APPENDICES
APPENDIX I

CONCEPTUAL FRAMEWORK

For the purposes of verification of the hypotheses (given in Chapter II) about the characteristics of the diversifying firms as also of the industries, some terms and concepts such as size, growth, age, profitability and financial policies of a firm and some concepts relating to growth, profitability, technological sensitivity, uncertainty and cyclical variation, seller concentration, size-ratio of plants, of an industry have been used in the study. These terms and concepts along with their computational plans are explained in this appendix.

A. CONCEPTS RELATING TO A FIRM

i) Size and Growth

To understand what constitutes the size of a company, one should address himself to another question; what a firm stands for. An answer to this is that in whatever manner, we define it, whether by building an elaborate mathematical edifice as a show piece for an economic museum or by expressing it in a plethora of subjective values, it is important
to remember that a firm with its own mind and capacities is a living institution which purchases productive requisites and services at a given time and converts them into saleable products to be sold at a subsequent time such that its utility function composed of profits, prestige, and power is maximized. In other words, every firm has a productive plan which is made of a stream of inputs and outputs with the objective of maximizing and/or stabilising the stream of surpluses. Therefore, any measure of size involves the dimensions or scales of these streams. Further, since growth means an increase in size, the former is also expressed in terms of the dimensions of these streams.

These dimensions are varied. Inputs imply capital, labour, technology and organization; outputs mean physical production, value of turnover, and surpluses stand for profits, power, prestige, and appreciation of equities. Therefore, the choice of a single yard-stick to measure the size and thereby the rate of growth becomes an intricate problem. However, some hair-splitting of these dimensions enables one to find that some of these are not precisely measurable with sound statistical standards; whereas some fluctuate so violently that they fail to give any perceptible idea about their trend. Still a few others are caused and influenced by other dominant dimensions already existing within the system.

For example, the volume of sale or turnover, though
easily available as a measure of size would be the least satisfactory yardstick for company size and its growth for a sample of companies drawn from different manufacturing activities. This is so because some firms may use very costly ingredients or inputs, and thereby may accelerate the sale values of their products while others may use cheap inputs which may keep the sale values at low levels. Further difficulty may arise as in some cases due to commodity taxation such as excise duties, the sale values may be shown at an artificially higher level than where either there are no commodity taxes or their extent in very low. Further, whereas some firms may exclusively be dealing in the purchase of industrial products and reselling them without doing any significant productive or manufacturing process, others may create the entire sales value within their factories by integrating a large number of manufacturing processes. Again, the use of payrolls or labour employment would present the difficulty of correctly understanding the relative economic capacity of firms dependent on mechanised equipment and fixed capital, on which the chief charge may be depreciation.

It is sometimes argued that there are different forms of development and since each has in common the purpose of increasing profits, the rate of profit should be used as an indicator of growth. This criterion lacks precision as there is normally a lag between investments and its effects on profits. Moreover this lag varies substantially from industry
to industry. Further, scaling by income has validity if income gives some noticeable trend, but the common experience suggests that it is the most fluctuating and unstable variable. Similarly, changes and evaluation of other dimensions such as power, prestige, technology, organization are not subject to any precise and objective statistical measurement.

Thus by the process of elimination the choice of a single yardstick for measuring the size and growth has leaned towards capital assets employed in the business. This criterion is selected not merely because statistical data about this variable is easily available which facilitates the computational plan of the study, but also because it objectively measures the capacity or stamina of a firm to face the vagaries of business and serves as a driving force which pushes the business forward.

A related issue here is that in determining capital assets whether one should take the depreciated or the undepreciated assets. Perhaps the undepreciated assets appear more appropriate as depreciation allowances are determined arbitrarily, and these vary from firm to firm and within a firm from time to time. Where, however, the sample of firms, whose scales and growth rates are compared internally, are heterogeneous with regard to the age and type of activity, undepreciated assets will bring a large degree of error in estimating the productive capacities because the aged units, and more particularly of those industries where, because of
peculiar technology, the comparative degree of capital obsolescence is high, will unnecessarily show higher figures of their assets than of their current capacities.

