PRODUCTIVITY ANALYSIS AND MEASUREMENT

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Abdollah Jafarali Jassbi M. Sc.

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ABDOLLAH JAFARALI JASSBI

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SUMMARY

The state of the art in productivity measurement and analysis shows a gap between simple methods having little relevance in practice and sophisticated mathematical theory which is unwieldy for strategic and tactical planning purposes, particularly at company level.

An extension is made in this thesis to the method of productivity measurement and analysis based on the concept of added value, appropriate to those companies in which the materials, bought-in parts and services change substantially and a number of plants and inter-related units are involved in providing components for final assembly.

Reviews and comparisons of productivity measurement dealing with alternative indices and their problems have been made and appropriate solutions put forward to productivity analysis in general and the added value method in particular.

Based on this concept and method, three kinds of computerised models, two of them deterministic, called sensitivity analysis and deterministic appraisal, and the third one, stochastic, called risk simulation, have been developed to cope with the planning of productivity and productivity growth, with reference to the changes in their component variables, ranging from a single value to a class interval of values of a productivity distribution. The models are designed to be flexible and can be adjusted according to the available computer capacity, expected accuracy and presentation of the output.

The stochastic model is based on the assumption of statistical independence between individual variables and the existence of normality in their probability distributions. The component variables have been forecasted using polynomials of degree four. This model is tested by comparisons of its behaviour with that of mathematical model using real historical data from British Leyland, and the results were satisfactory within acceptable levels of accuracy. Modifications to the model and its statistical treatment have been made as required.

The results of applying these measurement and planning models to the British motor vehicle manufacturing companies are presented and discussed.

PRODUCTIVITY
ADDED VALUE
DETERMINISTIC MODELS
STOCHASTIC MODELS

TO MY PARENTS, MY WIFE, AND MY CHILDREN

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MAIN NOMENCLATURES

A	Average price per unit of output.
B	Average cost of bought-in input per unit of output.
C	Total number of output quantity.
D	Average remuneration per employee per year.
E	Weekly average number of employees.
F	Total facilities cost per year.
G	Average facilities cost per unit of output.
H	Average capital interest charges per unit of output.
K	Average resource utilisation cost per unit of output.
M	Total value of bought-in input cost per year.
P	Bought-in inputs price.
Q	Bought-in inputs quantity.
R	Total remuneration per year.
S	Gross output (annual sales).
T	Value of total resources.
U	Average added value per unit of output.
V	Added value (net output).
X	Percentage change in total productivity.
Y	Productivity of total resources.
Z	= x
m	Index of bought-in input.
p	Product (output) price.
q	Product (output) quantity.
s	Gross output index.
t	Index of total resources

v	Added value index.
m'	Unadjusted bought-in input index.
P'	Price per unit of represented bought-in input.
Q'	Quantity of represented bought-in input.
S'	Unadjusted gross output.
V'	Unadjusted added value (net output).
p'	Price of represented product.
q'	Quantity of represented product.
s'	Unadjusted gross output index.
v'	Unadjusted added value (net output) index.
AM	The mean value of component variable A.
BM	The mean value of component variable B.
CM	The mean value of component variable C.
DM	The mean value of component variable D.
EM	The mean value of component variable E.
GM	The mean value of component variable G.
HM	The mean value of component variable H.
AS	The standard deviation of component variable A.
BS	The standard deviation of component variable B.
CS	The standard deviation of component variable C.
DS	The standard deviation of component variable D.
ES	The standard deviation of component variable E.
GS	The standard deviation of component variable G.
HS	The standard deviation of component variable H.
aM	The mean value of change in component variable A.
bM	The mean value of change in component variable B.
cM	The mean value of change in component variable C.
dM	The mean value of change in component variable D.
eM	The mean value of change in component variable E.

gM	The mean value of change in component variable G.
hM	The mean value of change in component variable H.
XM	The mean value of change in Y.
aS	The standard deviation of change in component variable A.
bS	The standard deviation of change in component variable B.
cS	The standard deviation of change in component variable C.
dS	The standard deviation of change in component variable D.
eS	The standard deviation of change in component variable E.
gS	The standard deviation of change in component variable G.
hS	The standard deviation of change in component variable H.
XS	The standard deviation of change in Y.
PC	Productivity of Capital Interest Charge.
PE	Productivity of Manpower (employees).
PF	Productivity of facilities.
PR	Productivity of Remuneration.
y	Productivity index of total resources.
YC	Productivity index of capital interest charges.
YF	Productivity index of facilities.
YR	Productivity index of remuneration.
SD	Standard deviation.
M_x = PM	Midpoint of class intervals
F_x	Frequency of each class interval.
CF_x	Cumulative frequency.
F'_x	Adjusted frequency size for graphical representation.

a,b,c,d,e,g,h	Parameters of A,B,C,D,E,G,H.
A1,B1,C1,D1,E1,G1,H1	Original values of A,B,C,D,E,G, and H.
TA	Target value for productivity.

CHAPTER 1

INTRODUCTION

1.1. PRODUCTIVITY IN PERSPECTIVE

Productivity has now become a major concern for all nations throughout the world. This is because any movement in general economic health of nations such as rapid economic growth, improvements in balance of payments, control of inflation and obtaining more stable prices, rise in standards of living or more generally a better welfare in society as a whole depends significantly on the changes in level of productivity. Productivity can, therefore embrace any production units from a small shop to the entire nation(1).

Despite the fact that in recent years much has been said and written about, and wide attention paid to the subject, productivity is still difficult and elusive in terms of definition, measurement, prediction and the way of improvement. This is particularly true at company level where in terms of overall efficiency similar methods of measurement and analysis are used as for national productivity.

The rapid increase in the use of methods of productivity measurement and analysis, especially in industrial fields, has made necessary a wide understanding both of the foundation of these methods and of their limitations. These methods have been used for:

- comparison of national economy as a whole,
- inter-industry comparison,
- inter-firm comparison,
- inter-plant comparison, and
- inter-section or product comparison.

They have also been used for comparison in each of the above establishments over a number of periods. These comparisons enable one to explore the sources of significant change in productivity and to achieve control for planning purposes whether long or short term, so that one knows what results are accruing from decisions and how soundly judgement is being exercised.

This thesis is concerned with the measurement, analysis and planning of productivity and productivity growth with particular emphasis for application at company or firm level.

1.2. OBJECTIVES AND SCOPE OF THE THESIS

The main objectives of this thesis are:

(1) To examine the field of productivity measurement and analysis with particular regard to the understanding and use of productivity within industry.

(2) To evaluate the main measures and analysis techniques and to establish a comprehensive measure of productivity suitable for assessing individual company performance.

(3) To develop and test this measure using real data from companies and examine the detail analysis of this measure appropriate to productivity forecasting and planning.

(4) To discuss problems and limitations facing the measurements of productivity and possible solutions to them.

(5) To evaluate and study the use of deterministic and stochastic approaches in productivity forecasting and planning.

In line with the first objective the concept and definition of productivity and its synonymity with other terms i. e. effectiveness, performance, efficiency and rate of return, is discussed, and justification is made for the need of measuring productivity in different establishments particularly for industrial firms.

The second objective deals with alternative classifications and approaches to productivity measurements ranging from a simple ratio to an integrated model. On examining this in depth the conclusion was drawn that no master method is available which can be used for all cases irrespective of the size, nature of product etc., and the responsibility is left to the analyst to choose the appropriate one with respect to the needs and possibilities of the establishment. Preference is given to the added value base measure in connection with those firms involved in large amounts of bought-in parts, materials and services with many plants and inter-related units such as aircraft or motor vehicle manufacturing industries. This method is used as a basic measure in this thesis for evaluating company performance.

The third objective is connected with application of the added value concept and the use of its results in computing partial and total productivity. Data of four British motor manufacturing companies over ten years have been used for this analysis. Extension is also made in total productivity as a comprehensive measure by breaking it down into component variables for detailed analysis which is also appropriate for forecasting and planning productivity and productivity growth. The results of these analyses are graphically presented and discussed.

With respect to the fourth obj ective all problems and limitations facing the measurement of productivity, for example paucity of data, statistical treatment, use of false percentage, use of index numbers in production and productivity and interpretation of the results, are analysed and discussed. Alternatively adjustment analysis have been used as an appropriate solution to some of these problems.

Finally in line with the last objective three kinds of computerised models are used called sensitivity analysis, deterministic appraisal and risk simulation. The first two are deterministic and the third one stochastic. The productivity measure is formulated for sensitivity analysis and deterministic appraisal to measure the variability of the results due to predetermined and systematic change in component variables. The measure is also formulated for a risk simulation model with respect to both forecasting and planning productivity and productivity growth based on the assumption of normality of probability distribution and statistical independence between component variables. The forecast values of the component variables for these modelling objectives have been calculated from their mathematical trend equations using polynomials of degree four.

Data of British Leyland is used to test the stochastic model by comparing its behaviour with that of the mathematical trend, and the result was satisfactory within the acceptable levels of accuracy. Modification to the base measure and its statistical treatment is made in connection with the stochastic model as required. The flow charts of all computer programs together with their respective outputs are presented and discussed.

CHAPTER 2

CONCEPT, DEFINITION AND OBJECTIVES OF PRODUCTIVITY MEASUREMENT AND ANALYSIS.

2.1. CONCEPT AND DEFINITION OF PRODUCTIVITY

Productivity is an elusive and complex concept since it covers a wide range of meanings and definitions with respect to different measurements and uses (2, 3).

In a general term it is a relationship between real output and all or part of its inputs. However the way of measuring output and inputs, the type of ratio or model used to calculate, and the interpretations of results acquired change with respect to different circumstances and the range of impressions got by different use of criteria which make it a more confused and perplexing term. Productivity is synonymous with other terms particularly;

- effectiveness
- performance
- efficiency, and
- rate of return and/or profit

Therefore to make it clear it is necessary to refer briefly to its difference and similarity with these terms.

2.1.1. Effectiveness

The effectiveness of any enterprise relates to the extent to which it uses resources in the process, i. e. to be effective one has to provide the services or products which people need in the market. Thus the objectives of an organisation cannot be achieved effectively just by increasing the output per unit of input, since an organisation can have high efficiency but zero effectiveness if it offers something which is not saleable or required. In fact the effectiveness is concerned with choosing effectively among alternative products or services, and starting out with the realisation that usually a small part of the products or activities in any enterprise will give a large amount of results, and vice versa. Therefore it tries making effective use of that small part and neutralising the other part which is large (4, 5, 6).

2.1.2. Performance

Performance, a specific analysis, which was developed initially in the U. S. A. is a method for measuring the effectiveness of a system with which manpower is being utilised. It lies somewhere between work measurement and standard costing methods (7).

M. E. Mundel (5) has described the performance as the measure of output against current year standard times rather than base year standard times. Thus if one cannot take the advantage which is due to better methods of production, it has a low performance although its output with respect to the past has been increased. This cannot, however, lie beyond productivity concept in its broad sense, which will be discussed later.

2.1.3. Efficiency

Efficiency is clearly associated with productivity, but it is not exactly the same. There are a number of different views about efficiency with respect to productivity.

J. Kendrick (8) considers efficiency as a general concept of which productivity is a part. Then productivity refers to change in productive efficiency, but not to the other aspects of management efficiency such as marketing, new product development etc.

B. I. M. (9) refers to efficiency so that it relates to effectiveness as well as productiveness. Then it covers both the productivity and the degree of success in achieving the objectives.

I. G. Smith (10) states that efficiency is also linked with the quality of the product which is not the case for productivity. He believes that the assessment of efficiency can be made in terms of quality of the production process and the potential to produce which is inherent in the quality.

Some authors have often regarded productivity as synonymous with efficiency, at least from the engineering point of view such as R. G Norman and S. Bahiri (11, 12).

2. 1. 4. Profit and/or Rate of Return

Profit and/or rate of return is widely regarded as the ultimate measure of management success which can be shown simply as a difference between outputs and inputs expressed in financial terms. According to economists and accountants it is the most common indicator of overall business performance. However, there are some areas which cannot be cleared just by financial ratios. For example in the time of favourable shifts in demand, irrational increases in price and high inflation it is possible for many firms to have, at least in the short term, enormous profit or return on investment without any improvement in productivity or efficiency. Again a firm might be able to continue its survival if it has not encountered strong competition because of exclusive advantages taken from the monopoly or import tariffs in that commodity. But this cannot be continued in the long run if its productivity will not cope with the requirements of the competitive national and international markets.

According to J. E. Ksansnak (13) 'profitability is a function of numerous factors which essentially sort out into productivity factors for people, equipment and materials on one hand and cost or price changes on the other hand'. By defining this way profitability is given, more or less, the same concept as could be applied to productivity, and one cannot distinguish the real difference between these two terms.

E. G. Wood (14) describes three problems faced with the use of profit in relation to capital employed as a measure of overall productivity. Firstly profit is either dependent or influenced by the methods of measuring depreciation, inventory, development cost, and also the treatment of government grants and the rate of interest charges etc. Secondly the problem of asset valuation such as land, building, etc. and the fact that their value may depend 'on the profit record and potential rather than on the historical price or replacement cost.' Finally the level of wages and salaries. Here two companies can be imagined which 'are equally efficient in generating wealth' but their profits differ because of their different contributions to employees and shareholders.

2.1.5. Implication

Having discussed the concepts of alternative terms associated with, and used sometimes instead of, productivity, one can now turn to the view that it embraces the social organisation of the entire material world, and there are few forms of human activity that do not lie within the vast and complex cycles of behaviour resulting from the productivity (15).

Thus the concept of productivity covers a wide area and according to Bahira, Jenney and Norman (16) its concept goes beyond the normal methods used by accountants, engineers, or economists and it can reveal the true and often astonishing extent of potential improvements. It can also be viewed as a measure of degree of utilisation of the same source, such as labour or capital which is more than just a ratio of outputs to some or all inputs.

The broad and general term of productivity, therefore is not restricted by, and distinguished from, what is related to some or all of the above terms unless specially indicated.

All the mathematical models particularly the most sophisticated and computerised ones are concerned with most or all of these terms, taking into account as many factors as possible, to make the formulae or models more comprehensive. This can be shown in a number of mathematical models which have been developed so far and reference will be made to them in this thesis in the relevant chapters.

2. 2. OBJECTIVES OF PRODUCTIVITY MEASUREMENT

Having discussed the productivity concept and definition, it is necessary to know the objectives of its measurement and analysis. This is in fact referred to a simple question' why the productivity measurement and analysis are needed?' before going to any computation and analysis. The answer to this question also throws light on the ways and approaches of the measurement and analysis required for different uses. There are many uses in which productivity measurement is put. The main ones are briefly discussed as follows:

2. 2. 1. General Economic Analysis

At national level this is for comparison and forecasting with respect to changes in income and output, occupational shifts, labour requirements, population, aggregate prices, foreign trade and markets etc.

2. 2. 2. Inter-Industry Comparison

This is the comparison of the individual industry over a number of periods. This comparison can be extended to include the same industry in different countries in the world market.

In recent years considerable work has been carried out in this area which enables industry to use the results as a first step in comparing the strengths and weaknesses with their competitors in the world markets (17). The measures and analysis of past developments can also be used for computing secular trends which is an appropriate tool for decision making.

2.2.3. Level of Individual Firm

In the level of individual firm, the measurement can be used for technical, economic and managerial aspects in different places or over different periods or both. It may also be appropriate and necessary to use these results in productivity bargaining and incentives, in which many books and articles have been written in this decade. Multi-plant companies usually use some form of productivity measurements as complements to financial ratios which are tools for managerial control.

2.2.4. Plant Level

Within a company the comparison of a particular plant over a single or a number of periods can be used for managerial effectiveness and control. This includes also the comparison of productivity of a particular plant with its own firm or industry.

2.2.5. Section and Product

The same preceding comparison can be applied to a single section or product within a firm or plant over a number of periods, or a group of products between different firms or plants. With enough sophistication the results of productivity measurement and analysis can be used for forecasting requirements of labour, materials and other resources for each product and the effect of them in complementary or substitute products with respect to the changes in price.

2.2.6. Other Classifications with respect to Objectives

Different authors have used a variety of classifications in explaining objectives of productivity measurement and analysis. A. R. Smith (18) has classified it into two sections. In fact he refers to the number 2.2.2. to 2.2.5. above as a second major purpose which serves as a tool of management. He also has discussed three different productivities as 'process, product and job productivities, the last of these being the special concern of the work study expert.'

T. E. Easterfield (19) brought this title under four groups as

- Broad measures of the economy as a whole,
- Input - output measurements for the purpose of forecasting, etc. in the level of industry, firm, plant or even product,
- and finally, statistical comparisonof large number of plants etc.

L. Rostas (20, 21) and also G. C. Bert (2) have divided the need for productivity measurements and analysis into three classes as: 'general economic analysis, incentive industry studies and measurement at the plant level.'

M. E. Mundel (5) refers to a number of uses for productivity measurement and analysis - among them;

- a rational allocation of manpower,
- a basis for comparing alternative methods,
- a basis for work planning and control
- a basis for a rational, meaningful discussion of alternative budgets.

The Institute of Personnel Management (22) described three alternative comparisons for productivity measurement as:

- comparison of current performance with a historical base performance,
- comparison of performance between one unit and another,
- comparison of actual performance with a target.

S. Eilon and J. Soesan (23) divided the purposes of productivity measurements and analysis into four:

- strategic purpose,
- tactical purpose,
- planning purpose, and
- other management purpose.

which is another form of classification in the productivity literature.

2. 3. IMPLICATION

The notion of productivity in broad terminology is the net output in a given period from a known input of resources and any improvement in productivity will mean an improvement of the equation. This means either the same output from fewer resources, or a higher output from the same input resources.

In this principle lies justification for the need to measure productivity, so that one may know what results are accruing to his decisions and how soundly his judgement is being exercised.

CHAPTER 3

ALTERNATIVE CLASSIFICATIONS AND APPROACHES TO PRODUCTIVITY MEASUREMENT

3.1. INTRODUCTION

There is neither a standard classification nor a simplified approach to productivity measurement and the subject has long been a topic of argument and conflict. A variety of techniques have purported to measure company performance, so that comparisons with other organisations, and over a number of periods can be made.

This chapter describes a number of classifications and approaches to productivity measurement together with their strengths and weaknesses which, although is not exhaustive, embraces most of the methods and form the basis from which further more detailed measurement analysis can be carried out.

A reflection of the productivity of the firm as a whole, concentrating on those parts made within the firm, but with the full impact of customer reaction through volume and value of sales, is added value base measure which is the most prevalent approach and is also the basic approach for analysis in this thesis.

3.2. ALTERNATIVE CLASSIFICATION

The most important classifications used in the literature can be described in the following sections:

(i) Norman and Bahiri classified them in terms of three measures as:

- 'accountants measure of productivity' which refer to a number of financial ratios,

- 'economists measure of productivity' which relate not only to the financial but to physical units as well, and they are mostly macro in nature.
- 'engineers measure of productivity', a synonymous to efficiency which relate the energy supplied and converted into useful work, more relevant for small units such as plant level.

