International Bank for Reconstruction and Development.

Chenery, H.B. "Patterns of Industrial Growth." American Economic Review 50 (September): 624-656.

_____. 1969. "The Process of Industrialization." Harvard University Center for International Affairs, Economic Development Report 146 (December). Cambridge, Mass.: Harvard University.

_____. 1979. Structural Change and Development Policy. New York: Oxford University Press.

Chenery, H.B.; Shishido, S.; and Watanabe, T. 1962. "The Pattern of Japanese Growth, 1914-1954." Econometrica 30 (January): 98-139.

Chenery, H. B., and Taylor, L. J. 1968. "Development Patterns Among Countries Over Time." Review of Economics and Statistics 50 (November): 391-146.

Chenery, H. B., and Watanabe, T. 1958. "International Comparisons of the Structure of Production." Econometrica 26 (October): 487-521.

Cruz, O. "A Study on the Market, Production, and Financial Sectors of the Automotive Industry in the Philippines." Master's Thesis, Center for Research and Communication, 1981.

Denison, E. F. 1974. Accounting for United States Economic Growth 1929-1969. Washington D.C.: Brookings Institution.

Domar, E. 1967. Theory and Empirical Analysis of Production, ed. M. Brown. New York: Columbia University Press. Comment.

Encarnacion. J. and others. 1972. Econometric Models of the Philippines. Manila: National Economic Council.

Estanislao, J. P., and Go, D. 1978. "Consumer Industries: Background, Immediate Performance and Prospects." Manila: Center for Research and Communication. (Mimeographed.)

Estanislao, J. P., 1981. "Economic Growth and Structural Change in the Philippines, 1956-1978." Manila: Center for Research and Communication.

Griliches, Z., 1964. "Research Expenditures, Education, and the Aggregate Agricultural Production Function." American Economic Review 54 (December: 960-974.

Griliches, Z. and Jorgenson. 1967. "The Explanation of Productivity Changes." Review of Economic Studies (July): 34-99.

Hoffman, W. 1958. The Growth of Industrial Economies. Manchester: Manchester University Press.

Jones, 1976. "An Introduction to Modern Theories of Economic Growth" New York: McGraw-Hill.

Klein, L. R. and Preston R. S. 1967. "Some New Results in the Measurement of Capacity Utilization." American Economic Review 57 (March): 34-57.

Kim, Kwang Suk and Roemer, M. 1979. Growth and Structural Transformation. Cambridge, Mass.: Harvard University Press.

Krueger, A., and Tuncer, B. 1980. "Estimating Total Factor Productivity Growth in Developing Countries." World Bank Staff Working Paper No. 422 (October).

Lampman, R. J. 1967. "The Source of Post-War Economic Growth in the Philippines." Philippine Economic Journal 6: 170-188.

Lim, M. "An Evaluation of the Performance of the Steel and Cement Industries in the 1960's and the 1970's." Master's Thesis, Center for Research and Communication, 1981.

Maizels, A. 1970. Growth and Trade. London: Cambridge University Press.

Mangahas, M. 1979. "On How to Measure Poverty." Institute of Economic Development and Research. Quezon City: University of the Philippines.

Nadiri, M. 1972. "International Studies of Factor Inputs and Total Factor Productivity: A Brief Survey."

_____. 1970. "Some Approaches to the Theory of Measurement of Total Factor Productivity: A Survey." Journal of Economic Literature 8 (December): 1137-1171.

Nieva, C. "Study on the Marketing, Production, Financial, and Long-Term Aspects of Pulp and Paper Industries of the Philippines." Master's Thesis, Center for Research and Communication, 1981.

Power, J. H. and Sicat, G. 1970. Industrialization in the Philippines. Institute of Economic Development and Research. Quezon City: University of the Philippines.

Primero, E. "The Constancy of Philippine Input-Output Technical Coefficients." Staff Paper, Center for Research and Communication, 1980.

Ranis, G. 1974. Sharing and Development: A Programme of Employment, Equity and Growth for the Philippines. Geneva: International Labor Office.

_____. 1968. "Industrial Production Functions in the Philippines." IEDR Discussion Paper No. 68-81 (May). Manila: Institute of Economic Development and Research. (Mimeographed.)

Syrquin, M. "Production Functions and Regional Efficiency in the Manufacturing Sector in Mexico, 1965." Doctoral Thesis, Harvard University, 1970.

Thurrow, L. 1968. "Disequilibrium and Marginal Productivity of Capital and Labor." Review of Economic Statistics 59(1) (February).