It may, therefore, be stated here that the size of a firm has been measured in terms of capital employed, and more precisely in terms of book value of net tangible assets according to the usual accounting convention, as at the close of year 1963-64. Similarly, the growth rate has been taken as the compound interest rate of increase of size and the mean rate of growth per annum has been calculated for a period of five years viz. 1959-60 to 1963-64.

ii) Age

The age of a company is measured in terms of number of years completed by the company from its year of establishment to 1964.

iii) Profitability

Profits continue to be the criterion of the sound financial health of a business enterprise. However, in order to examine the association between diversification and profitability it is difficult to attach any precise meaning to the traditional principle of profit maximization. Should the firm maximize the rate of profit on its own capital or on the total capital employed by it, or should it maximize total profits?

Since in the present study, firms vary considerably
with regard to their size of scale of operation, and therefore it profits are taken not in the ratio sense but as a result of a subtraction sum, it will naturally be proportional to the scale of operation. That is, a large firm, whether homogenous or heterogenous with regard to the industrial activities maintained, can expect a larger profit than a small firm and this will be the chief snag in any analysis of the relationship between diversification and major business motive of profitability. Thus in order to make the analysis more rational and logical, one must hit a denominator which may indicate the scale of the resources put in, or the scale of input.

As a business unit is more interested in the rate of return on its own capital, its profitability is measured by calculating the percentage of net profit to net worth. In order to eliminate the effect of time, if any, the simple average for five years 1959-60 to 1963-64 of these rates has been calculated for all the sample companies. Further, since there has been no set legal procedure for a company to prepare its profit and loss account and more particularly about the allocation of certain items like depreciation, taxation, and development rebate between the profit and loss account, and the appropriation account, the profit and loss accounts of these selected companies have been largely reworked for this study so as to permit the appropriate concept of profitability.

The concept of profit used in the study is that of a net of depreciation, taxation and interest but is gross of
development rebate as the latter is not an item of cost but retained earnings in accelerating the tempo of investment in fixed assets like plant and machinery. The average annual percentage of this profit to the net worth is considered as profitability or profit rate of an enterprise.

iv) Financial Policies

There are always two alternatives, internal resources and external resources, by which the firm can supply financial grease and lubrication to the cogs of its production, expansionary and diversification plans. The internal resources in the case of a public joint stock company are equity capital, preferential capital, reserves and surpluses which are ploughed back into the business from the past incomes; whereas external funds are borrowings and current liabilities of the firm. Since accountants all over the world have christened the aggregate internal channels of financing the business "net worth"; the total blood of assets running into the veins of any business enterprise is an aggregation of net worth and external funds.

For the purpose of apprising the financing policies of a sample company, the difference between its average annual growth rate of net tangible assets and its corresponding average annual growth rate of net worth for a period of five years from 1959-60 to 1963-64 has been calculated. A positive difference indicates that the company is relatively expanding its financial investments in terms of borrowed funds; whereas
a negative difference suggests that the strategy for investment expansion is largely the internal resources rather than the external funds.

v) Retention Ratio

The sources of internal financing are raising the capital (equity and/or preferential) from capital market and ploughing back a portion of the previous earnings. As sharing of net profits between dividends and plough back do not obey any single principle because the companies within an industry have different dividend policies, the effect of this policy on expansion and diversification is always a subject of debate.

For the purpose of examination of the relationship between diversification and dividend policy, a concept called retention ratio is set up which is defined as the percentage of ploughed back profits, i.e., net profits minus dividends paid, to the net profits over a certain period. In this case the period is five years, 1959-60 to 1963-64. This relative measure of feed-back of profits is developed because the absolute amount of profits and thereby the retained earnings, other things being equal, change pari passu with the scale of enterprise.