(ii) Some writers and institutions such as Organisation for Economic Co-operation and Development (24) divided the measurement of all inputs and output into two classes as physical and monetary, although they referred to measurements based on both physical and monetary as well.

(iii) Some authors classified the measurements in terms of time and place. For example, C. Winston and M Hall (25) refer to two systems of productivity measurement as:
- cross -section at point of time (e. g. inter-firm comparison),
- relative measurement over a period of time (e. g. indices of the productivity of labour),

and all measures can be brought under these two classes.

(iv) Still others classify them in terms of total and partial productivities. An extension of this classification is given by S. S. Stephenson (26) who brought the measurements under four headings:

- 'overall productivity' - expressing the relationship between total output and all inputs,
- 'partial productivity'; expressing the relationship between total output and two or more but not all inputs.
- 'component productivity' - expressing the relationship between the output of particular product or department and all inputs to that product or department.
- 'specific productivity'; expressing the relationship between total output and one specific input.

(v) Classifications with respect to productivity bargaining and incentive schemes. I. D. S. Study (27) brings productivity bargaining into four schemes as:

- scheme based on volume,
- scheme based on value,
- changes in work practices,
- long term arrangement.

However, because this thesis is not concerned particularly with productivity bargaining, this classification is not of our central interest.

(vi) The Oxford team given by T. E. Easterfield (19) refer to a classification of efficiencies as follows:

(a) - Gross efficiency $= \dfrac{G}{F + M + O}$

(b) - Nett Efficiency $= \dfrac{G - M - O}{F}$

(c) - Conversion efficiency $= \dfrac{\text{Conversion Output}}{\text{Conversion Input}}$

(d) - Design Efficiency $= \dfrac{\text{Conversion Output}}{\text{Work Done}}$

(e) - Manufacturing Efficiency $= \dfrac{\text{Work Done}}{\text{Conversion Input}}$

Where G = value of output

F = value of factorial input (wages and salaries, capital charges and rent)

M = value of raw materials input

O = value of remaining input

Conversion Output = G - M

Conversion Input = F + O

Work Done = conversion output - value of materials or operations saved (through better design etc.)

(vii) Finally the Bureau of Labour Statistics (BLS) in the U. S. A. (2 pp. 104) classified the productivity indicies in two categories, namely physical output and nett output in terms of man-hour as follows:

Productivity (Man-Hours) Indices

- Physical Output
  - Output per man-hour
    - Current year Composite
    - Base year Composite
  - Man-Hours per unit of output
    - Current year Composite
    - Base year Composite
- Nett Output
  - Output per man-hour
    - Current year Composite
    - Base year Comp-site
  - Man Hours per unit of output
    - Current year Composite
    - Base year Composite

MEASUREMENTS OF PRODUCTION AND PRODUCTIVITY(From BLS(2))

However this is not an overall but a kind of labour productivity, and can be assumed as an approach rather than a classification of approaches.

3. 3. ALTERNATIVE APPROACHES

A variety of approaches has been developed to deal with productivity measurement and analysis, providing a substantial amount of literature in this field. Each of them is appropriate for a particular or a set of particular objectives, taking into account the use of the method of measurement and the capability to face with problems involved such as shortage of data, time and financial resources, which will be discussed later in detail particularly for the added value approach. Some of the more prevalent approaches are explained as follows:

3. 3. 1. Financial Ratio Analysis

This type of measurement frequently used is a ratio relating two kinds of financial information to each other. The type of ratio chosen depends on the emphasis put in the analysis. A formalised system of these ratios is used by investors and creditors to evaluate the performance of the business on behalf of the profitability and security of the company respectively. These ratios are classified in many ways, but mostly divided into four groups of ratios which are given below:

Liquidity Ratios

They measure the ability of company to meet its short term requirements and mainly consist of:

(i) current ratio; calculated by dividing current assets by current liabilities,

(ii) quick or asset test ratio ; computed by dividing the quick assets (current assets - inventory) by current liabilities.

Lêverage Ratios

They examine the finance provided by the firm's creditors against the funds supplied byowners. Their main purpose is to show a margin of safety, and mainly consists of two ratios as:

(i) - Debt ratio; the ratio of total debt to total assets, for measuring the percentage of funds provided by creditors,

(ii) - Time interest - earned ratio; calculated by dividing the gross income (earnings before interest and tax) by the interest charges, and it indicates how far earnings can fall without serious difficulty in meeting its annual interest costs.

Activity Ratios

They show the degree of effectiveness of the firm in using its resources and mainly consist of:

(i) - Inventory turnover; calculated through dividing sales by inventories, to examine the efficiency of stock control policy.

(ii) - Average collection period ratio; computed either by dividing the annual sales into 360 or by dividing accounting receivables into sales per day to give the number of days involved in receivables.

Profitability Ratios

They give the final results about the degree of effectiveness of managing an enterprise. They are used in a large number of decision making and are mostly in two ratios:

(i) Return on Investment (RO I) = nett profit after tax/ total assets.

(ii) Profit Margin = nett profit after tax/sales

Many firms use the RO I for measuring the performance of the business. The centre for Interfirm Comparison in Britain uses a number of financial ratios shown in Fig. 3.1.

Discussion

These formal financial ratios, although a useful tool for representing the performance of the firm for different purposes, does not give an overall indication of productivity of a company. The most important short-comings with respect to productivity is the lack of physical resource flows to show the flows of financial resources into physical inputs and outputs. The other limitations are lack of clear criteria to separate controllable from uncontrollable variables. There is also a lack of adequate information on the relative contribution of different responsibility centres and levels which eventually produce an unclear picture of overall inter-action among different departments (28, 29, 30).

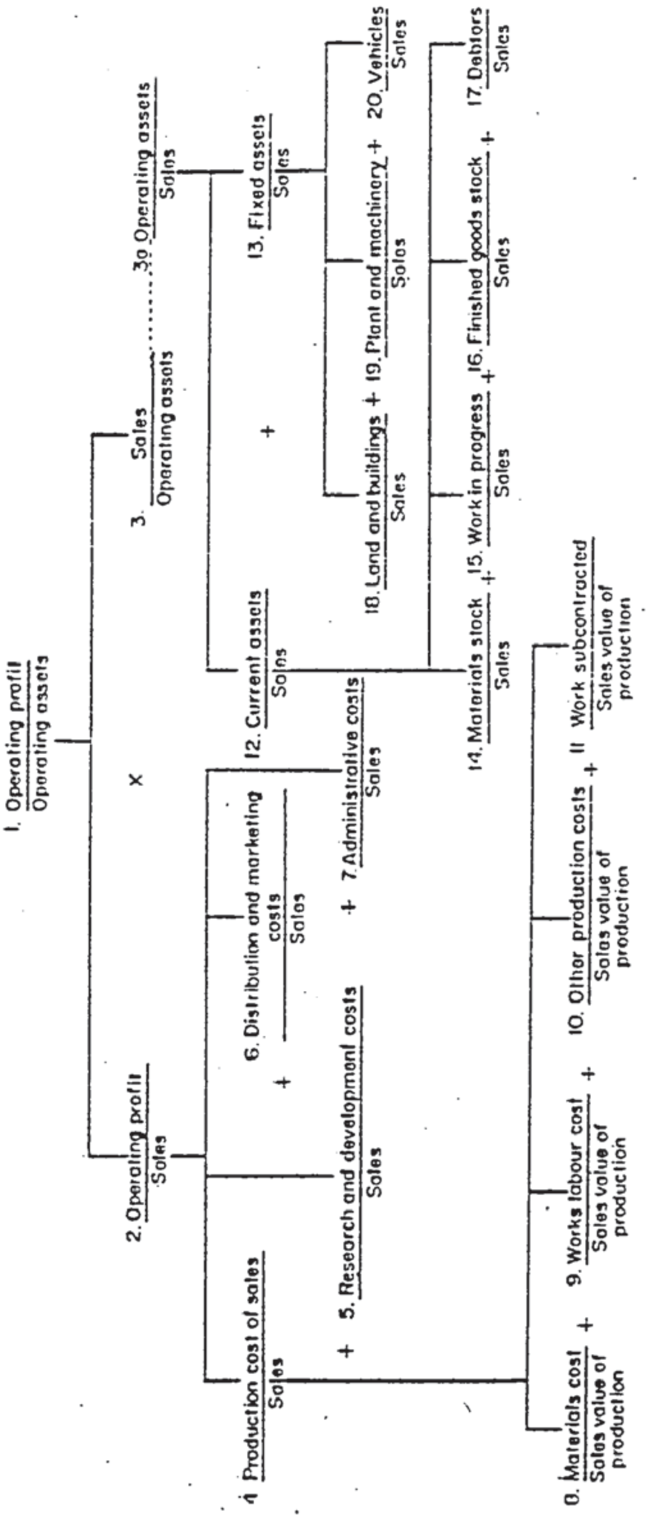

Fig. 3.1 A structure of financial ratios(23,pp 9)

However in the long term C. R. Amery (31) believes that rate of return is a good approximation of relative efficiency of firms within the same industry if their size or their degree of monopoly which they possess have not marked differences.

3. 3. 2. Actual and Embodied Labour

This form of measurement is mainly based on labour productivity, and converting all input factors into labour units. Most of the protagonists of this approach use all the factors of input in terms of labour content. Therefore, it involves the calculation of 'embodied labour' i. e. the labour content of the materials, equipment and other facilities which are used to produce the company's products, and adding all of these to factory labour to give us eventually the total labour in terms of units of labour.

Sir E. Smith and R. Beeching in their paper 'Measurement of Effectiveness of the Productive Unit' (32), explains and supports this approach.

Another form of this approach is to use the unit working time instead of labour force. This method is developed on the principle that labour input is calculated in terms of clock hours and other inputs in terms of index hours which needs a series of conversion factors on a national basis (33).

Discussion

There are some important problems faced in using this approach which have made it less relevant. Firstly a company has no interest to involve itself in computation of labour used in materials and equipment made by other firms, neither has it statistical data for doing these kind of computations which at the end bring little in return for time and funds consumed (18). Secondly it is quite impractical to convert all facility inputs to labour units, e. g. for equipment which has been used for a number of years and for computers which are mostly hired not purchased. The company is usually concerned with these facilities in terms of their cost and not labour content. Thirdly, even for the labour factor itself it is not easy, without using financial terms, to convert them in equal labour units, knowing that the labour represents a wide range from the experience and skills points of view with significant differences in their wages and bonuses.

These computations are more complicated when the company produces a range of products with different styles, using a wide range of different materials, equipment and methods of production. The official employees are another factor which needs to be converted into labour units.

3. 3. 3. Productivity Costing

Productivity costing is an approach which was introduced and applied initially by D. Tolkowsky in two industrial firms (34). This approach which is mainly discussed and implemented by S. Bahiri and

Professor H. W. Martin in 1970 (35) may be looked upon as an additional technique in the extent of costing methods which take into account certain additional factors to those of the prevalent method of direct costing.

This approach tries to bridge the marginal costing methods with operating overhead expense absorption costing in a system to meet both organisation and functional requirements of a firm. To be comprehensive for commercial systems and sub systems, the method has used the term 'total earnings' concept (T) as sales minus production materials and 'net total earnings'(T_n) equal to total earnings minus 'directly variable outside purchases' (C_{vx}) such as freight, fuel, consumable tools etc. It also employs the added value concept which is equal to sales minus all bought out input (see Chapter 7).

Bahiri and Martin set up a list of productivity indices and amongst them are two indices of more importance, 'product total earnings productivity' (T_d/ C_d) and 'system total earnings productivity' (T_d/C_s). The productivity is measured by total earnings and/or profit generated by the product, and it is more concerned with products than functions. They distinguish between one part of work which is ancillary or non-productive and another part which is truly productive, and they explained this part as that work (carried out by man or machine) which either changes the shapes and physical characteristics of production materials or it joins and separates one material to and from another, making the products saleable. They

Fig. 3.2 Productivity costing breakdown of components
(from Bahiri and Martin(35))

indicate the primary product productivity index as the rate in which the product sub system conversion costs can add the value to the materials. Therefore added value and profit are fundamental in their analysis.

The main limitation of this approach is given by S. Eilon and J. Soesan (23). They see this approach as one more related to the concept of profit margins by product lines and the concept of allocations with respect to different groups of costs, and less related to interaction between physical output and input resource flows. Figure 3. 2 illustrates the Bahiri and Martin productivity costing and analysis.

3. 3. 4. Transfer Pricing

H. C. Verlage (33) argues that transfer pricing has come into existence as a result of decentralisation or rather divisionalisation. He refers to the economic, international and organisational aspects, and we are more concerned here with the first aspect in respect to performance measurement. He believes that the use of transfer prices may lead to differences between controllable and uncontrollable parts of profit and eventually to profit distortion. Therefore the effect of transfer pricing on controllable profits should be identified if the performance measurement based on profit is to be made.

He distinguishes the prices based on 'information from one division, more than one but not all division and all divisions.'

An example of the first one is the cost of production division, of the second one is negotiated price among some divisions, and of the third one is a consolidated figure of cost and profit allocation. Figure 3. 3. represents the outline of transfer-pricing methods given by Verlage.

Fig. 3.3 (from H. C. Verlage (33))

C. T. Horngren (36) argues that the performance measured within a company is difficult when different divisions of a company exchange goods and services. He refers to two kinds of performance measurement, return on investment and transfer pricing. Transfer pricing is useful when the different divisions are used as profit centres. The assignment of profit responsibility to sub division of a company brings the needs for sales, expenses and profits of each division. He classifies the transfer pricing as:

(i) Cost Bases: When transfer prices based on costs, or on cost plus some mark up which may or may not be related to market price. This kind of transfer pricing is more convenient but often fail to provide an incentive to control costs.

(ii) Variable Cost Bases: When transfer pricing is based on variable costs, which is difficult to use in a profit centre.

(iii) Market Price Bases: When each division regards the other division as different companies. Then the price applied is more or less the same as an outsider. Before purchase from the external supplier the division should make a reasonable attempt to bring the internal division's price into line with those available outside, and finally it should be justified that the purchase from an outsider is really compatible with the overall objective of the company.

(iv) Fictitious Profit: This concept of transfer pricing exists when the manager of a division is not free to choose between internal and external suppliers and purchasers. In this case his profit centre is fictitious and seems more to be a cost than profit centre.

Horngren concluded that for managers to act in harmony within overall objectives of the company, the orders should be kept within the company as far as the market price is not less than variable costs.

The Centre for Business Research (37), having done an analysis on transfer pricing based on questionnaires for 44 firms, concluded that the most important function of transfer pricing were:

(i) To give more insight into profit implication.

(ii) To give the contribution of each of the main operating units to total company performance.

Discussion:

Transfer pricing which is used as a tool for performance measurements suffer from all the limitations discussed for financial ratios if it is based on market price and free to use external supplier and buyer. Otherwise it cannot be used even as a financial measure for inter-firm comparison and company's productivity measurement at all, because any price not based on market value is artificial and does not represent the real performance based on that division.

3.3.5. Financial Efficiency Model

C. R. Carlson (38) developed an index of financial efficiency by using a rank correlation test. He found the correlation of the following seven financial ratios as independent variables with shareholder wealth appreciation as dependent variable in the drug industry:

1 - current ratio

2 - cash turnover

3 - inventory turnover

4 - receivables turnover

5 - fixed asset turnover

6 - debt ratio

7 - dividend payout

The steps of computation of this index of efficiency is given by him as follows:

1. Compute a mean value for each dependent and independent variable of the companies in the drug industry during 1960-1969.

2. Rank all drug companies from high to low based on the mean value of their dependent variable.

3. Normalise* all values of independent variables on a scale from one to one hundred.

4. Select various combinations of weighting factors which sum to 100.

5. Multiply the various sets of weighting factors times each normalised value obtained in Step 3.

6. Compute a composite value by adding the component scores obtained in step 5 for each firm.

7. Rank a composite values for each company from high to low.

8. Use each set of weighting factors as specified in Step 4 to run a Spearman Rho Rank Correlation Test between the rankings in step 7 and step 2.

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* For normalisation see Page 29 of above reference.

9. Select the composite value arrived at in the iterative solution procedure described above with highest Spearman Rho co-efficient - this will be the index of financial efficiency.

Discussion:

The advantage of this method over other financial methods is that it considers seven financial ratios simultaneously by integrating them into a single index, and therefore can give an overall measure of financial efficiency of the company within the industry. The author has overcome the complication of computation by writing a simple computer program.

This approach can be used for other industries as well. However it suffers from some limitations. Firstly it is an internal measure, since it does not take the company outside that industry and/or in the same industry but in different countries. Secondly the objective in the model which is the base of correlation i. e. shareholder's wealth is purely a financial measure and has less impact on productive measures.

3. 3. 6. Efficient Production Function

Knowing that the production function i. e. the relationship between input of production factors and output of product per unit of time, is purely a technical measure of production, there have been some attempts to integrate this measure with measure of factor prices to obtain the overall measurement of production efficiency.

W. E. G. Salter (39) has used broadly these two measures in his book, 'Productivity and Technical Change'. He has used the term 'best practice' as a conscious decision which employs the up-to-date technique corresponding to the appropriate factor prices. However M. J. Farrell (40) is the man who defined the term 'efficient production function' as a yardstick to measure technical efficiency and use this together with price efficiency to provide the overall efficiency.

The essential principle of this approach can be discussed using a simple case in which two factors of production e. g. labour and materials, are used to produce a constant quantity of output for a number of firms, ignoring the economies and diseconomies of scale. If this relationship of inputs for each firm can be represented on an isoquant diagram, by a point, a scatter of points can be given in a diagram such as Figure 3. 4 as follows:

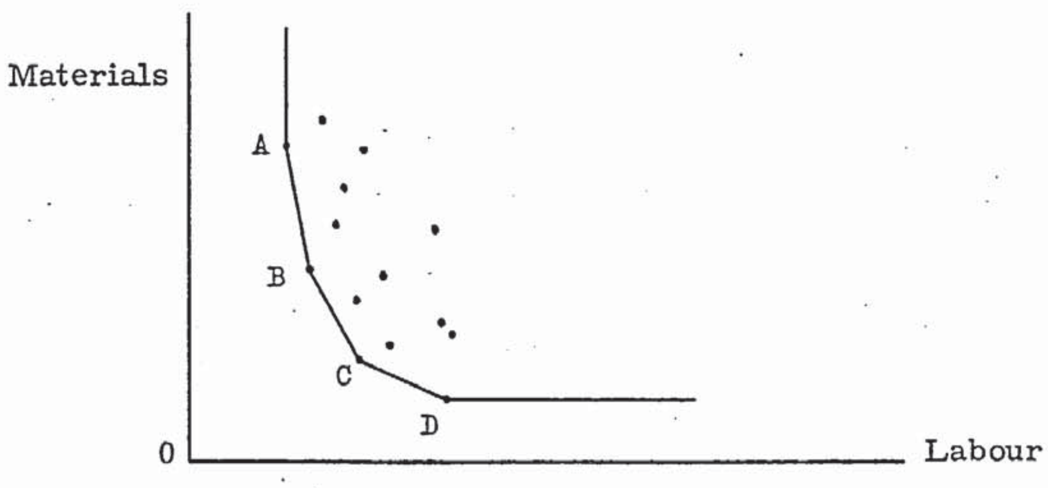

Figure 3. 4. - Efficient Production Function

The efficient production function is the isoquant curve which is obtained by joining the points A, B, C, D. etc. assuming that neither of lines AB, BC, CD etc. have a positive slope. Another assumption is that no line should lied between any point and the origin. Such an isoquant is based on observed points and therefore is a practical standard for measuring technical efficiency, and unlike the theoretical standard takes into account some elements which make it more realistic.

Having found the 'efficient production function' (EE in figure 3.5) one can compare the technical point of each firm with efficient production function to obtain the technical efficiency. In figure 3.5 the technical efficiency of firm represented by point P is $\frac{OQ}{OP}$, since the real firm P which produce the same output as hypothetical firm Q on the efficient production function (EE) uses more inputs

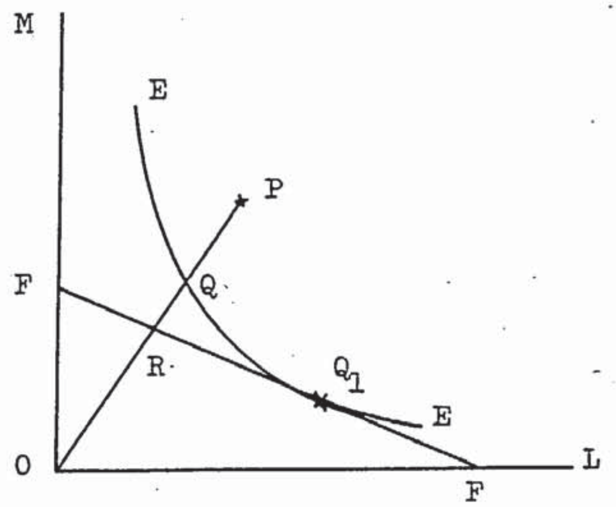

Figure 3.5 - Diagram of Technical Efficiency

The next step is to calculate the price efficiency of the firm. If line FF has the same slope as ratio of the prices of the two factors, the point Q_1 represents the optimum combination of inputs, and the ratio $\frac{0R}{0Q}$ is theprice efficiency of the firm P. The overall efficiency of the firm p, therefore is equal to $\frac{0R}{0P}$ which can be computed by multiplying price and technical efficiencies together, i. e.,

$$\frac{OR}{OP} = \frac{OQ}{OP} \cdot \frac{OR}{OQ}.$$

Farrell generalised this approach to include the case of many inputs and outputs. He also tried to relax the assumption of constant return to scale by recommending that the observations (scatter points) can be divided into groups of roughly equal outputs and the above principle can be used for each group separately. For quasi factors such as air, water, location etc. he proposed the ad hoc analysis.

Farrell declared the term 'structural efficiency' instead of technical efficiency to use it for comparison of efficiency among industries at international level. But because of lack of sufficient observations in this scale for satisfactory estimates, he prefers to compare the 'performance of industry with the efficient production functions derived from its constituent firms'. This will show the extent to which an industry is dispersed away from its most efficient firm.

Discussion

The main limitation of this approach is that efficient production function totally depends on the best firm, and any change in it will change our standard. This is more significant when there is a sharp rise in technical efficiency of the best firm with no change or opposite change in other firms.

Easterfield (19) taking into account this limitation, support the idea of efficient production function and the need for further development. Eilon and Soesan (23) declared two shortcomings to this approach as practical difficulties faced when it is to be used in the multi-input-multi-output case, which is more usual in industrial firms, and both practical and theoretical problems faced in measuring 'efficient production functions'. They support their criticism by an application of this approach to eleven 2-input, single-output plants carried out in Imperial College with unpromising results.

3. 3. 7. Added Value Base Measures

The term 'added value' which sometimes called 'value added' refers to the contributions made by a firm, and industry or any other kind of organisations over the value of raw materials, bought-in goods and services. However the International Labour Office (41) referred to four different forms of added value as:

(i) 'value added by industry' - which can be obtained by subtracting the current purchases and investment outlays from the gross output. Therefore it does not include the fixed investment.

(ii) 'gross value added by industry' - which is equal to gross output minus current purchases. This unlike the first one, includes the fixed capital investment.

(iii) 'nett value added' for which the depreciation should be deducted from the 'gross value added by industry'.

(iv) 'census value added' is the data used for calculating industrial production indices published by different countries. They usually include some of the bought-in services like banking, insurance, advertising, consultation etc. It is only used when data for subtracting these items from the nett value added are not available.

The firms usually apply the nett added value concept in which the items bought from other organisations or made by other industries but consumed in the process of production should be subtracted from the sales revenue. However among the items to be subtracted, the bought-in services bring some ambiguity into the calculations of added value. The following four different methods for calculating the added value are given whose deference remain mostly on the part of services.

These four methods are given by W. Taylor and K. R. Davis (42), British Institute of Management (9), H. A. V. Wilson (43) and R. S. K. Riddle discussed by E. F. L. Brech (44 pp. 155) respectively.

<u>Method 1</u>

Value added output = (S + C + MP) - E

where S = Sales

C = Inventory change

MP =Manufacturing Plant

E = Exclusion

By MP they refer to items which are produced internally and used as part of machinery. The exclusion includes those factors externally purchased such as materials and supplies, depreciation on buildings, machinery and equipment and rentals.

<u>Method 2</u>

$$\text{Sales Turnover}\begin{cases}\left.\begin{array}{l}\text{Profit}\\ \text{Depreciation}\\ \text{Indirect Labour}\\ \text{Direct Labour}\end{array}\right\}\text{Added value}\\ \text{Bought-in goods and services}\\ \text{Bought-in raw materials}\end{cases}$$

Method 3

Added value may be calculated from a simple form of profit and loss account by either of two methods:

(a)

Added value is
Sales
less sum of:
Raw materials
Bought out components
Sub-contracted processing
} used in goods sold or scrapped

Consumable stores
Loose tools
Repairs and maintenance of plant and equipment
Heat, light and power
Transport
Production services
Other purchased services
plus/minus:
Labour and overheads in increase/decrease in work in progress and finished stock.

(b)

Added value is the sum of:
Profit before taxation
Depreciation
Rent, rates, insurances
Wages and salaries
Employee benefits
Advertising
Professional services
Interest payable
Other overhead expenses

Method (a) starts with sales and deducts appropriate expenditure: (b) begins with profit and adds the remaining items of expenditure. Hence, both methods should provide identical figures for added value.

Method 4

The concept of added value
Materials
Purchases consumable materials, fuel, gas electricity sub-contract plant repairs, etc.
Total cost of hourly paid labour
Total cost of all other employees
All other overheads including depreciation
Surplus for interest, taxes, dividends, reserves

Added Value

The determination of added value		
Actual Sales		A
Stock-opening	B	
closing	C	D(=B C)
Stock to spares		E
TOTAL SALES-ACTUAL		F(=A+D+E)
Selling Price Variation		G
Adjustable Sales		H(=F -G)
Purchases-at standard cost		J
(Direct materials, consumable, sub-contract, plant repairs by outside contract, bank interest etc.)		
Purchase Price Variation		K
Works Expenses		L
Tooling		M
Accruals e. g. gas, telephone		N
TOTAL PURCHASES - ACTUAL		P(=J+....+N)
Purchase Price Variation		K
ADJUSTED PURCHASES		Q(=P-K)
ADDED VALUE-ACTUAL		X(=F-P)
ADDED VALUE-ADJUSTED		Y(=H- Q)

The above four methods plus the method used in this thesis in chapter six give different alternatives for calculating the added value, each relevant for a special kind of company with respect to its availability of data.

Having discussed the way of calculating added value, it should be divided by part or total value of resources used to obtain the partial or total productivity respectively which are shown below:

Productivity based on added value

- Overall productivity
  - $\dfrac{\text{Added value}}{\text{total resources}}$
- Specific or partial productivity
  - Manpower Productivity: $\dfrac{\text{Added value}}{\text{Total number of employees}}$
  - Productivity of facilities: $\dfrac{\text{Added value}}{\text{facilities cost}}$
  - Productivity of capital interest charges: $\dfrac{\text{Added value}}{\text{capital interest charges}}$
  - Productivity of remuneration: $\dfrac{\text{Added value}}{\text{Remuneration}}$

Added value per employee is an indicator of manpower utilisation and profit which can be further broken down to represent its contribution to department, section, project, production personnel or those in other categories. This can also be applied to other partial productivity measures. However the most comprehensive one is the total productivity measure which put the efficiency of all parts of the company as a whole into picture.

Discussion

The advantage of using added value in measuring productivity over other financial measurements is that the products are counted only once irrespective of the number of times they are bought or sold. Moreover, unlike profit and other financial indicators it is not significantly affected by accounting policy about depreciation, interest charges etc. because all of these, along with the profit, are included within the added value. Therefore the fundamental merits of this approach can be shown in those industries or large companies in which the material, bought-in parts and services vary substantially and/or in those organisations in which a number of plants or inter-related units are involved in providing components and the operations of their final assembly. The practical examples can be seen in vehicle and aircraft industries. The concept of added value is also used considerably in national productivity when the term GDP (gross domestic product) is employed. However, it cannot be applied to non-profit making organisations, where output cannot be measured in money terms.

The added value based method is, therefore, the natural foundation for assessing the true productivity because of its advantage over other methods, and it provides a more realistic and interesting mode of comparison among divisions or departments within a compay n as well as among firms in the same industry.

3. 3. 8. Other Methods Based on Labour Force or Time

There are some practical and/or general methods in measuring productivity which have been used for a number of years or decades in different organisations and different countries, ranging from a plant to the whole economy, all of them related to labour in one sense or another. Their importance is greater in international and inter-temporal comparisons than inter-firm comparisons.

The labour input can be described in different ways depending on the objective and nature of measurement. The measurement can be based on national labour force, total number of persons involved in organisation, total number of employees, total number of wage earners, total number of production workers etc. It can also be related to the number of hours, days, weeks or months actually worked or paid for.

In spite of these different kinds of terms, the labour input can be based on two basic types i. e. unit of time and number of workers (labour force) involved in production.

Each of these two concepts (unit time or labour force) has its own competence and limitations. When management wants to find out the effect of a change in a production process of a plant, a workshop or a machine, and it is to be used for short term projection, the most suitable unit of measurement is the hour of work. This has also the advantage of neutralising the effects of change in working day, week and year. This is important since both the number of working hours per day and the number of working days per year, in industrialised countries have fallen significantly over the recent decades. However the most widely used of labour input is the labour force. One important reason is that data for the labour force can be collected very much easier than man hours, and usually in the annual report of companies and in the statistics of employment and manpower etc. the labour force or total employees are given more than man hours. Furthermore as Edward F. Denison*(45 pp. 370) declares for the estimation of average hours worked there is no statistical counterpart as for 'persons engaged' which bring an error into the measurement of output per man hour. Thus for long term planning and also for overall measurement of labour productivity of a company, the labour force is more relevant than the hours worked.

In measuring labour productivity by either of the above concepts one needs to distinguish between the variety of labour definitions and find out what is really meant by labour force or man hours. Two terms, 'live' labour and 'embodied' labour are sometimes used. The first one refers to both direct and indirect labour, when direct labour covers that part of labour directly related to the production', and indirect labour is that part which covers not directly the production. process but is necessary in the establishment. Embodied labour, which is not usually used in labour productivity represents the contribution of labour from outside in the form of equipment,

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*measurement of labour input: some questions of definition and the adequacy of data.

machinery, raw materials etc. as discussed before.

Sometimes instead of hours worked, the hours paid for are taken as labour input. In terms of real cost to the employer there is a significant variance between manhours actually worked and man hours paid for. In the U. S. A. the Bureau of Labour Statistics (BLS) uses the man hours worked which is more relevant to the meaning of productivity concerned with real input-output- relations. However again for the productivity measurement this is a matter of access to the data which is mostly in terms of hours paid for rather than hours worked (8 pp. 34-37).

Having found out the labour force or work units, there are usually three methods of calculating the labour productivity or performance. In the first one the physical output and in the second the added value should be divided by labour input. These two measures are more common in economic analysis. However the third method is more prevalent in engineering and can be calculated by dividing the standard time by actual time taken to do the work. This measurement relates to the subject of work study in calculating the standard time of work (41, 12, 46). N. A. Dudley (47, chapter 6) has dealt with performance characteristics of repetitive work based on this method.

Discussion

The labour productivity discussed above is surely one of the most important measures of partial productivity in the general sense, and is sometimes used as an indicator of the standard of living. In all branches and sectors of a productive economy the labour is an important element of costs, which in relation to cost of other factors of production is also easier to measure. However, the major shortcomings in productivity based on labour alone is that the economy of an enterprise as a whole does not totally depend on one factor of production. Very often, the easiest way to increase the average labour productivity in this sense is to use more machinery or capital factor of production which beyond a certain point brings the overall efficiency of a company down. It is worth noting that for the last decade the labour productivity with respect to total productivity was so important that H. Weigel (48) declares the rank correlation of labour productivity with total productivity of 14 major groups of British manufacturing industries (1948 - 1954) as high as +. 91. However this is not the case for recent and next decades, in which other factors of production such as capital play a significant role in productivity change.

3. 3. 9. <u>Productivity Change</u>

A number of authors have referred to the index of productivity change which is of considerable value and it is specially useful for prediction and planning.

W. B. Reddaway and A. D. Smith in the Department of Applied Economics of Cambridge University have discussed this method which is reconsidered by H. Weigel (48). If one uses x to show the productivity progress during the period in question, the method is given as follows:

$$x = \frac{\text{Increase in output, less allowance for extra factors}}{\text{Output which would have been attained with unchanged productivity.}}$$

or mathematically*

$$x = \frac{P_1 \Delta O - (w_1 \Delta L + r_1 \Delta C)}{P_1 O_1 + w_1 \Delta L + r_1 \Delta C}$$

Einer Hardin (49), using again the productivity growth method has discussed this approach on the basis of three methods of averaging. Firstly the method of 'terminal year' when the data relates only to two periods. Secondly the 'logarithmic least squares' method which is superior to that of terminal year because

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*The formula initially was; progress $= \frac{P_1 O_2 / P_1 O_1}{(w_1 L_2 + r_1 C_2)/(w_1 L_1 + r_1 C_1)} - 1$ where O, P, L, C, w and r are output, price, labour, capital, wage rate and return or charge to a unit of capital respectively. Also suffixes 1 and 2 refer to periods 1 and 2 respectively. On the assumption of exhaust net output in the base year, $w_1 L_1 + r_1 C_1 = P_1 O_1$ and also using $r_1 C_2 = r_1 C_1 + r_1 \Delta C$ we have

$$x = \frac{P_1 O_2}{P_1 O_1 + w_1 \Delta L + r_1 \Delta C} - 1.$$ Since $P_1 O_2 = P_1 O_1 + P_1 \Delta O$

then the above formula will be produced.

it takes into account the productivity levels of all years in the required period. Thirdly the "Pesek's" method which is based on the time series of productivity data by an iterative procedure unlike the other two methods, which are based on output data*

The advantages and limitations of this approach depends on the concept to which the measurement referred. Therefore this method can be considered more as a sub-approach than an independent approach.

3.3.10 Managerial Control System

B. Gold (50) has developed a 'network of productivity relationships among direct factors' based on a number of ratios to integrate the physical and financial flows in a productive system. He together with S. Eilon and J. Soeson (23) implemented this method and applied it to a 'simple chemical process' and 'an integrated steel plant'. This analysis employs two sets of ratios namely managerial and financial. Figure 3.6 represents the comparisons of these two sets of ratios.

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*for the detail analysis and formulae see given reference.

Fig. 3.6 Comparison of managerial control and financial ratios.(from Bela Gold(23))

The profit on investment in this method, is taken as a basic measure of managerial ratios and is broken down into five areas as follows:

$$\frac{\text{Profit}}{\text{total investment}} = \left(\frac{\text{Product Value}}{\text{output}} - \frac{\text{Total Costs}}{\text{output}}\right) \times \frac{\text{Output}}{\text{capacity}} \times$$

$$\frac{\text{Capacity}}{\text{Fixed Investment}} \times \frac{\text{Fixed Investment}}{\text{Total Investment}}$$

which together with $\dfrac{\text{equity capital}}{\text{total investment}}$ make six areas of performance measurement. They use the term 'economically oriented concept of physical output' using the Edgeworth formula for weighting the quantity of each product with its value in two different periods.

Discussion

This analysis has some advantages over other methods of measurement in which it firstly relates not only to the actual parts of ratios discussed but also the changes in unit measurement of them, which brings a concept of productivity growth into account, and secondly some important elements namely facility utilisation (output/capacity) and the productivity of facilities and equipment (capital/fixed investment) are brought into the model.

However by using the physical output based on both price and quantity, and applying this concept to all inputs measurement as well as output, makes the method difficult to use in practice. B. Gold is aware of this limitation when he declares that 'the diversity of purchased materials, fuels and other supplies invites aggregation in terms of current total outlay rather than physical units' (23 pp. 43). This is in fact a problem of collecting data for all quantities of input factors as well as their costs, particularly in those firms where some input factors such as materials are numerous and hetrogenious.

3.3.11 Other Approaches

There are other productivity measurement approaches in addition to those declared above.

Hiram S. Davis (51) in relation to a business firm has used a method based at cost on constant prices in that the cost of each input factor is measured in terms of its contribution to output. Therefore for price per unit of output, the real cost of input factors are calculated and compared over time. This method suffers from all limitations of monetary measurements and the advantage of unnecessity of physical input measures.

The Cobb-Douglas function or some extension of this production function are used by many authors to calculate the efficiency of a production system. For example O. Aukrust (52) has used an extension of this function* to see whether increase in investment is required or not. However it is criticised by A. Olgoard (53) as a biased estimation of the coefficient because of the weakness of figures which are used for the amount of real capital in Norway.