B. CONCEPTS RELATING TO AN INDUSTRY

As stated in Chapter II, most of the characteristics of an industry are viewed and examined with the help of secondary data. The sources of such data and the methodology
of estimating various parameters that determine the characteristics of industry are given below:

i) Growth

The annual growth of industry has been estimated by taking a simple arithmetic average of the annual index numbers of industrial production (with base 1956 = 100) for a period of 10 years, i.e., 1954 to 1963 published by the Central Statistical Organization, Government of India, in its annual publication "The Statistical Abstract of India - 1965". These index numbers cover 51 industries and are based upon the monthly statistics of production of selected industries in India.

ii) Profitability

To estimate the relative position of various industries and industrial groups with respect to their rate of return on capital, simple arithmetic averages of the annual index numbers of profitability based on the ratio of gross profits to total capital employed, for the period 1961-62 to 1963-64 (base 1960-61 = 100) as published by the Reserve Bank of India in its monthly bulletin January, 1966 (pages 8-10), have been prepared.

iii) Technological Sensitiveness

Since technological susceptibility of various industries is not subject to any direct measurement, four indirect methods
have been adopted to understand the technological sensitivity of the industries. These are: (a) capital intensiveness, (b) changes in scale of production, (c) labour productivity and (d) technical personnel ratio.

(a) **Capital Intensiveness** - Industries which are generally characterised by rapidly changing technologies are those in which the cost-reducing devices, such as division of labour and automation, call for ample use of machinery. Therefore, such industries are likely to have a high content of fixed capital in their unit of operation i.e., factory establishment. Capital intensiveness i.e., amount of fixed capital employed for factory establishment, therefore, is calculated for 203 manufacturing industries as reported in the annual Survey of Industries, 1963.

(b) **Changes in Scale of Production** - Technological changes foster repaid expansion in the scale of operation in order to attain the economies of scale. Changes in scale of production, therefore, become an appropriate barometer to disclose the degree of technological sensitiveness of an industry. In fact, an industry which experiences more rapid expansion in its scale of operation than the one which either shows negative change or a slow positive change is more prone to technological sensitiveness.

For the purpose of empirical evidence on changes in scale of production, the annual growth relatives of physical
production and number of employees per factory have been estimated for 29 manufacturing industries as covered under Census of Manufacturing Industry for the period 1948 to 1958.

To determine the annual rate of growth trend lines of the exponential type \( y = a(b)^t \) have been fitted to each series of factories registered and physical output by the method of least squares. As \( t \) - the unit of time is measured in years, \( r \) in the equation of growth relatives where \( b = (1+r) \), is the average rate of growth per annum. The growth relatives of scale of production are quotients of the division of the growth relatives of physical output by that of number of factories.

To obtain the data on physical output for 1948-1958, the series of the production values for all the industries as given in the reports of Census of Manufacturing Industries, have first been adjusted for complete coverage for all the existing factories (registered under the Factories Act). These adjusted series have been deflated by the wholesale price index of manufactured articles with a view to eliminating the fluctuating price effects. Similarly, the number of employees has been adjusted for a complete coverage.

(c) **Labour Productivity** - It is most often argued that technological changes enhance labour efficiency. The degree of labour productivity, about which no data at present are compiled by any government agency, has been calculated as
the ratio of man-hours employed to total value added for the year 1963 in respect of 203 industries which are reported under the scheme of 'Annual Survey of Industries'.

(d) Technical Personnel Ratio - Since technology, besides developing methods of increasing labour efficiency and reducing costs, is also concerned with the development of new products and new uses of existing products, there is a growing tendency for intensive research in the industries which are highly sensitive to technological changes, and this in its turn implies that there is more technical personnel in the industry. Since necessary data on the technical personnel ratio for various industries is not available, an effort has been made to build-up this ratio for 203 manufacturing industries for 1963 on the basis of data reported under Annual Survey of Industries. The ratio used is the percentage of employees other than workers (that is administrative, technical and supervisory personnel) to all the employees in an industry. This has been called technical personnel ratio.

iv) Cyclical Vicissitudes and Economic Uncertainty

"Economic literature recognizes four major types of uncertainty or variability which relate to decision and choice making, these include variation in prices of products and resources, variation in yields (the coefficients of production for a single production function), changes in techniques and changes growing out of the relationships between individuals
and groups of individuals.  