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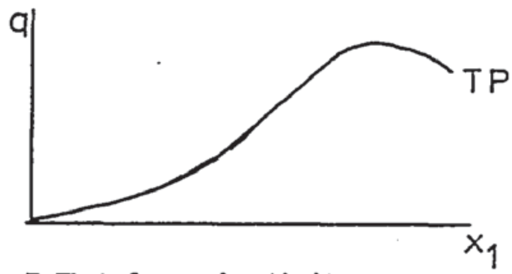
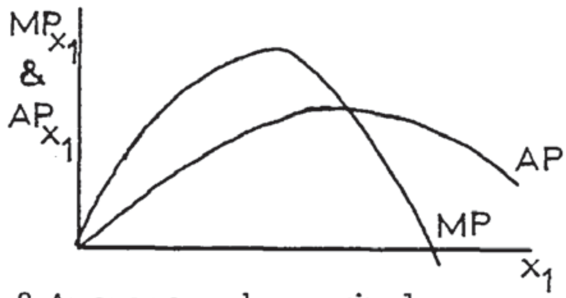
*$Y = a.K^{\alpha}.L^{\beta}.e^{\gamma t}$ — Y = National product
K = real capital — L = employment
γ = effect of human factors — α, β, γ (parameters) and a constant
t indicates time

H. J. Zimmermann and M. G. Sovereign (54 pp. 573 - 4), using a one output, two input production function, show the total, average and marginal productivity of a factor x_1 where the amount of factor x_2 is fixed in diagrams as 3. 7 and 3. 8 below.*



3. 7 Total productivity



3. 8 Average and marginal productivity.

This is again based on production function approach. However it gives an impression of the direction of total, average and marginal productivity from the economists point of view.

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* where $q = f(x_1, x_2)$ is quantity of output resulted from input quantities x_1 and x_2. Average productivity of x_1(x_2 being fixed) is defined as $AP_{x_1} = q/x_1$ and marginal productivity of x_1 is $MP_{x_1} = \frac{\partial q}{\partial x_1}$.

3.3.12 Conclusion

From the foregoing discussion it can be found that there are a great number of possible solutions to the problem of measuring productivity in an enterprise ranging from purely physical to purely monetary and from a simple ratio to an integrated model. It will be unrealistic to believe that any of these approaches alone is a master method and can be applied to all cases irrespective of size, nature of product and other characteristics of the enterprise. They are a wide range of solutions open to management in appraising productivity, each of them giving priority to some elements ignoring or underestimating the other elements of measurement However it is the responsibility of management to pick up one or some of them which are relevant from the standpoint of their needs and possibilities with reference to their financial and technical capabilities and limitations in providing good and comparable data.

From this evaluation it is appropriate that research continues into developing and complementing the existing approaches as well as designing new methods to provide more efficient and precise tools of measurement.

With respect to this argument the added value base measure for productivity is discussed, computed and developed in chapters six and seven on the principle that it is one of the most suitable and predominant approaches on the firm and industry levels particularly in those firms or industries which have a wide range of inputs and outputs and with a variety of inter-related units and plants such as motor manufacturing companies which are studied as particular cases in this thesis. In fact in these circumstances e. g. where raw material input is a large item in the manufacturing cost, productivity assessments based on physical terms can be significantly influenced by price changes in the materials so that the whole comparison can be distorted. These cases can be met by using the concept of added value i.e. excluding influences which are entirely determined outside the firm itself, and taking into account only those parts arising internally plus return on capital. In this method of measurement the products are counted only once irrespective of the number of times they are bought or sold. Also, as said earlier it is not influenced by accounting policy such as depreciation interest charges etc. because they are included within the added value.

Therefore the added value base measure which is the method used in this thesis, give a reflection of the productivity of the firm as a whole concentrating on those items which have been made inside the company, but with the full impact of customer reaction through volume and value of sales.

In line with the extension of this approach, the productivity formula discussed in chapter seven is broken down into components, and each component is taken as a component variable to throw light onto the source of each effective part of the model for evaluating and manipulating the productivity and productivity growth.

CHAPTER 4

THE CONCEPT AND USE OF INDEX NUMBERS IN PRODUCTION AND PRODUCTIVITY

4.1. THE CONCEPT AND USE OF INDEX NUMBERS

Index numbers are designed to measure relative (or percentage) change in magnitude of some variables or a group of related variables in a series from time to time (chronological) or from place to place (spacial). However comparisons over time are more common.

Bowley (55 pp. 2) defined an index number in more developed form; 'Index numbers are used to measure the change in some quantity which we cannot observe directly, which we know to have a definite influence on many other quantities which we can so observe, tending to increase all, or diminish all, while this influence is connected by the action of many causes affecting the separate quantities in various ways'.

Based on the U. N. Study (56) an index of industrial production describes changes over time or space in the volume of production of non-agricultural commodities. Thus an index number of quantities shows the average percentage change in quantities over periods or spaces.

Production here, when used with index numbers, indicates the volume or quantity of output, free from any price fluctuations. It can be distinguished from both input and consumption- from the first one because 'it refers not to activity but to results of activity', from the second one because 'it does not take account of the terms on which exports are traded for imports' (2).

According to G. C. Bert (2) 'an index of industrial production can be put to several uses both in micro and macro economic analyses. Some of the important uses are outlined below.

1. Individual factories may compare changes in their output with the production index of their own industry.

2. Again such factories can compare the production index in conjunction with other series, e. g., employment, prices, wages, etc. (For instance, a factory may compute its own productivity index and compare it with that of the industry of which is a part).

3. Similarly, inter-industry variations in the level of production and productivity can also be compared and analysed.

4. In macro economics, the index of production can be compared with the corresponding changes in national income, population , foreign trade, prices and similar other aggregates. '

This chapter concentrates on index numbers in which different formulae need to be discussed and compared with respect to the price deflation. Thus to avoid complexity, the gross output (sales revenue) rather than nett output (added value)has been used. However some aspects of nett output in connection with index number will be considered in chapter eight, after analysis and calculation of nett output (added value) in chapters six and seven.

Therefore the purpose of this chapter is to put index number into perspective and discuss the most suitable one to use in productivity measurement in following chapters.

4. 2. ALTERNATIVE INDEX NUMBERS

Index numbers with respect to production and productivity refer to both the choice of average or aggregate percentage changes and the choice of weighting systems. Thus different formulae have been used which give usually different results and one cannot regard any measure as a production or productivity index without referring to those criteria which cancel the rivals. This means that we are concerned not only with choosing a productivity index number but choosing the best one, taking into account the possibilities and limitations.

Because index number measure changes, they are described with a selected period (or place) as 100. This is called the 'reference base' of the series of index numbers, and the other period (or place) is often called comparison base. As Allen (55) indicates 'a change between two dates in a series of figures can be shown in ratio form either forwards or backwards and one ratio is the reciprocal of the other.' The following sections show the most important index numbers which are sometimes used directly as production and/or productivity indices (57, 127, 58). The following subscripts are used in representing different formulae:

p indicates	individual price
q indicates	quantity of homogeneous or homo division products.
o indicates	base period.
n indicates	comparison period.
i indicates	the serial number of product.
k indicates	the total number of products.
I indicates	the index number.

4.2.1. The Weighted Aggregate Index

There are two common forms of weighted aggregate index numbers called Laspeyres index and Paasche index with respect to their weighting systems as follows:

Laspeyres Formula

This index employs the base year (period) price for weighting and can be shown as :

$$I = \frac{\sum_{i=1}^{k} p_{oi} \quad q_{ni}}{\sum_{i=1}^{k} p_{oi} \quad q_{oi}} \times 100$$

To avoid confusion when there is no ambiguity, the subscripts i and k can be dropped and the index can be simply shown as:

$$I = \frac{\sum p_o \quad q_n}{\sum p_o \quad q_o} \times 100 \qquad (1\text{-}1)$$

Paasche Formula

The difference between the Laspeyres formula and Paasche formula is that the Paasche uses current year price (P_n) for weighting instead of base year price. Therefore the formula (1) becomes:

$$I = \frac{\sum p_n \quad q_n}{\sum p_n \quad q_o} \qquad (I - 2)$$

The limitation of Laspeyres method is that the base weight does not reflect the new changes brought by output, tastes etc., in a dynamic economy, and after a certain period of time the results may be invalidated. The major disadvantage of the Paasche index is that for a continuing series, the weights would have to be reasigned each year and the whole series need to be computed every year (period).

R. G. D. Allen, having analysed the weighted aggregate indexes and the relationship between Laspeyres and Paasche concluded that 'the Laspeyres and Paasche index forms are related so that the reciprocal of the foreward Laspeyres index is the backward Paasche index and the reciprocal of the forward Paasche index is the backward Laspeyres index'.

4.2.2. Edgeworth Index

In constructing an index, an attempt should be made in the selection of the base period to be a normal year in terms of economic conditions of a company or an establishment. Both Laspeyre and Paasche indices have shortcomings as well as advantages. A compromise solution is proposed by F. Y. Edgeworth which involves the averaging of the base and current weights of price to use for a quantity index. Therefore if for each product p average = $p_a = \dfrac{p_o + p_n}{2}$, the index can be written as:

$$I_n = \frac{\sum p_a q_n}{\sum p_a q_o} \times 100 = \frac{\sum \frac{1}{2}(p_o + p_n) q_n}{\sum \frac{1}{2}(p_o + p_n) q_o} \times 100 \quad (I - 3)$$

The Edgeworth index has the advantage over other methods discussed so far, since it satisfies a statistical test called 'time reversal test' (58). It means that if one reverses the time subscripts, then the index produces an inverse result. In other words the product of the original index and its time amendment is equal to unity.

4. 2. 3. Fisher's Ideal Index

Irvin Fisher proposed two criteria for an index number. The first one is the 'time reversal test' which is discussed earlier, and the second one is 'the factor reversal test'.

Neither Laspeyre nor Paasche indices satisfy these tests. The Edgeworth index shown above satisfies the first test, but not the second one.

The factor reversal test can be explained briefly as follows: Let I_p and I_q be the price and quantity indexes respectively. The factor reversal test requires $I_p \times I_q = I_v = \dfrac{\Sigma p_n q_n}{\Sigma p_o q_o}$

when I_v is called the valve index. This condition is met when one of these two indexes be in Laspeyre and the other in Paasche form.

i. e. $\left\{\begin{array}{ll} I_{po} = \dfrac{\sum p_n \quad q_o}{\sum p_o \quad q_o} & \text{Laspeyre price index.} \\ I_{qn} = \dfrac{\sum p_n \quad q_n}{\sum p_n \quad q_o} & \text{Paasche quantity index.} \end{array}\right.$

$\left\{\begin{array}{ll} I_{pn} = \dfrac{\sum p_n \quad q_n}{\sum p_o \quad q_n} & \text{Paasche price index.} \\ I_{qo} = \dfrac{\sum p_o \quad q_n}{\sum p_o \quad q_o} & \text{Laspeyre quantity index} \end{array}\right.$

Therefore value index $= I_v = I_{po} \cdot I_{qn} = I_{pn} \cdot I_{qo} = \dfrac{\sum p_n \quad q_n}{\sum p_o \quad q_o}$

All indices discussed so far including the Edgeworth index fail to satisfy this test. The 'Fisher's idealindex' satisfies both 'time reversal' and factor reversal' tests. It employs the geometric average instead of the arithmatic one, and can be written as follows:

$$I_F = \sqrt{\frac{\sum p_o \quad q_n}{\sum p_o \quad q_o} \times \frac{\sum p_n \quad q_n}{\sum p_n \quad q_o}} \times 100 \qquad (I - 4)$$

where $\dfrac{\sum p_o \quad q_n}{\sum p_o \quad q_o}$ and $\dfrac{\sum p_n \quad q_n}{\sum p_n \quad q_o}$ are Laspeyre and Paasche

indices respectively (59, 60).

Eilon and Soesan (23) having investigated, concluded that the Fisher's index, although perfect, is cumbersome and only suitable when the computer is used for computation. Their view is that the Edgeworth index is easier to use and accurate enough.

4.2.4. Chain Index

All index numbers, discussed so far, are limited in the sense that they are comparison of two periods (base period and comparison period) without reference to the price - quantity in between. The chain index takes into account all the price-quantity information from the base year up to and including the current year. Therefore it is a dynamic representation of change over a number of periods. The chain index can be in different forms. Two important ones, i.e. Laspeyre and Paasche forms, are as follows:

Chain Laspeyre Index

$$I_n = 100 \times \frac{\Sigma p_o q_1}{\Sigma p_o q_o} \times \frac{\Sigma p_1 q_2}{\Sigma p_1 q_1} \cdots \times \frac{\Sigma p_{n-1} q_n}{\Sigma p_{n-1} q_{n-1}} \qquad (I - 5)$$

Chain Paasche Index

$$I_n = 100 \times \frac{\Sigma p_o q_o}{\Sigma p_o q_1} \times \frac{\Sigma p_1 q_1}{\Sigma p_1 q_2} \cdots \times \frac{\Sigma p_{n-1} q_{n-1}}{\Sigma p_{n-1} q_n} \qquad (I - 6)$$

The chain index is the only index, discussed so far, which satisfies a test called the 'circular test'. It means that, for example, the index for period n with respect to period n - 2 can be obtained when the index of n - 1 to n - 2 and n to n - 1 are available i.e. *

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*For more information about index numbers especially chain index refer to R. D. G. Allen (55).

$$I_{n-2,\,n} = I_{n-2,\,n-1} \times I_{n-1,\,n}$$

As R. G. D. Allen indicates the base year o is arbitrary in the chain index.

4. 3. COMPUTATION AND ILLUSTRATION

The indices of production and productivity usually employs either gross or net outputs. The formulae discussed so far are all in the form of gross output which is more prevalent in the national economy than in the economics of firms. In the following chapters the nett output or added value formulae, more relevant for company levels, will be discussed. However, since the gross output is also used for measurement of production and productivity for some companies, particularly when there is not adequate data for net output, and because this chapter is more concerned with the use of index numbers than their use with respect to different productivity concept, we can illustrate the indices of gross output, using real data as discussed earlier.

Since it was not possible to get the data for all kinds of products which are produced in British Leyland, the data are collected in terms of divisions. Table 4. 1 shows sales quantity and price of the products of four divisions for four years, 1970 to 1973. Data of this table does not include 'special products' and 'Prestcold' whose values for 1971, 1972, and 1973 are 94, 91 and 113 million pounds respectively (61).

Year		1970		1971		1972		1973	
DIVISION NAME	Division No.	Quantity (000's)	Price £	Quantity (000's)	Price £	Quantity (000's)	Price £	Quantity (000's)	Price £
		(5)	(1)	(6)	(2)	(7)	(3)	(8)	(4)
Austin Morris	1	665	648	746	662	762	722	730	838
Jaguar**	2	30	2100	31	2645	24	2542	28	3000
Rover ** Triumph	3	210	910	234	1064	233	1176	212	1448
Truck and Bus	4	57	2930	49	3612	37	4270	43	4791

TABLE 4.1 BRITISH LEYLAND * (Home made products)

*Quantity data are taken from 'The Motor Industry of Great Britain', 1973 page 31 and 1976 page 22 and rounded to nearest thousand (62, 63).

** Data for Jaguar and Rover Triumph in 1970 were available in aggregate, and they are separated relative to 1971 data.

		$P_{1970}\ q_n$		
Year	1970	1971	1972	1973
Procedure	(1) x (5)	(1) x (6)	(1) x (7)	(1) x (8)
Division 1	430,920	483,408	493,776	473,040
Division 2	63,000	65,100	5,400	58,800
Division 3	191,100	212,940	212,030	192,920
Division 4	167,010	143,570	108,410	125,990
$\sum P_{1970}\ q_n$	852,030	905,018	819,616	850,750
I_n	100	106.2	96.2	99.8

TABLE 4.2 - LASPEYRES INDEX (I - 1)

		$P_{1973} \times Q_n$		
Year	1970	1971	1972	1973
Procedure	(4) x (5)	(4) x (6)	(4) x (7)	(4) x (8)
Division 1	557,270	625,148	638,556	611,740
Division 2	90,000	93,000	72,000	84,000
Division 3	304,080	338,832	337,384	306,976
Division 4	273,087	234,759	177,267	206,013
$\sum P_{1973}\ q_n$	1,224,437	1,291,739	1,225,207	1,208,729
I_n	100	105.5	100.1	99.2

TABLE 4.3. PAASCHE INDEX (I - 2)

	$p_a = \frac{(1)+(2),(3),(4)}{2}$			p_a ×	q_n	p_a ×	q_n	p_a ×	q_n
Year	1970-71	1970-72	1970-73	1970	1971	1970	1972	1970	1973
Procedure	(9)	(10)	(11)	(9)x(5)	(9)x(6)	(10)x(5)	(10)x(7)	(11)x(5)	(11)x(8)
Division 1.	655	685	743	435575	488630	455525	521970	494095	542390
Division 2.	2372.5	2321	2550	71175	73548	69630	55704	76500	71400
Division 3.	987	1043	1179	207270	230958	219030	243019	247590	249948
Division 4.	3271	3600	3860.5	186447	160279	205200	133200	220049	166002
$\sum p_a q_n$				900467	953415	949385	953893	1038234	1029740
I_n				100	105.9	100	100.5	100	99.2

TABLE 4.4 - EDGEWORTH INDEX (I - 3)

Year	1970	1971	1972	1973
(I - 1)*	100	106.2	96.2	99.8
(I - 2)**	100	105.5	100.1	98.7
I_F	100	105.8	98.1	99.2

TABLE 4.5 - FISHER'S IDEAL INDEX
*Taken from Table 2 ** Taken from Table 3

	$p_o \cdot q_o$	$p_1 \cdot q_1$	$p_2 \cdot q_2$	$p_o \cdot q_1$	$p_1 \cdot q_2$	$p_2 \cdot q_3$
	(1) x (5)	(2) x (6)	(3) x (7)	(1) x (6)	(2) x (7)	(3) x (8)
Div. 1.	430,920	493,852	550,164	483,408	504,444	527,060
Div. 2.	63,000	81,995	61,008	65,100	63,480	71,176
Div. 3.	191,100	248,976	274,008	212,940	247,912	249,312
Div. 4.	167,010	176,988	157,990	143,570	133,644	183,610
$\Sigma p_n q_n$	852,030	1001,811	1043,170	905,018	949,480	1031,158

TABLE 4.6 - VALUES NEEDED FOR CALCULATING CHAIN INDICES

LASPEYRE CHAIN INDEX

$I_{70} = 100$ (arbitrary)

$$I_{71} = I_{70} \times \frac{\Sigma p_o q_1}{\Sigma p_o q_o} = 100 \times \frac{905018}{852030} = 106.2$$

$$I_{72} = I_{71} \times \frac{\Sigma p_1 q_2}{\Sigma p_1 q_1} = 106.2 \times \frac{949480}{1001811} = 100.7$$

$$I_{73} = I_{72} \times \frac{\Sigma p_2 q_3}{\Sigma p_2 q_2} = 100.7 \times \frac{1031158}{1043170} = 99.5$$

PAASCHE CHAIN INDEX

$I_{70} = 100$ (arbitrary)

$$I_{71} = I_{70} \times \frac{\Sigma p_o q_o}{\Sigma p_o q_1} = 100 \times \frac{852030}{905018} = 94.1$$

$$I_{72} = I_{71} \times \frac{\Sigma p_1 q_1}{\Sigma p_1 q_2} = 94.1 \times \frac{1001811}{949480} = 99.3$$

$$I_{73} = I_{72} \times \frac{\Sigma p_2 q_2}{\Sigma p_2 q_3} = 99.3 \times \frac{1043170}{1031158} = 100.5$$

Index. Nos.	Description	Indices calculated in this chapter			
		1970	1971	1972	1973
I - 1	Laspeyres index	100	106. 2	101. 5	99. 8
I - 2	Paasche index	100	105. 5	100. 1	98. 7
I - 3	Edgeworth index	100	105. 9	100. 5	99. 2
I - 4	Fisher's ideal index	100	105. 8	100. 8	99. 2
I - 5	Chain Laspeyres index	100	106. 2	100. 7	99. 5
I - 6	Chain Paasche index	100	94. 1	99. 3	100. 5

TABLE 4. 7 - ALL INDICES.

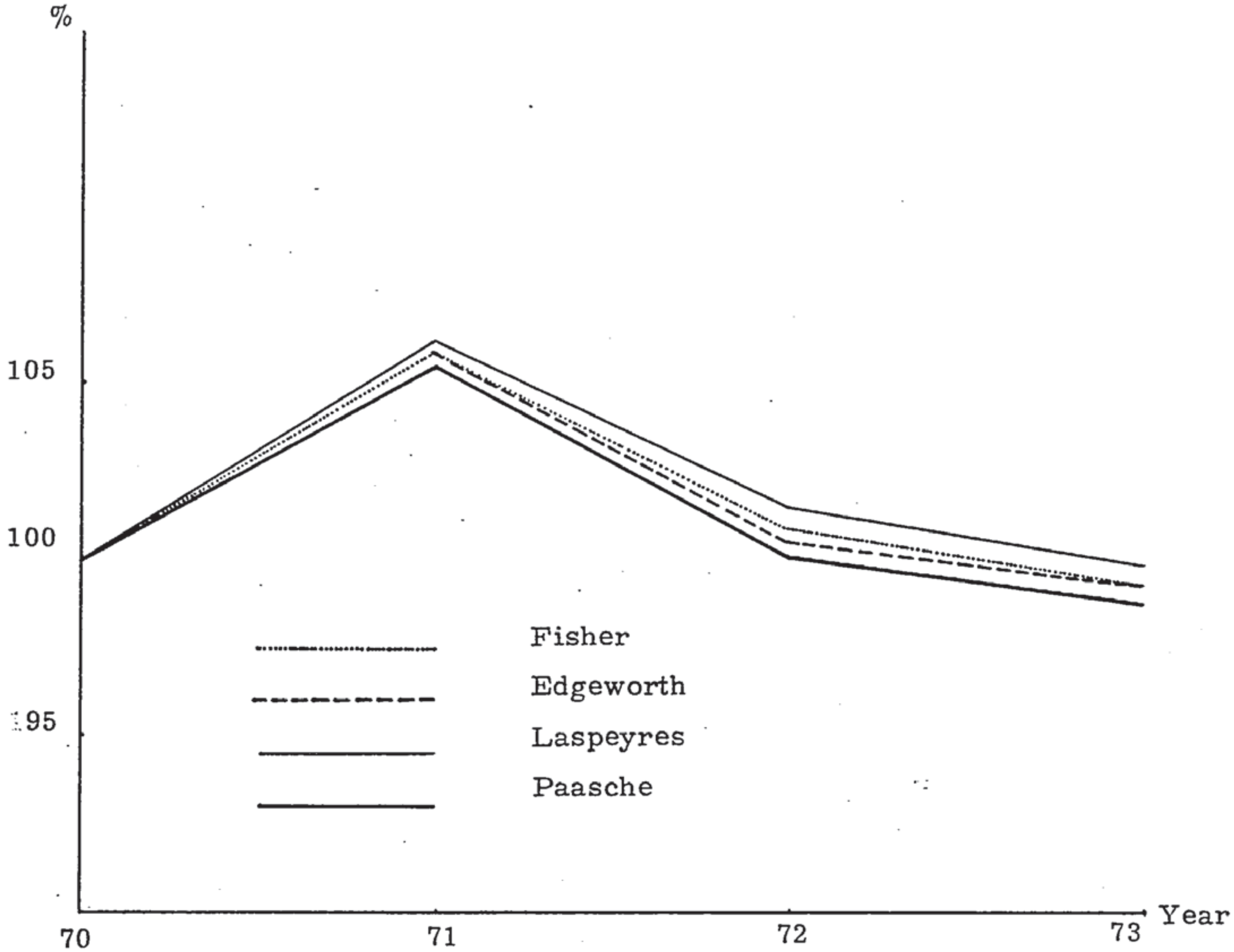

Fig. 4. 1 - INDEX NUMBERS I - 1 to I - 4.

Having had the above data of products and prices for different divisions, the index numbers (I - 1) to (I - 6) can be calculated as shown (year 1970 is usually taken as base year). in tables 4. 2 to 4. 6.

4. 4. CONCLUSION

The prevalent index numbers used in production and productivity are the following indices which have been discussed so far.

1 - Laspeyres

2 - Paasche

3 - Edgeworth

4 - Chain (Laspeyres or Paasche)

Applications are made of these indices, using data from four divisions of British Leyland and the results have been shown in Table 4. 7 and graphically in Figure 4. 1. Mostly Fisher's ideal index has been taken as the yardstick to compare indices, from a statistical point of view.

Some statisticians support the chain index. They argue that all indices except chain make an adjustment to remove the effects of price changes between two periods whereas the chain index measures the change between two periods by successive multiplication of all the intervening links and adjusting for changes in the relative importance of outputs. However some other view that when outmoded commodities are continuously replaced by new ones, the meaning of chain index numbers becomes increasingly doubtful as more distant years are compared and one may often not be able to describe what the comparison really means.

Both chain index and Fisher's ideal index are cumbersome from a computation point of view and need more data than Laspeyres. The Laspeyres and Paasche indices on the other hand have not enough precision especially when the number of periods get larger.

In concluding this chapter a compromise solution to these indices both from the precision and computation point of views with reference to the results in Table 4. 7 is the Edgeworth index as has been supported by others as well (23). Therefore in the next chapters of this thesis the Edgeworth index number will be used for deflating added value or nett output to remove the effects of price change and show the real change in output.

CHAPTER 5

PROBLEMS AND LIMITATIONS IN MEASUREMENT

5.1 INTRODUCTION

The measurement of production and productivity indices is not free from limitations and problems which can be attributed to those embodied within the formulae or models, difficulties arising from statistical analysis and treatment, and limitations in interpretation of results with respect to requirements of different objectives and responsibilities. In this chapter some of the important problems are considered, before the selected method for measurement is put forward.

5.2. AVAILABILITY AND CONSISTENCY OF DATA

The possibility of productivity measurement and its precision depends considerably on the availability and reliability of data used. Financial data is open to distortion due to price movements as is physical data due to the hetrogeneous nature of many production systems.

The quantity of data available to the researchers or the people in charge of measurements varies with respect to the different products and different divisions. In some of them factual and detailed information is available, whereas for others the collection of data can be done only with necessary approximation.

Completeness of data is necessary for the accuracy of measurement. However this is not attainable in a complete sense over a long period and between different parts of a company, since we have to get data from different sources where they use different methods and questions to classify them.

The collection of data is subject to error, and the magnitude of error depends on the sources of data and the method of collecting and tabulating them. Most of the data for research are usually collected from secondary sources such as annual reports, balance sheets, government publications and so on. However part of the data can be collected from primary sources, using questionnaires, or other methods.

Since in practice the data available for measurement are often inadequate and defective, productivity indices may not give a precise result. This is one of the reasons why different methods are used for measurement whose requirements for data are not the same. Therefore the selection of method for measurement, as well as its base weight discussed in a previous chapter, is to some extent dependent on the availability of respective data.

In the following chapters of this thesis data used for the motor industry are collected from both primary and secondary sources, however most of them are from the latter rather than the former. Data collected from different secondary sources were checked against each other to cancel all incorrect data.

5.3 COMPLEXITY OF THE PRODUCTION SYSTEM

A system of production consists of a number of different inputs with different characteristics. It also may produce a range of different outputs each of them again with different quality, price etc. which can be alternative, complementary or a mixture of these.

The hetrogeneous outputs and inputs make the measurement of productivity more difficult. In a complex situation one is faced with the measurement of output whose characteristics will change over time, and also the aggregation of hetrogeneous units of outputs and inputs. This problem exists in some industries such as motor manufacturing etc. even when the data are adequately available.

Difficulties can arise when products or manufacturing process are not classified with respect to uniform principles. For example the manufacture of tools and assembly or packaging equipments may be accounted according to its share in total output in one country, whereas in another country it can be classified with respect to the activities and kind of products they produce.

Another problem in production system is the discontinuation of the old products and the introduction of new ones. This is what I. H. Siegel (45, 24, pp. 45 - 59) refers to as sub-product and suggests a solution called sub-product approach. In fact during the period in question there may be some new products which enter in the range of company's supply and some others which are defunct products and exit from the range. This is particularly serious issue when the measurement of the productivity index is to be done for a long period in which the substitution of old products with new ones is inevitable. This is also true for companies when change or postponement of products and arrival of new products take place very quickly due to market movement and/or technical change.

5.4 CHANGE IN QUALITY

Although the discussion of complex production systems can include the change in quality as well, it is introduced here separately because of its importance in measurement.

As a result of continuing research and invention over the years or periods in question, many products have been improved or changed. Therefore a trend of production indices will show a downward bias.

As L. Usilaver pointed out, a control of quality should be available if the productivity index is to be reliable. This is because an increase in productivity can be achieved at the expense of quality, and the increase in productivity can be traded off against the decrease in quality (64).

Different comments have been given to cope with this problem, B. L. Wagman (64) refers to the method in which quality levels should be treated as far as possible as separate output. They should be then aggregated by using a weighting system so that the required measurement can be evaluated. This can also be reflected in output measures. One can deal with quality differences for employees on the basis of pay differentials i. e. the higher the pay, the greater the weight, as discussed by Mark (64).

Unfortunately an unambiguous translation of quality into quantity is not always possible. It is more likely that for different levels of labour or different product with fundamental changes in quality, different ratios in productivity will emerge. Some adjustment analysis, however, is given by some authors to deal with quality which will be discussed in chapter eight. It should be considered that although the measurement of quality is not easy, it is not something that one can disregard.

5.5. CAPACITY UTILISATION

Productive capacity is one of the important factors in productivity planning and its under-utilisation is an impression of low efficiency of a company.

The measurement of capacity is really complex; since it is not possible to work out a clear and unique definition for it. It can be related to individual products or the overall production of the establishment. Still one should consider that a company may consist of a number of plants and divisions with inter-relations which make it difficult to consider the capacity of any individual part. Again the measurement depends on whether one considers the present or the future situation, and also whether one takes into account the availability and accessability of manpower, capital facilities, materials or all of these together against their utilisation. In these cases what is the weight to be given to each of them. To have a more realistic and understanding concept let us refer to this problem in the motor manufacturing companies which is the main example used in this thesis, as explained by W. Bucknall (65) Senior Economist of S. M. M. T. * in a personal written communication.

'There are considerable problems in identifying capacity in overall terms:

(a) There clearly exists a difference between installed capacity and manned capacity (whether on a 1, 2 or 3 shift basis);

(b) Theoretical capacity may still exist for the manufacture of obsolete models, for which the demand would be low even in a boom period;

(c) Effective capacity depends to some extent on the effective capacity of the component sector to supply the right quantities at the right time;

(d) Assembly capacity tells only part of the story. For example about one-half of British cars produced for export are shipped knocked down for assembly abroad;

(e) Vehicle manufacturers also produce sets of knocked down parts, not classified by vehicles in the British production returns, for incorporation into vehicles manufactured or assembled in overseas plants.

Neither of these parts of a vehicle manufacturer's activities are usually reflected in capacity calculations based on recorded vehicle production.'

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*The Society of Motor Manufacturers and Traders Limited.

All these considerations will, of course, add to the problem of establishing meaningful indications of capacity utilisation, but there is no clear way as to how these can be overcome. S. M. M. T. has tried to make an assessment on the basis of the best month's production in a year, assuming that in such a month production was near effective capacity; this assumption was quite fair for 1975, when most manufacturers had to make up in later months the earlier production lost through strikes. The result was however not satisfactory, since it can be seen from the following table that the capacity arrived at diverged significantly from the figures in the Expenditure Committee Report.

TABLE 5.1

	1975 Actual Output	1974 TISC maximum planned capacity	1975 Capacity based on best month input	1975 Capacity utilisation
	Unit(000)	Unit(000)	Unit (000)	Unit %
B. L.	605	1145	805	75%
Chrysler	227	365	330	69%
Ford	330	650	395	84%
Vauxhall	99	365	105	94%
Total	1268	2525	1640	77%

The Central Policy Review Staff (CPRS) (17) gives the assembly capacity of utilisation of major car manufacturers in Europe as follows:

MAJOR CAR MANUFACTURERS' UTILISATION OF EUROPEAN ASSEMBLY CAPACITY

			Units ('000)		
	1974 Profit after tax *	2-shift capacity	Production in best year	Production in 1974 actual	% capacity utilisation
	(£m.)	(i)	(ii)	(iii)	(1974)
B. L. (including Belgium	-11. 0	1, 190	916	738	62
Chrysler(U. K. /France)	-25. 8	900	780	647	72
Fiat	-13. 7	1, 850	1, 514	1, 206	65
Ford(U. K. /Germany)	-31. 3	1, 450	1, 428	807	56
General Motors(Vauxhall / Opel)	-20. 8	1, 400	1, 116	715	51
Peugeot/Citroen	-85. 4	1, 570	1, 263	1, 127	72
Renault	-21. 1	1, 500	1, 174	1, 174	78
Volkswagen(including Audi-NSU)	-168. 7	1, 800	2, 032	1, 436	80

* before extraordinary items.

Table5. 2 - (From C. P. R. S. (17))

The C. P. R. S. report stated a belief that this under-utilisation will continue. It predicted that total demand for Western Europe cars could easily be as low as 9. 7 million units in 1980 and 11. 3 million in 1985, whereas the capacity by 1980 will be 15 million units.

This is not only the case for the car industry. R. G. Norman (11) applying productivity measurement for four manufacturing industries in the West Midlands region, concludes that all the companies within the sample were operating at less than half the maximum utilisation of their available productive capacity.

With the argument we have followed so far about capacity utilisation one can realise that there is no need to put productive capacity as a constraint factor in planning future productivity in the following chapter, at least for the motor industry in Britain, in which we refer to in this thesis, except for an assumption of a very large amount of increase in production. However J. W. Kenderick (8, pp. 70) argues that productivity indices should be compared, in trend analysis, for periods when the establishment is operating at much the same level of capacity.

5.6 FAULTY USE OF PERCENTAGE

As F. E. Croxton, etal (66, pp. 133 - 134) have discussed, the ratios and percentages are in such general use that there is the possibility of misusing them. This is equally true in measuring production and productivity indices, and can be traced to the following important causes:

(a) 'confusion in regard to base': Assuming that output quantity of a homogeneous product produced by a company in two different periods are 415 and 83 respectively. The Manager may claim that the production of this product, over period in question, is reduced by 400 percent. In fact he is referred to this percentage with respect to current period as base, whereas with respect to first period, the production is reduced 80 percent. This means that the Manager's view is rather misleading, although he has not used the arbitrary figure.

(b) 'percentage for small number': In comparing small numbers, the use of percentage may lead to wrong impressions. For example a shop may claim that about 70 percent of employees are women where it has only 2 women and one man, in which the percentage may change basically if one person moves out or in. In such a case either the percentage should not be used or the figures should accompany the percentage.

5.7 INVENTORY

One of the problems with the measurement of productivity concerns inventory. This is because some of the units sold could be from finished inventory. Such a condition would yield an over-stated output. Conversely, units produced but not sold would not be counted, giving an understated output.

One solution to this problem is to treat inventories taken from previous periods as a purchase of bought-in inputs. Then, although the materials and parts used are from previous years, it does not matter if they are deducted as a purchase of bought-in inputs in the calculation of added value. This is also true when the firm sells less than its volume produced as these inventories will be counted as sales in the calculation of added value.

However, productivity is concerned with the efficiency of converting inputs to outputs and not just the units sold. It also causes difficulty when the prices used for the calculation of the inventory, whether raw materials or finished goods, change. Therefore in these cases the added value calculation should be adjusted for change in the value of inventory.

Secondary sources such as annual reports rarely reveal inventory levels. Therefore when information is collected in this way, the method described above is used to reduce the effect of inventory variation.

5.8 OTHER PROBLEMS

There are still other problems which one may encounter in measurement of productivity such as determination of unit cost with respect to real cost, capital input, fixed investment etc. Also dealing with economies of scale, seasonal fluctuations,sex differentials etc. as factors of consideration in productivity measurement.

T. E. Easterfield (19) believes that the question of the effect of scale or size of a company on productivity has been widely argued, mostly somewhat inconclusively. G. J. Stigler (45 p. p. 63) argues that economies of scale are potentially of the same order of magnitude as technical progress, and establishing an approximate magnitude for that is a major problem in productivity and economic growth. For the motor industry companies in Britain to which we refer later on, C. P. R. S. (17 pp. viii) indicated that 99% of British cars in 1974 are produced by four big companies, of which B. L's and Ford's production volumes are large enough to achieve full economies of scale in all operations whereas Chrysler's and Vauxhall's are not.

5.9 CONCLUSION

In this chapter some problems which exist regarding calculations on production and productivity indices are discussed. Some of these problems are more important and one needs to take allowances for adjustment. Some of them can be solved by relevant assumptions, instead of ignoring them, to produce more comprehensive results.

In view of the importance of these limitations and problems, one can appreciate why a considerable body of literature on different approaches and methods to deal with this complex domain has developed.

In this thesis, to avoid complexity, some of the problems less significant to analysis, may be ignored, and relevant assumptions are made for others wherever necessary, depending on their significance and accessibility to necessary data.

Chapter eight deals with solutions to some of the problems discussed in this chapter.

CHAPTER 6

ADDED VALUE:

CONCEPT, CALCULATION AND APPLICATION

6.1 ADDED VALUE INDEX

In Chapter three different approaches and methods including added value and its different forms of calculations are discussed. However a theoretical construction or formula is only worthwhile when it can be put into practice.

The advantages and limitations of the net output or added value concept in measurement of production and productivity have been already explained. But it is useful to have a brief review of this concept here again.