The task of measuring the degree of variability or uncertainty for the industries is a formidable one for two reasons: First, very few, perhaps no, empirical studies dealing with uncertainty have been made in India. Second, as discussed earlier, there are a large number of factors which influence uncertainty.

Since uncertainty deals with estimates and phenomena which extend into the future, an attempt to characterise the relative economic variability of various industries in an empirical fashion must be based upon a sample in 'time'. The primary data for analysis has, therefore, been culled from the studies of 'Finances of Indian Joint Stock Companies' undertaken by the Reserve Bank of India as these studies cover a wide time span, 1949-50 to 1963-64.

In order to examine the magnitude of uncertainty, the present study is confined to profit variability of various industries because it is felt that all types of economic variations

---


2The findings of these studies were published by the Reserve Bank of India in its monthly bulletins of September, 1957, September, 1961, and November, 1965.
uncertainties are packed into this variable. The concept of profit has been taken as gross profit which includes managing agents' remuneration, interest charges and provision for tax but excludes depreciation.

The amount of depreciation has been excluded from profit because different industries due to their exposition to scientific knowledge and technological innovations have different degrees of capital obsolescence and replacement. In order to roll up the effects of innovations, particularly with regard to technique and process of production rather than with regard to product and market into a measure of uncertainty, profit has been taken net of depreciation. The element of managing agents' commission, which is mostly a derivative rather than a determinant of income, is excluded from the cost structure and hence has been included in profit to ward off erroneous comparisons of inter-industry income variations. Similarly, profits are gross of interest because some companies carry their businesses with loanable funds and pay interest as the price of their borrowed funds; whereas others save this cost by employing their own funds and thereby, other things being equal, inflate their profit figures. This type of variation is permissible for inter-firm comparisons but for inter-industry comparisons, the interest charges paid are imputed into profits. The amount of tax has been included in the profits to facilitate a comparison about variations in gross profits before tax and gross profits after tax so
that an objective measure of uncertainty about the public tax policy may be made.

Since the Reserve Bank of India for its study of the finances of private corporate sector has explicitly used a sample design with varying sample size as 750, 1001, and 1333 companies (which have been studied for the periods 1949-50 to 1954-55, 1955-56 to 1959-60 and 1960-61 to 1963-64 respectively) a comparison of degrees of uncertainties for various industries, calculated on the basis of variations in absolute figures of gross profits, henceforth referred as profits, will introduce an error in the references. To avoid this a comparative measure of profits in terms of profit rate becomes imperative and this entangles us in the problem of finding out an appropriate denominator to estimate the yearly profitability for each industry.

Among the available set of appropriate denominators namely sales, assets and net worth, the choice has leaned towards sales because margin on sales i.e., profits as percentage of sales is more sensitive to the market fluctuations or economic uncertainties than any other measure of profitability. In fact, analyses of trade cycles have shown that return on capital, whether measured in terms of net assets or net worth is a laggard to margin on sales as the variations in the former are the result of the variations in the latter. Besides this logical importance of sales over other suitable denominators, the choice could not fall upon
either assets or net worth as their statistics for the period 1955-56 to 1959-60 have not been published by the Reserve Bank of India in its study relating to this period.

Now that the variable used for this study is the margin on sales, numerous measures must be employed if adequate estimates are to be obtained for depicting the degree of uncertainty.