Broadly speaking the added value or nett output of a company in a particular period is the difference between the value of its products (gross output) and the contributions to this value made by other companies in the form of raw materials, fuels etc., supplied by them and consumed in manufacture. One should know that the measurement referred to value of output, whether gross or nett, is not a technical but an economic measure of productivity, since we are not measuring a homogeneous entity but a mixture of elements which are interacting on each other. The choice between nett and gross measures for a particular industry depends on the purpose on hand, but the preference is surely in favour of the nett figures. This is because the use of the products of some companies as materials by others, leads to some amount of duplication which can be misleading. Moreover most studies of production functions take into account only some of the input factors such as labour and capital and ignore the materials and bought-in parts. This according to I. H. Siegel (45 pp. 44) is a theoretical oversight, or at least a failure to make explicit the assumptions used. As indicated before, the added value method has the advantage over profit and other financial ratios in that it is not significantly affected by accounting policy of depreciation, interest charges etc. because all of these together with profit are included within the added value.

This method is especially appropriate when applied to those companies in which the materials, bought in parts and services change substantially or when a number of plants and inter-related units are involved in providing components of final assembly such as motor manufacturing companies which are analysed in this thesis. These merits of the added value concept made it a prevalent approach not only for the analysis in the level of the nation's economy but also in the level of a firm's economy. It has also been used for productivity measurement and incentives.

6. 2. METHOD OF CALCULATION

The practical method for calculating added value which can cope with data collection problems and be applicable in four big motor companies is given below. It gives the same result as other methods discussed in chapter three with different forms of calculating resources.

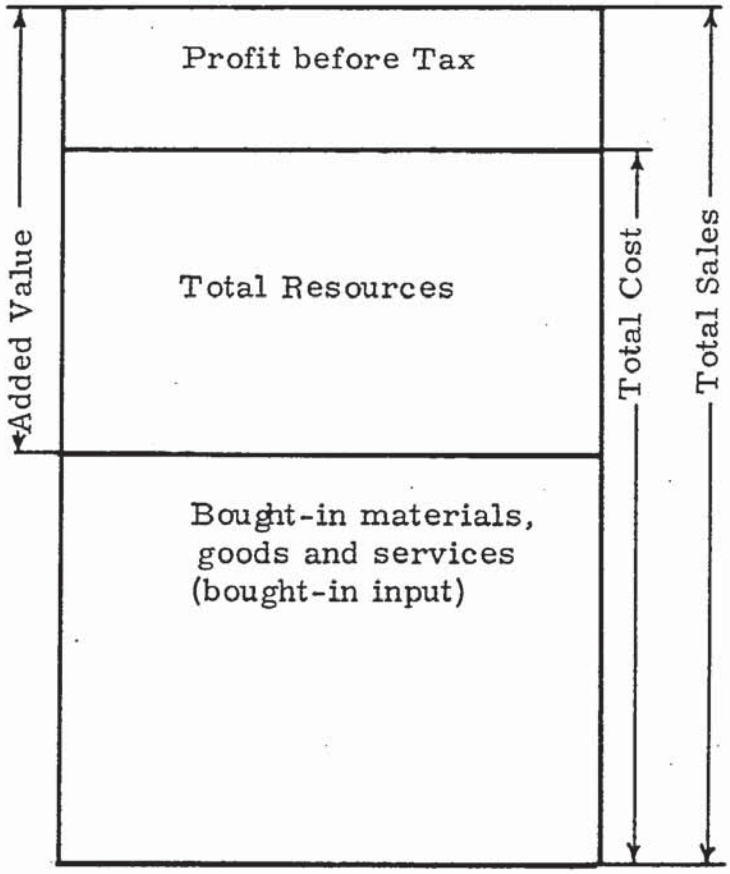

Fig. 6.1. Method of added value calculation.

Method

Total cost = total sales less profit before tax.

Total resources is the sum of

- remuneration
- facilities (depreciation + amortisation + hire of plants and machinery)
- capital interest charges (interest paid less interest received).

Bought-in input = total cost less total resources

Added value = total sales less bought-in input

6.3 APPLICATION

The above method calculates the added value for each period showing both price and quantity movements. However to have an index of added value for a number of years we need to use a deflation approach to see the real change free from price movements. The simple index can be either in Laspeyres form or Paasche form. However, since during the past ten years a significant change in quality and other characteristics of products have been taken place, using a constant price say of 1968 or 1977 give a tremendous downward bias or upward bias respectively. It is therefore more sensible to employ Edgeworth formula as an approximation to Fisher's ideal index as discussed earlier, using an average price of two base and current periods for price deflation. Then first of all one has to work out the added value per unit of output for each period and then obtain the added value index as follows:

$$v = \frac{C_n \times U_a}{C_o \times U_o} \times 100 \qquad \text{where } U_a = \frac{U_o + U_n}{2}$$

Where v, C and U are added value index, total quantity of products over a year and added value per unit of output respectively. Suffixes o and n represent base and current (given) periods. The following tables, 6.1 to 6.4, represent data and calculations of indices of added value for four big motor manufacturing companies in Britain, i.e. British Leyland, Ford, Vauxhall and Chrysler. Data for these companies used in this thesis are for

TABLE 6.1 - BRITISH LEYLAND

No.	DISCRIPTIONS		SUBSCRIPTS	UNITS	1968	1969	1970	1971	1972	1973	1974	1975	1976 *	1977
1.	Sales Revenue		S	£M	907	970	1021	1177	1281	1564	1595	1868	2314	2602
2.	Profit Before Tax			£M	37.9	40.4	3.9	32.4	31.9	51.3	2.3	(76.1)	56.4	3.1
3.	Remuneration		R	£M	248.2	260.0	288.0	322.1	356.2	439.4	484.8	553.0	626.0	702.9
4.	Facilities		F	£M	42.2	41.8	44.2	49.6	45.5	47.3	46.0	53.8	64.6	71.7
5.	Capital Interests Charges		CI	£M	7.6	5.3	10.3	14.3	9.1	6.9	17.1	38.0	37.8	53.6
6.	Manpower		E	000's	188.2	196.4	199.5	193.7	190.8	204.1	207.8	191.5	183.4	194.6
7.	Output		C	000's	1050	1083	984	1057	1127	1161	1020	845	785	785
8.	Total Cost	(1)-(2)		£M	869.1	929.6	1017.1	1144.6	1249.1	1512.7	1592.7	1944.1	2257.6	2598.9
9.	Total Resource Utilisation	(3)+(4)+(5)	T	£M	298.0	307.1	342.5	386.0	410.8	493.6	547.9	644.8	728.4	828.2
10.	Bought-in Input	(8) - (9)	M	£M	571.1	622.5	674.6	758.6	838.3	1019.1	1044.8	1299.3	1529.2	1770.7
11.	Added Value	(1)-(10)	V	£M	335.9	347.5	346.4	418.4	442.7	544.9	550.2	568.7	784.8	831.3
12.	Added Value per Unit of Output	(11)÷(7)	U	£	319.9	320.9	352.0	395.8	392.8	469.3	539.4	673.0	999.7	1059.0
13.	Average Added Value for two periods	$\frac{(12)_o-(12)_n}{2}$	U_a	£	319.9	320.4	336.0	357.9	356.4	394.6	429.7	496.5	659.8	689.5
14.	Deflated Added Value	(13)x(7)	V_d	£M	335.9	347.0	330.6	378.3	401.7	458.1	438.3	419.5	517.9	541.3
15.	Added Value Index	$\frac{(14)_n}{(14)_o} \times 100$	V	%	100	103.3	98.4	112.6	119.6	136.4	130.5	124.9	154.2	161.1

*The data for 1976 was 15 months data instead of 12 months in annual report. Therefore it is adjusted for 12 months by multiplying them by 12/15.

TABLE 6.2 - FORD MOTOR COMPANY LIMITED

No.	DISCRIPTIONS		SUBSCRIPTS	UNITS	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
1.	Sales Revenue		S	£M	488.0	537.8	586.7	589.0	797.8	890.2	967.9	1146.5	1627.5	2253.1
2.	Profit Before Tax			£M	43.0	38.1	25.2	(30.7)	46.8	65.4	8.7	14.1	121.6	246.1
3.	Remuneration		R	£M	103.7	108.6	134.8	138.2	180.4	198.7	232.5	269.9	318.1*	345.3
4.	Facilities		F	£M	27.2	28.5	27.8	34.4	37.8	35.3	36.2	41.0	46.8	53.6
5.	Capital Interest charges		CI	£M	4.7	5.0	5.9	11.5	9.7	11.1	19.1	25.3	18.6	17.0
6.	Manpower		E	000's	61.0	65.0	67.0	70.0	70.0	71.0	70.0	67.0	68.0	71.0
7.	Output		C	000's	712.0	681.0	677.0	550.0	707.0	674.0	602.0	534.0	644.0	708
8.	Total Cost	(1)-(2)		£M	445.0	499.7	561.5	619.7	751.0	824.8	959.2	1132.4	1505.9	2007.0
9.	Total Resource Utilisation	(3)+(4)+(5)	T	£M	135.6	142.1	168.5	184.1	227.9	245.1	287.8	336.2	383.5	415.9
10.	Bought-in Input	(8)-(9)	M	£M	309.4	357.6	393.0	435.6	523.1	579.7	671.4	796.2	1122.4	1591.1
11.	Added Value	(1)-(10)	V	£M	178.6	180.2	193.7	153.4	274.7	310.5	296.5	350.3	505.1	662.0
12.	Added Value per unit of output	(11)÷(7)	U	£	250.8	264.6	286.1	278.9	388.5	460.7	492.5	656.0	784.3	935.0
13.	Average added value for 2 periods	$\frac{(12)_o+(12)_n}{2}$	U_a	£	250.8	257.7	268.5	264.9	319.7	355.8	371.7	453.4	517.6	592.9
14.	Deflated Added Value	(13)x(7)	V_d	£M	178.6	175.5	181.8	145.7	226.0	239.8	223.8	242.1	333.3	419.8
15.	Added Value Inded	$\frac{(14)_n}{(14)_o} \times 100$	v	%	100	98.3	101.8	81.6	126.5	134.3	125.3	135.6	186.6	235.1

* This number is obtained by multiplying the remuneration in annual report by 1.07 to adjust it with other data about remunerations taken from company.

TABLE 6.3 - VAUXHALL MOTORS LIMITED

No.	DESCRIPTIONS		SUBSCRIPTS	UNITS	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
1.	Sales Revenue		S	£M	216.4	204.1	209.9	287.8	267.5	280.8	320.8	388.8	513.7	627.5
2.	Profit Before Tax			£M	9.0	(1.9)	(9.7)	1.8	(4.3)	(4.1)	(17.6)*	(12.8)*	(1.7)	(2.0)
3.	Remuneration		R	£M	50.2	47.6	60.5	71.6	72.5	79.6	90.7	95.7	108.5	124.5
4.	Facilities		F	£M	19.4	14.0	15.5	15.6	16.7	16.7	17.9	17.1	16.9	13.7
5.	Capital Interests Charges		CI	£M	3.2	3.6	4.5	4.5	3.9	3.9	8.0	11.5	9.1	7.3
6.	Manpower		E	000's	36.4	35.2	36.3	37.3	34.3	34.4	33.6	29.6	27.9	30.2
7.	Output		C	000's	329.0	285.6	269.8	331.2	272.8	258.7	249.8	205.3	230.2	234.2
8.	Total Cost	(1)-(2)		£M	207.4	206.0	219.6	286.0	271.8	284.9	338.4	401.6	515.4	629.5
9.	Total Resource Utilisation	(3)+(4)+(5)	T	£M	72.8	65.2	80.5	91.7	93.1	100.2	116.6	124.3	134.5	145.5
10.	Bought-in Input	(8)-(9)	M	£M	134.6	140.8	139.1	194.3	178.7	184.7	221.8	277.3	380.9	484.0
11.	Added Value	(1)-(10)	V	£M	81.8	63.3	70.8	93.5	88.8	96.1	99.0	111.5	132.8	143.5
12.	Added value per unit of output	(11)÷(7)	U	£	248.6	221.6	262.4	282.3	325.5	371.5	396.3	543.1	576.9	612.7
13.	Average added value for two periods	$\frac{(12)_o+(12)_n}{2}$	U_a	£	248.6	235.1	255.5	265.5	287.1	310.1	322.5	395.9	412.8	430.7
14.	Deflated Added Value	(13)x(7)	V_d	£M	81.8	67.1	68.9	87.9	78.3	80.2	80.6	81.3	95.0	100.9
15.	Added Value Index	$\frac{(14)_n}{(14)_o} \times 100$	v	%	100	82.0	84.2	107.5	95.7	98.0	98.5	99.4	116.1	123.3

*These are adjusted data taken from annual report 1976 and different from what are in 1974 and 1975 reports.

TABLE 6.4 - CHRYSLER U.K. LIMITED

No.	DESCRIPTIONS		SUBSCRIPTS	UNITS	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
1.	Sales Revenue		S	£M	175.9	165.2	178.8	239.7	281.3	297.4	313.3	351.1	331.6	458.0
2.	Profit Before Tax			£M	3.8	0.7	(10.6)	0.3	1.6	3.4	(17.7)	(35.5)	(42.6)	(21.5)
3.	Remuneration		R	£M	29.5	36.3	44.9	52.9	63.2	75.1	80.6	80.7	77.2	89.7
4.	Facilities		F	£M	7.2	5.1	6.0	6.8	7.1	7.6	7.1	6.8	7.9	9.9
5.	Capital Interests charges		CI	£M	0.9	1.6	3.1	3.9	2.4	2.8	6.2	7.8	10.0	13.4
6.	Manpower		E	000's	24.3	25.4	27.7	28.5	28.8	30.9	40.0	28.4	20.6	22.8
7.	Output		C	000's	216.0	207.7	226.3	310.3	333.8	334.2	319.3	279.8*	203.7*	213.0*
8.	Total Cost	(1)-(2)		£M	172.1	164.5	189.4	239.4	279.7	294.0	331.0	386.6	374.2	479.5
9.	Total Resource Utilisation	(3)+(4)+(5)	T	£M	37.6	43.0	54.0	63.6	72.7	85.5	93.9	95.3	95.1	113.0
10.	Bought-in Input	(8)-(9)	M	£M	134.5	121.5	135.4	175.8	207.0	208.5	237.1	291.3	279.1	366.5
11.	Added Value	(1)-(10)	V	£M	41.4	43.7	43.4	63.9	74.3	88.9	76.2	59.8	52.5	91.5
12.	Added value per unit of output	(11)÷(7)	U	£	191.7	210.4	191.8	205.9	222.6	266.0	238.6	213.7	257.7	429.6
13.	Average added value for two periods	$\frac{(12)_o+(12)_n}{2}$	U_a	£	191.7	201.1	191.8	198.8	207.2	228.9	215.2	202.7	224.7	310.7
14.	Deflated Added value	(13) x (7)	V_d	£M	41.4	41.8	43.4	61.7	69.2	76.5	68.7	56.7	45.8	66.2
15.	Added Value Index	$\frac{(14)_n}{(14)_o} \times 100$	V	%	100	101.0	104.8	149.0	167.1	184.8	165.9	137.0	110.6	159.9

*These data are obtained directly from company by private communication.

ten years, 1968 to 1977, most of them are collected from the annual report (60, 67, 68, 69), and some of them either from other publications (17, 70) or by official and private communications with these companies.

Figure 6.2. portrays the nett output or added value index for the four given companies over 10 years, using the Edgeworth formula. From this graph it can be seen that over 10 years all four companies have an upward trend in nett output or added value index. Ford has the most ambitious trend and since 1975 its index has sharply increased. The other three companies have nearly the same change on average. Chrysler has a sharp drawback since 1973 after a boom period over all others, but in 1977 its added value index has shown an improvement. British Leyland does not have any impulse and its growth in nett output index is steady. Chrysler has a disappointing result with respect to others, but it still has a significant growth since 1975. A better analysis of change in nett output index can be portrayed by breaking down into more than one variable.

6.4 DETAILED ANALYSIS

For detailed analysis of added value or nett output index there are three variables which are of considerable value to look at them namely sales value (gross output), total resources and bought-in input which are represented by capital letters S. T. and M.

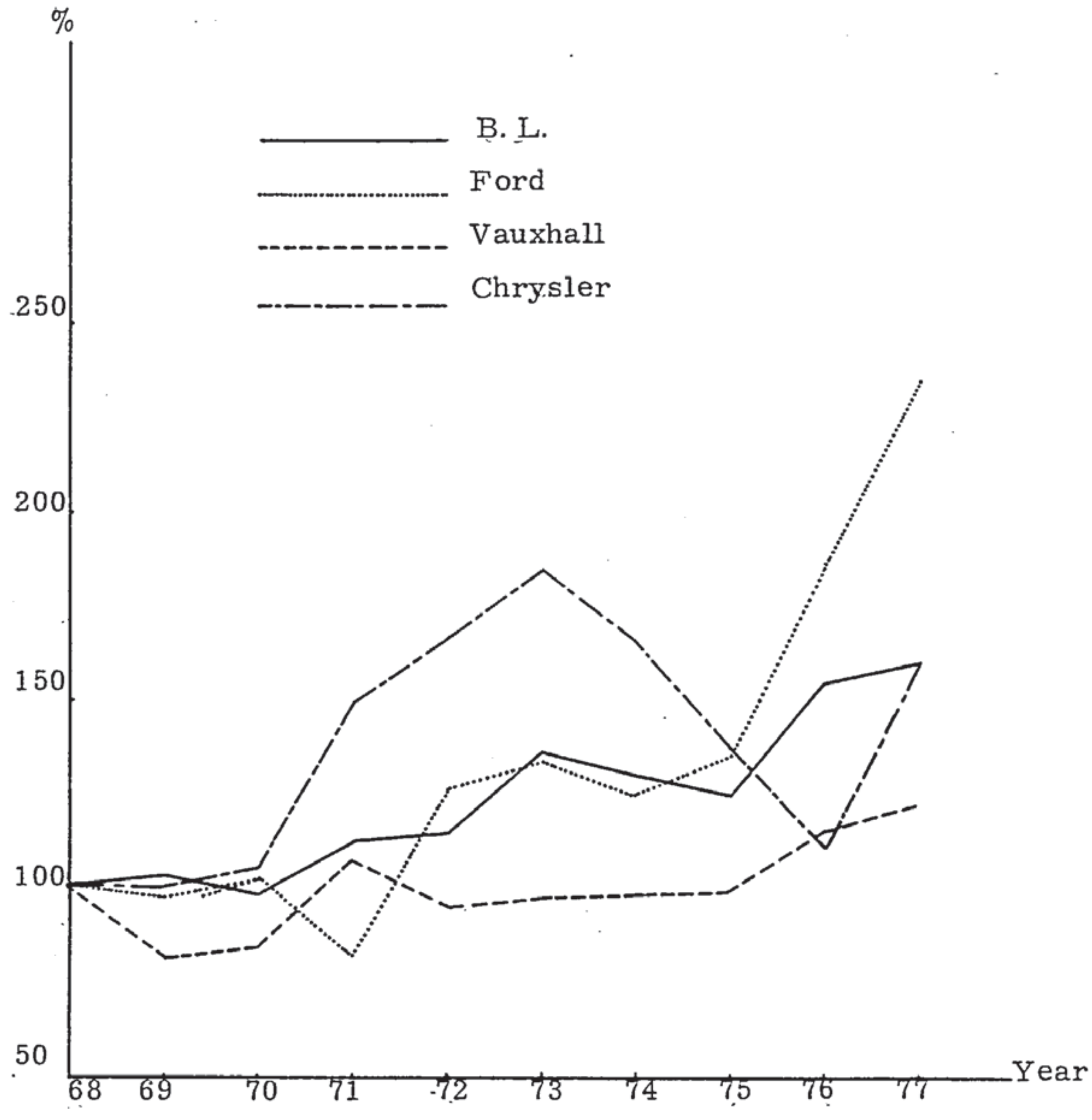

Fig. 6. 2. ADDED VALUE INDEX FOR 4 COMPANIES OVER 10 YEARS

(using Edgeworth Formula)

respectively, knowing that they are interdependent. These three variables and their respective indices s, t and m will show the change in net output index attributable to change in these indices which give signals for those parts where more attention need to be paid to them.

The same method can be used to calculate these indices as for added value, using the Edgeworth formula as follows:

$$s = \frac{C_n \times A_a}{C_o \times A_o} \times 100 \qquad \text{where } A_a = \frac{A_o + A_n}{2}$$

$$t = \frac{C_n \times K_a}{C_o \times K_o} \times 100 \qquad \text{where } K_a = \frac{K_o + K_n}{2}$$

$$m = \frac{C_n \times B_a}{C_o \times B_o} \times 100 \qquad \text{where } B_a = \frac{B_o + B_n}{2}$$

in which A, K and B refer to price of unit output, resource utilisation per unit of output, and bought-in input per unit of output respectively.

Tables 6. 5 to 6. 8 illustrate the calculation of these three indices. The results are graphically shown in figures 6. 3 and 6. 6 for B. L. , Ford, Vauxhall and Chrysler. respectively.

TABLE 6.5 - BRITISH LEYLAND

No.	DESCRIPTION		SUBSCRIPTS	UNITS	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
1.	Price P.U.O.O.		A	£	863.8	895.7	1037.6	1113.5	1136.6	1347.1	1563.7	2210.7	2947.8	3314.6
2.	Resource utilisation P.U.O.O.		K	£	283.8	283.6	348.1	365.2	364.5	425.2	537.2	763.1	927.9	1055.0
3.	Bought-in Input P.U.O.O.		B	£	543.9	574.8	685.6	717.7	743.8	877.8	1024.3	1537.6	1948.0	2255.7
4.	Average Price P.U.O.O.* for base and current periods.	$\frac{(1)_n+(1)_o}{2}$	A_a	£	863.8	879.8	950.7	988.7	1000.2	1105.5	1213.8	1537.3	1905.8	2089.2
5.	Average Resource utilisation P.U.O.O. in base and current periods	$\frac{(2)_n+(2)_o}{2}$	K_a	£	283.8	283.7	316.0	324.5	324.2	354.5	410.5	523.5	605.9	669.4
6.	Average bought-in input P.U.O.O. for base and current periods.	$\frac{(3)_n+(3)_o}{2}$	B_a	£	543.9	559.4	614.8	630.8	643.9	710.9	784.1	1040.8	1246.0	1399.8
7.	Deflated gross output	(4) x C	S_d	£M	907.0	952.8	935.5	1045.1	1127.2	1283.5	1238.1	1299.0	1496.1	1640.0
8.	Deflated resource utilisation	(5) x C	T_d	£M	298.0	307.2	310.9	343.0	365.5	411.6	418.7	442.4	475.6	525.5
9.	Deflated bought-in input	(6) x C	M_d	£M	571.1	605.8	605.0	667.4	725.7	825.4	799.8	879.5	978.1	1098.8
10.	Gross output index	$\frac{(7)_n}{(7)_o} \times 100$	s	%	100	105.0	103.1	115.2	124.3	141.5	136.5	143.2	165.0	180.8
11.	Resource utilisation index	$\frac{(8)_n}{(8)_o} \times 100$	t	%	100	103.1	104.3	115.1	122.6	138.1	140.5	148.5	159.6	176.3
12.	Bought-in input index	$\frac{(9)_n}{(9)_o} \times 100$	m	%	100	106.1	105.9	116.9	127.1	144.5	140.0	154.0	171.3	192.4

C = output quantity (from Table 6.1)   * per unit of output

TABLE 6.6 – FORD MOTOR COMPANY LIMITED

No.	DESCRIPTION		SUBSCRIPTS	UNITS	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
1.	Price P.U.O.O.*		A	£	685.4	789.7	866.6	1070.9	1128.4	1320.8	1607.8	2147.0	2527.2	3182.3
2.	Resource utilisation P.U.O.O.		K	£	190.4	208.7	248.9	334.7	322.3	363.6	478.1	629.6	595.5	587.4
3.	Bought in input P.U.O.O.		B	£	434.6	525.1	580.5	792.0	739.9	860.1	1115.3	1491.0	1742.9	2247.3
4.	Average price P.U.O.O. for base and current periods	$\frac{(1)_n+(1)_o}{2}$	A_a	£	685.4	737.6	776.0	878.2	906.9	1003.1	1146.6	1416.2	1606.3	1933.9
5.	Average resource utilisation P.U.O.O. in base and current periods	$\frac{(2)_n+(2)_o}{2}$	K_a	£	190.4	199.6	219.7	262.6	256.4	277.0	334.3	410.0	393.0	388.9
6.	Average bought in input P.U.O.O. for base and current periods.	$\frac{(3)_n+(3)_o}{2}$	B_a	£	434.6	479.9	507.6	613.3	587.3	647.4	775.0	962.8	1088.8	1341.0
7.	Deflated gross output	(4)xC	S_d	£M	488.0	502.3	525.4	483.0	641.2	676.1	690.3	756.3	1034.5	1369.2
8.	Deflated resource utilisation	(5) x C	T_d	£M	135.6	135.9	148.7	144.4	181.3	186.7	201.2	218.9	253.1	275.3
9.	Deflated bought in input	(6) x C	M_d	£M	309.4	326.8	343.6	337.3	415.2	436.3	466.6	514.1	701.2	949.4
10.	Gross output index	$\frac{(7)_n}{(7)_o} \times 100$	s	%	100	102.9	107.7	99.0	131.4	138.5	141.5	155.0	212.0	280.6
11.	Resource utilisation index	$\frac{(8)_n}{(8)_o} \times 100$	t	%	100	100.2	109.7	106.5	133.7	137.7	148.4	161.4	186.7	203.0
12.	Bought in input index	$\frac{(9)_n}{(9)_o} \times 100$	m	%	100	105.6	111.1	109.0	134.2	141.0	150.8	166.2	226.6	306.9

* per unit of output   C = output quantity (from Table 6.2)

TABLE 6.7 – VAUXHALL MOTORS LIMITED

No.	DESCRIPTION		SUBSCRIPTS	UNITS	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
1.	Price P.U.O.O.*		A	£	657.8	714.6	778.0	869.0	980.6	1085.4	1284.2	1893.8	2231.5	2679.3
2.	Resource utilisation P.U.O.O.		K	£	221.3	228.3	298.4	276.9	341.3	387.3	466.8	605.5	584.3	621.3
3.	Bought in input P.U.O.O.		B	£	409.1	493.0	515.6	586.7	655.1	714.0	888.0	1350.7	1654.6	2066.6
4.	Average price P.U.O.O. for base and current periods	$\frac{(1)_n+(1)_o}{2}$	A_a	£	657.8	686.2	717.9	763.4	819.2	871.6	971.0	1275.8	1444.7	1668.6
5.	Average resource utilisation for base and current periods	$\frac{(2)_n+(2)_o}{2}$	K_a	£	221.3	224.8	259.9	249.1	281.3	304.3	344.1	413.4	402.8	421.3
6.	Average bought in input P.U.O.O. for base and current periods	$\frac{(3)_n+(3)_o}{2}$	B_a	£	409.1	451.1	462.4	497.9	532.1	561.6	648.6	879.9	1031.9	1237.9
7.	Deflated gross output	(4) x C	S_d	£M	216.4	196.0	193.7	252.8	223.5	225.5	242.6	261.9	332.6	390.8
8.	Deflated resource utilisation	(5) x C	T_d	£M	72.8	64.2	70.1	82.5	76.7	78.7	86.0	84.9	92.7	98.7
9.	Deflated bought-in input	(6) x C	M_d	£M	134.6	128.8	124.8	164.9	145.2	145.3	162.0	180.6	237.5	289.9
10.	Gross Output index	$\frac{(7)_n}{(7)_o} \times 100$	s	%	100	90.6	89.5	116.8	103.3	104.2	112.1	121.0	153.7	180.6
11.	Resource Utilisation Index	$\frac{(8)_n}{(8)_o} \times 100$	t	%	100	88.2	96.3	113.3	105.4	108.1	118.1	116.6	127.3	135.6
12.	Bought-in input Index	$\frac{(9)_n}{(9)_o} \times 100$	m	%	100	95.7	92.7	122.5	107.9	107.9	120.4	134.2	176.4	215.4

* per unit of output   C= output quantity (from Table 6.3)

TABLE 6.8 – CHRYSLER MOTORS LIMITED

No.	DESCRIPTION		SUBSCRIPTS	UNITS	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
1.	Price P.U.O.O.*		A	£	814.4	795.4	790.1	772.5	842.7	889.9	981.2	1254.8	1627.9	2150.2
2.	Resource utilisation P.U.O.O.		K	£	174.1	207.0	238.6	205.0	217.8	255.8	294.1	340.6	466.9	530.5
3.	Bought-in input P.U.O.O.		B	£	622.7	585.0	598.3	566.5	620.1	623.9	742.6	1041.1	1370.2	1720.7
4.	Average price P.U.O.O. for base and current periods	$\frac{(1)_n+(1)_o}{2}$	A_a	£	814.4	804.9	802.3	793.5	828.6	852.2	897.8	1034.6	1221.2	1482.3
5.	Average resource utilisation for base and current periods	$\frac{(2)_n+(2)_o}{2}$	K_a	£	174.1	190.6	206.4	189.6	196.0	215.0	234.1	257.4	320.5	352.3
6.	Average bought-in input P.U.O.O. for base and current periods	$\frac{(3)_n+(3)_o}{2}$	B_a	£	622.7	603.9	610.5	594.6	621.4	623.3	682.7	831.9	996. 5	1171.7
7.	Deflated gross output	(4) x C	S_d	£M	175.9	167.2	181.6	246.2	276.6	284.8	286.7	289.5	248.8	315.7
8.	Deflated resource utilisation	(5) x C	T_d	£M	37.6	39.6	46.7	58.8	65.4	71.9	74.7	72.0	65.3	75.0
9.	Deflated bought-in input	(6) x C	M_d	£M	134.5	125.4	138.2	184.5	207.4	208.3	218.0	232.8	203.0	249.6
10.	Gross output inded	$\frac{(7)_n}{(7)_o} \times 100$	s	%	100	95.1	103.2	140.0	157.2	161.9	163.0	164.6	141.4	179.5
11.	Resource utilisation index	$\frac{(8)_n}{(8)_o} \times 100$	t	%	100	105.3	124.2	156.4	173.9	191.2	198.7	191.5	173.7	199.5
12.	Bought-in input index	$\frac{(9)_n}{(9)_o} \times 100$	m	%	100	93.2	102.8	137.2	154.2	154.9	162.1	173.1	150.9	185.6

* per unit of output C = output quantity (from Table 6.4)