One such measure recognized in the literature of business statistics is that of dispersion which can be made in an empirical fashion through the use of mean differences, standard deviation, variance and range. These absolute measure perhaps are sufficient for comparisons if the mean profit rates of the industries do not differ too greatly. Since the data do not uphold this assumption, the choice must necessarily fall upon the relative measures of dispersion, namely, coefficient of variation i.e., percentage of standard deviation to the mean, and coefficient of range, that is, the percentage of range to mean.

The measurement of uncertainty called coefficient of variation is of paramount importance provided the distribution of profit rates is symmetrical because with symmetrical distribution, the smaller value of coefficient of variation indicates a range of outcomes more closely distributed about the mean and therefore involves less uncertainty in predicting expected outcomes. If the distribution is non-symmetrical
i.e., skewed to either right or left, the measure is hedged with certain complications in the interpretation of uncertainty. If the mode of a series is to the right of the mean, skewness signifies that the probability, the mean profit rate is higher than the mode, is smaller than the probability when the mean profit rate is less than the mode, that is, when the mean lies towards the left of the mode. Since the data indicate that the distribution of the profit rate both with regard to direction and magnitude of skewness differ between industries, the coefficient of variation does not sufficiently characterise the uncertainty.

The other measure of uncertainty is the percentage of the range to the mean, that is, the mean coefficient of range which is the percentage of the difference between the maximum and minimum profit rates over the whole time span to the mean of the series. No doubt this is a good measure of cyclical amplitude about the mean of a series, that is, how much deep trough and how much high boom can be about the mean, but the concept is not quite popular as businesses are more concerned with the year to year variations in their profit-rates.

Therefore, the next measure of uncertainty is the yearly variability. This measure is computed by subtracting the income rate of one year from that of the following year and the total of these differences ignoring positive and negative signs is divided by the years less unity. This
gives us an absolute measure of variability and in order to get a relative measure this is expressed in percentage to the mean of the series. Algebraically the measure is expressed as
\[
\sqrt{\frac{\sum_{i=1}^{n-1} (X_i - \bar{X})^2}{(n-1)\bar{X}}} = \sqrt{\frac{\sum_{i=1}^{n-1} (\Delta X_i)^2}{(n-1)\bar{X}}}
\]
where \(X_i\) is the profit rate for year \(i\) and \(\bar{X}\) is the mean.

This measure of variation is important in depicting the amplitude of yearly variations, but the measure is vulnerable because it gives no consideration to the direction of trend of the series as the sign of the successive differences is ignored. In other words, if two series change by a constant rate but move in opposite directions, this measure will give the same estimate of uncertainty for both the series.

In fact when there is an increasing trend in profit rates for an industry, the expectations are always bright and businesses generally attach comparatively less importance to the magnitude of variability as revealed by this model and vice-versa. In order to remove this error, a correction factor is borrowed from C.F. Ferguson\(^3\) to modify the model. By introducing the correction factor, the modified version of the model is -

The basic property of the modified model suggests that if the variable gives the positive absolute difference (increasing trend) the value of the numerator will be less as compared to that of \( V \), that is yearly variability, and this will lower the degree of variability. Similarly, if the variable gives the negative absolute differences (decreasing trend), the numerator will be comparatively higher and will be twice if all absolute differences are negative, which will show a higher magnitude of variability and hence uncertainty. The indices of variability by the modified method are used for the present study.

Still another measure of uncertainty called cyclical frequency is measured by counting the turning points of the profit rates within the period covered by the data. This measure indicates whether the propensity of business to fluctuate within a given 'plan-horizon' will be high or low.

v) Seller Concentration

The testing of certain hypotheses also requires an identification of the market structure of the industries but this problem, in fact, is a vexed one because between the two
extremes namely effective monopoly and perfect competition, there are many types of mixed situations which have been treated in all economics by a patchwork of borrowing sometimes from competition and sometimes from monopoly. These intermingled forms of market structure are duopoly, oligopolistic competition, imperfect oligopoly, monopolistic competition which have been classified on the basis of product differentiation and number of sellers.

"A market is said to be perfect when the products have high cross elasticity of demand or little degree of product differentiation. Similarly, if in a market a handful of leading firms, though sometimes having high cross elasticity of demand, account for bulk of industry's output, i.e., a high degree of business concentration, monopolistic practices are more likely to be predominant."

"It is this relationship between concentration and monopoly power which has motivated most of the empirical studies involving the measurement of concentration and a variety of methods such as Lognormal distribution, Lorenz curve, Pareto distribution, Gini's coefficient, Law of proportion growth, Moments and Concentration ratios have been proposed by economic statisticians to measure the degree of dispersion and extent of business concentration. Of these measures of concentration, one useful device for the description of concentration is concentration curve wherein the abscissa measures the largest business units 1, 2, 3, ..., and the ordinate above these points on the abscissa measures the percentage of industry's total size accounted for by the largest firms. A short and steep concentration curve denotes high degree of concentration while a flat and low-lying curve indicates low concentration ...."

"But a question arises as to what are the dimensions of business concentration? In fact, there are many measures, namely sales, net value added, assets and employment by which the size of the trade and relative importance of a firm within a trade can be
determined. Sale or turnover, though easily available as a measure of size of a trade and of a business unit, is very deceptive as an indicator of business concentration because just on the sheer basis of volume of sale, a concern, which may exclusively be dealing in purchase of industrial products and then re-selling them without doing any significant productive processing, cannot attain the status of 'giantness' in the arena of manufacturing activities. Net value added is the best measure of economic size but its value varies from firm to firm and from trade to trade on account of variation in methods of estimation. Moreover, for its proper accounting, computational procedures are so complicated that it is rarely available with the business units. Similarly, assets are also good indicators of the 'productive strength' of a firm but as these are the result of past accumulation, their value is mostly uncertain and uncomparable because of variation in their valuation techniques."

"With these inherent deficiencies with the above mentioned monetary measures, which are neither standard nor stable for inter-temporal and inter-industry comparison, the choice lies with other physical dimensions for measuring the degree of business concentration. The number of persons employed or employment can be the best alternative measure of business concentration and the same has been adopted in this study because firstly, it is one of the most comparable measures of size over time; secondly, it is not affected by price changes; thirdly, labour is one of the primary factors of production, and lastly, with its measurement the analysis will touch the social and political aspects of business concentration. The only difficulty with this measure arises when there are some changes either in techniques of production or in labour productivity over time but such changes are rarely isolated, abrupt and sudden. Besides these reasons, it is also the only dimension about which the statistical data are available for registered factory establishments. No doubt statistics regarding other dimensions relating to biggest business units are collected in our country under the Annual Survey of Industries (formerly known as 'Census of Manufacturing Industries') but these are not released for publication under the provisions of the Collection of the Statistics Act, 1953. Moreover the Annual Survey of Industries does not cover all the factory establishments and hence
complete statistics about sale, net value added, and assets for a large number of small firms are not known."

"The degree of employment concentration may underestimate the degree of concentration in physical terms since the largest business units might be expected to use more capital intensive methods and small firms to employ more labour intensive methods of production, yet it is the most convenient one to use when comparing concentration in different industries."

"Following the path paved by H. Leak and A. Maizal, the concept of concentration ratio, used is the percentage of employment accounted by the three largest business units in each trade."4

For the purpose of the study these concentration ratios have been estimated for a sample of 105 manufacturing trades for the year 1958 on the basis of the information given in Labour Bureau's publication entitled Large Industrial Establishments in India - 1958. Degrees of concentration, defined as the extent of share of top 3 enterprises in the production of a product for 1964 as estimated by the Monopolies Inquiry Commission, 1965 for 1297 products have also been used.

vi) Size Ratio of Plants

In addition to the degree of concentration, another variable called size-ratio of plants "which is the average number of workers employed per establishment controlled