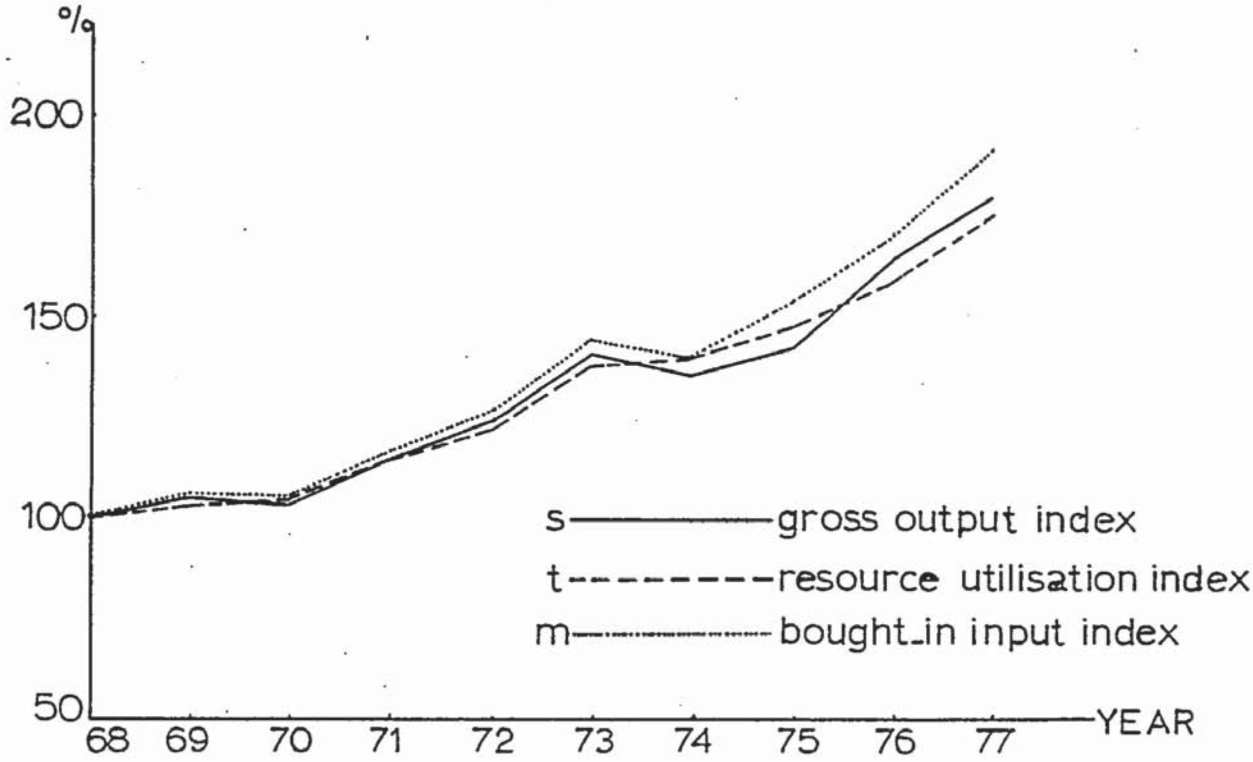

FIG. 6.3 BRITISH LEYLAND

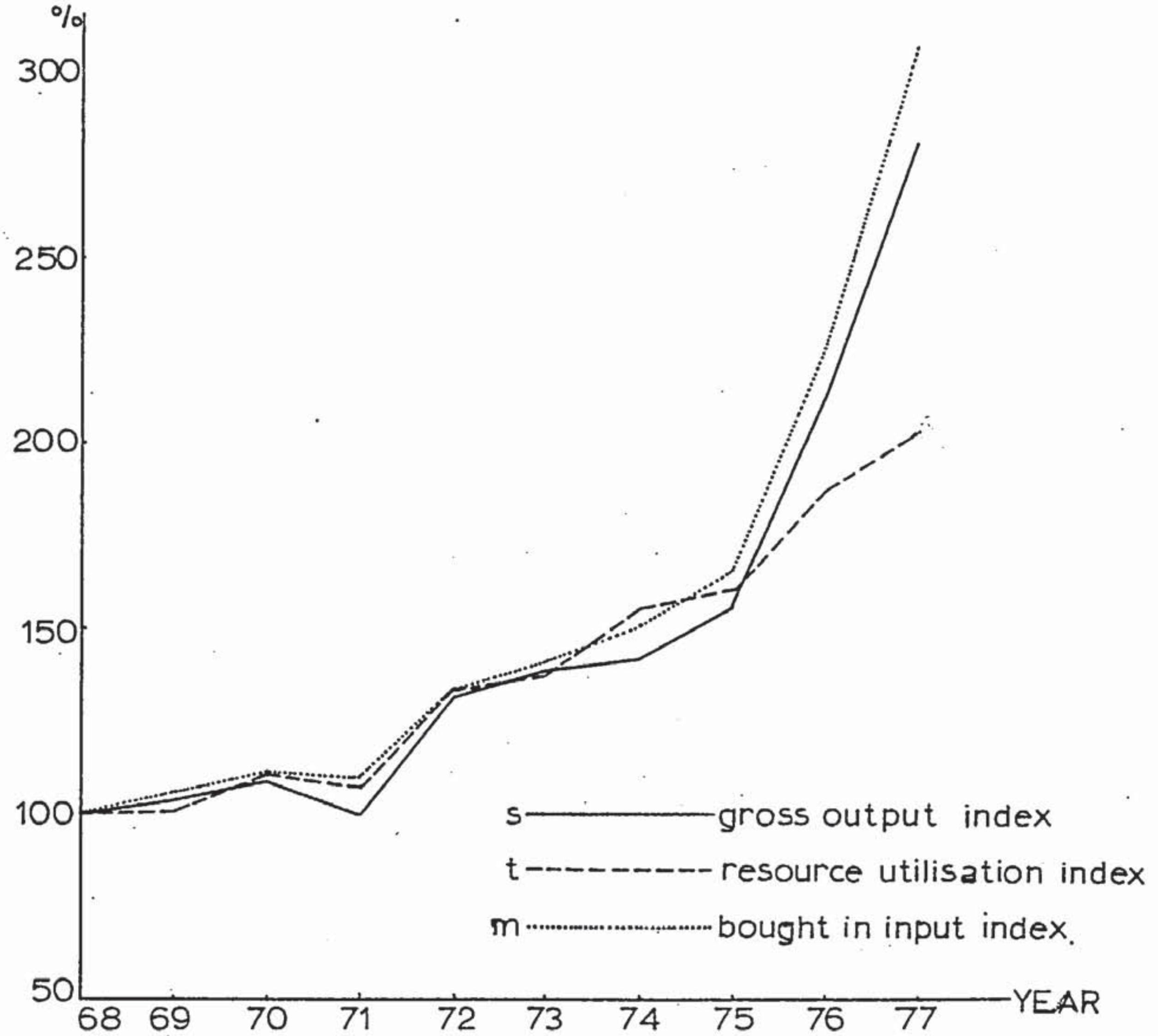

FIG. 6.4 FORD

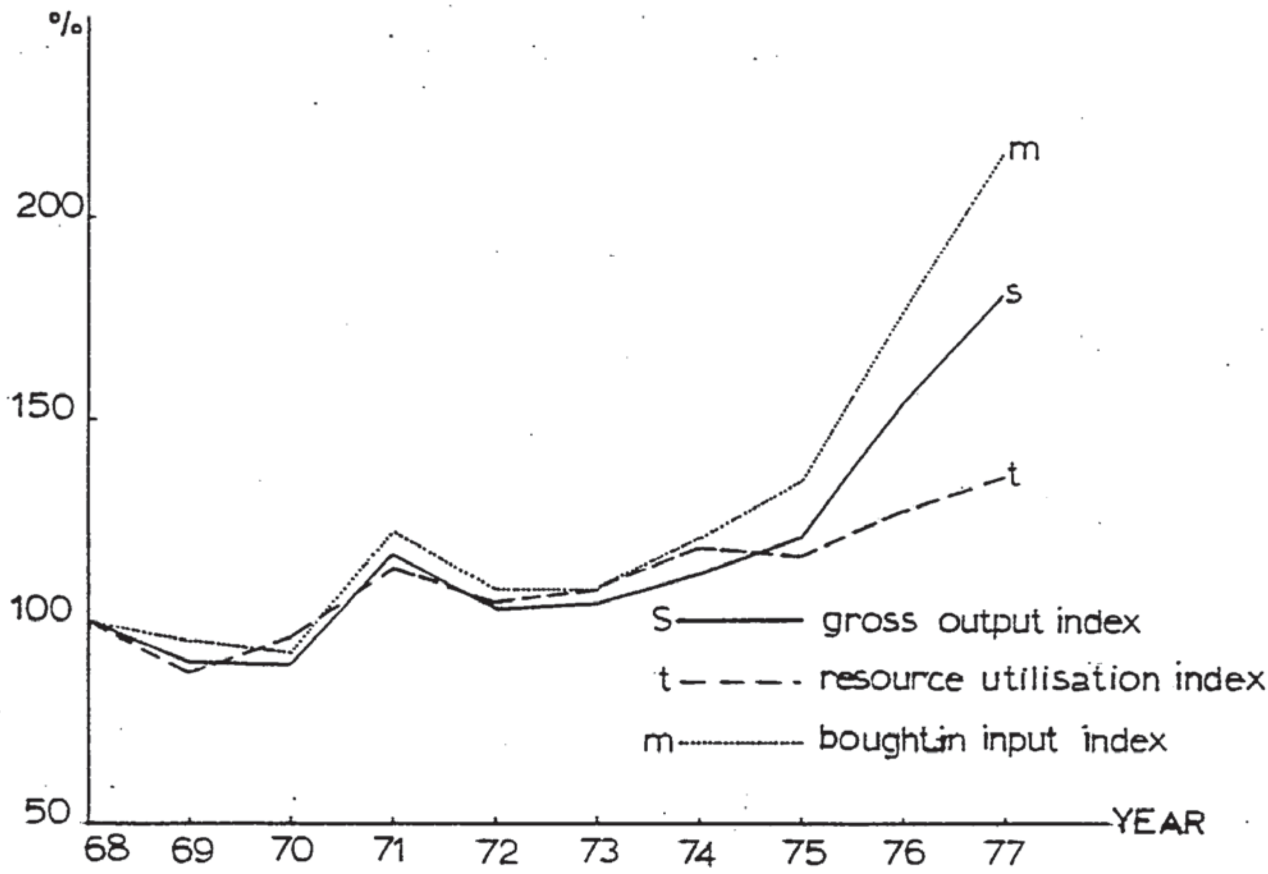

FIG. 6.5 VAUXHALL

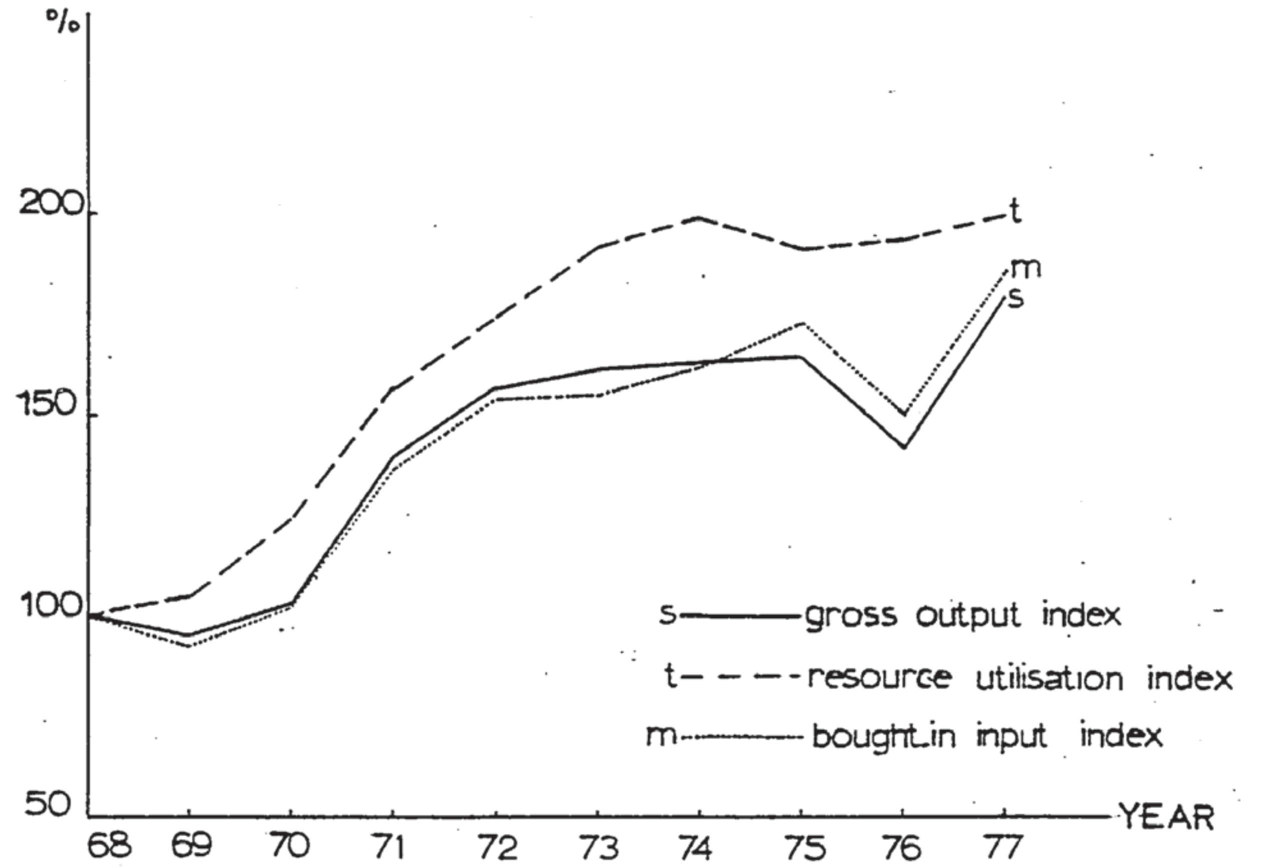

FIG. 6.6 CHRYSLER

6.5 ANALYSIS OF RESULTS

Figure 6.3 illustrating British Leyland shows that the indices of gross output, resource utilisation and bought-in input have all a steady increase over ten years except for 1973 in which the increase is sharp. This sharp increase is compatible with the existing boom for net output in this year represented in figure 6.2 (for B. L.).

Figure 6.4 describes that the change in three indices for Ford are increasing steadily until 1975 with the exception of 1971 in which the low net output represented in figure 6.2 is mostly due to losses incurred. This is because decrease in gross output index is more than two other indices. This steady increase has been continued since 1975 for resources but for the other two the increases are very high rather than steady. Therefore we see more efficient use of resources such as labour and machinery over these periods.

Figure 6.5, giving the indices of Vauxhall, show upward trends which have become sharp since 1975 especially in bought-in input. The 1972 is a bad year for this company since the indices have fallen to lowest level after 1970 which is compatible with the fall of the net output in the same year.

The net output index of Chrysler in figure 6.2 is explained in detail by figure 6.6 in which a great gap between resource utilisation index and other 2 indices, especially over three years 1973-76 represent the inefficient use of the resources, i.e. labour, machinery etc.

6. 6. CONCLUSION

In this chapter the nett output or added value index for four big motor manufacturing companies were computed with the use of the Edgeworth formula to dismiss the price movements, giving the real quantity change in nett output. The more detailed analysis was also made to explain these changes through three other indices i. e. gross output, bought-in materials and total resources. This analysis over 10 years portrays that the situation of Ford is better than the others particularly after 1974. B. L. has a steady growth and better than the other two companies. Chrysler after a four year period of drawback should improve its position and Vauxhall has nearly a flat trend, but it has started improving since 1975.

One should know that these measurements are all related to their own base year and not to a unit standard. Therefore we should less rely on the use of these indices for inter-company comparisons. The next chapter will give the productivity indices which will partly satisfy this requirement.

The use of the Edgeworth formula for price deflation has the advantage over Laspeyres and Paasche in the sense that it does take into account some price change beyond the change due to inflation such as change in cost because of change in characteristics of products. However, it includes the element of error when these changes are not the same relatively for sales components such as materials and resources. Therefore, at least, for detailed analysis one needs to be sure that e. g. quality of materials have improved relative to quality of final products, otherwise the differences need to be adjusted. However such an adjustment makes the formula more complicated and requires a greater amount and more precise data. In chapter eight some adjustment analysis will be discussed for some of these problems.

The analysis of these three component indices of added value gives us a better understanding of the sources of changes in the added value index for above companies which can be used for a better interpretation of results of Figure 6. 2.

CHAPTER 7

PRODUCTIVITY MEASUREMENT AND ANALYSIS BASED ON ADDED VALUE

7.1. PRODUCTIVITY INDICES

The productivity measurement based on the nett output (added value) concept given in this thesis is a ratio in which the nett output can either be related to total or part of the value of resources or to the number of employees and/or labour in particular. It is called overall or total productivity when it relates to total resources and specific (partial*) productivity when it refers to some part of resources, or to number of employees whether labour or total manpower. Thus total productivity can be written as:

$$Y = \frac{V}{T} = \frac{S - M}{R + F + CI}$$

where Y refers to total productivity and other letters are the same as given in previous chapters.

Partial or specific productivities can also be given as:

$PR = \frac{V}{R}$ productivity of remuneration

$PF = \frac{V}{F}$ productivity of facilities

$PC = \frac{V}{CI}$ productivity of capital interest charges

$PE = \frac{V_d}{E}$ productivity of employees

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* S. S. Stephenson (26) calls specific productivity when the denominator of the ratio is only one input and refers to partial productivity when the denominator includes more than one input but not all inputs. However we consider these two terms here the same.

Among these partial productivities the first three have both numerator and denominator in terms of value for the same period but in the last one only the numerator is in terms of value. Therefore the added value used for the last one is the deflated added value discussed in Chapter 6.

Each of the above ratios can be still broken down into two or more ratios. For example the productivity of remuneration can be divided into productivity of wages belonging to labour and productivity of salaries belonging to white collar employees. The first one can again be broken down into productivities of direct and indirect wages. This analysis can be continued until any part of resources is taken separately as a partial productivity.

For the purpose of comparison one needs to divide either the productivity in the present period to that of the base period or the productivity of one place to that of another place. This is what is called productivity index. It is easier to compare the productivity measurements over a number of periods when they are represented as a percentage of base period as it was in the previous chapter. Therefore if suffixes o and n are used to show the base and current period respectively as before, the total productivity index can be written as:

$$y = \frac{Y_n}{Y_o} \times 100 = \frac{V_n/T_n}{V_o/T_o} \times 100 = \frac{V_n \; T_o}{T_n \; V_o} \times 100$$

similar formulae can be written for partial productivity indices*

as follows:

$$YR = \frac{PR_n}{PR_o} \times 100$$ Productivity index of remuneration

$$YF = \frac{PF_n}{PF_o} \times 100$$ Productivity index of facilities

$$YC = \frac{PC_n}{PC_o} \times 100$$ Productivity index of capital interest charges

$$YE = \frac{PE_n}{PE_o} \times 100$$ Productivity index of manpower

It is important to know that manpower productivity is the more commonly used criterion in inter-firm as well as inter-industry comparisons, both nationally and internationally. In this case the denominator is the number of men which is more commonly used criterion. However it tells only part of the story because it does not include capital and other resources.

Tables 7.1 to 7.4 show the productivity indices, both total and partial, for four major motor manufacturing companies and Figs. 7.1 to 7.6 are the graphical representation of these tables, using the same sources of data given in previous chapters.

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*Einar Hardin (49) refers to these kinds of indices, in which the ratio of nett output to resources or employees are used over a number of periods instead of net output itself, as Pesek method since they compare productivity data instead of output data. However he has used different formula from those used here and his method is concerned with productivity growth index rather than productivity index.

TABLE 7.1 - PRODUCTIVITY INDICES OF BRITISH LEYLAND

No.	DESCRIPTION		SUBSCRIPTS	UNITS	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
1.	Productivity of remuneration	V/R	PR	-	1.35	1.34	1.20	1.30	1.24	1.24	1.13	1.03	1.25	1.18
2.	Productivity of Facilities	V/F	PF	-	7.96	8.31	7.84	8.44	9.73	11.52	11.96	10.57	12.15	11.59
3.	Productivity of capital interest charges	V/CI	PC	-	44.20	65.57	33.63	29.26	48.65	78.97	32.18	14.97	20.76	15.51
4.	Productivity of Manpower*	V_d/E	PE	£000's	1784.8	1766.8	1657.1	1953.0	2105.3	2244.5	2109.2	2190.6	2823.9	2781.6
5.	Productivity of total resources	V/T	Y	-	1.13	1.13	1.01	1.08	1.08	1.10	1.00	.88	1.08	1.00
6.	Productivity index of remuneration	$\frac{(1)_n}{(1)_o} \times 100$	YR	%	100	99.3	88.9	96.3	91.9	91.9	83.7	76.3	92.6	87.4
7.	Productivity index of facilities	$\frac{(2)_n}{(2)_o} \times 100$	YF	%	100	104.4	98.5	106.0	122.2	144.7	150.3	132.8	152.6	145.6
8.	Productivity index of capital interest charges	$\frac{(3)_n}{(3)_o} \times 100$	YC	%	100	148.3	76.1	66.2	110.1	178.7	72.8	33.9	47.0	35.1
9.	Productivity index of manpower	$\frac{(4)_n}{(4)_o} \times 100$	YE	%	100	99.0	92.8	109.4	118.0	125.8	118.2	122.7	158.2	155.8
10.	Total Productivity index	$\frac{(5)_n}{(5)_o} \times 100$	y	%	100	100.	89.4	95.6	95.6	97.3	88.5	77.9	95.6	88.5

*deflated net output or added value over number of employees

TABLE 7.2 - PRODUCTIVITY INDICES OF FORD

No.	DESCRIPTION		SUBSCRIPTS	UNITS	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
1.	Productivity of remuneration	V/R	PR	-	1.72	1.66	1.44	1.11	1.52	1.56	1.28	1.30	1.59	1.92
2.	Productivity of Facilities	V/F	PF	-	6.57	6.32	6.97	4.46	7.27	8.80	8.19	8.54	10.79	12.35
3.	Productivity of capital interest charges	V/CI	PC	-	38.0	36.04	32.83	13.34	28.32	27.97	15.52	13.85	27.16	38.94
4.	Productivity of Manpower*	V_d/E	PE	£000's	2927.9	2700.0	2713.4	2081.4	3228.6	3377.5	3197.1	3613.4	4901.5	5912.7
5.	Productivity of total resources	V/T	Y	-	1.32	1.27	1.15	.83	1.21	1.27	1.03	1.04	1.32	1.59
6.	Productivity index of remuneration	$\frac{(1)_n}{(1)_o} \times 100$	YR	%	100.	96.5	83.7	64.5	88.4	90.7	74.4	75.6	92.4	111.6
7.	Productivity index of facilities	$\frac{(2)_n}{(2)_o} \times 100$	YF	%	100.	96.2	106.1	67.9	110.7	133.9	124.7	130.0	164.2	188.0
8.	Productivity index of capital interest charges	$\frac{(3)_n}{(3)_o} \times 100$	YC	%	100.	94.8	86.4	35.1	74.5	73.6	40.8	36.4	71.5	102 .5
9.	Productivity index of Manpower	$\frac{(4)_n}{(4)_o} \times 100$	YE	%	100.	92.2	92.7	71.1	110.3	115.4	109.2	123.4	167.4	201.9
10.	Total productivity index	$\frac{(5)_n}{(5)_o} \times 100$	y	%	100.	96.2	87.1	62.9	91.7	96.2	78.0	78.8	100.	120.5

*deflated net output or added value over number of employees

TABLE 7. 3 - PRODUCTIVITY INDICES OF VAUXHALL

No.	DESCRIPTION		SUBSCRIPTS	UNITS	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
1.	Productivity of remuneration	V/R	PR	-	1.63	1.33	1.17	1.31	1.22	1.21	1.09	1.17	1.22	1.15
2.	Productivity of Facilities	V/F	PF	-	4.22	4.52	4.57	5.99	5.32	5.75	5.53	6.52	7.86	10.47
3.	Productivity of Capital interest charges	V/CI	PC	-	25.56	17.58	15.73	20.78	22.77	24.64	12.4	9.70	14.59	19.66
4.	Productivity of Manpower*	V_d/E	PE	£000's	2247.3	1906.3	1898.1	2356.6	2282.8	2331.4	2398.8	2746.6	3405.0	3341.1
5.	Productivity of total resources	V/T	Y	-	1.12	.97	.88	1.02	.95	.96	.85	.90	.99	.99
6.	Productivity index of remuneration	$\frac{(1)_n}{(1)_o} \times 100$	Yr	%	100.	81.6	71.8	80.4	74.8	74.2	66.9	71.8	74.8	70.6
7.	Productivity index of facilities	$\frac{(2)_n}{(2)_o} \times 100$	YF	%	100.	107.1	108.3	141.9	126.1	136.3	131.0	154.5	186.3	248.1
8.	Productivity index of capital interest charges	$\frac{(3)_n}{(3)_o} \times 100$	YE	%	100	68.8	61.5	81.3	89.1	96.4	48.5	37.9	57.1	76.9
9.	Productivity index of manpower	$\frac{(4)_n}{(4)_o} \times 100$	YE	%	100	84.8	84.5	104.9	101.6	103.7	106.7	122.2	151.5	148.7
10.	Total productivity Index	$\frac{(5)_n}{(5)_o} \times 100$	y	%	100	86.6	78.6	91.1	84.8	85.7	75.9	80.4	88.4	88.4

*deflated net output or added value over number of employees.

TABLE 7.4 - PRODUCTIVITY INDICES OF CHRYSLER

No.	DESCRIPTION		Subs.	Units	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
1.	Productivity of Remuneration	V/R	PR	-	1.40	1.20	.97	1.21	1.18	1.18	.95	.74	.68	1.02
2.	Productivity of Facilities	V/F	PF	-	5.75	8.57	7.23	9.40	10.46	11.70	10.73	8.79	6.65	9.24
3.	Productivity of Capital Interests Charges	V/CI	PC	-	46.0	27.31	14.0	16.38	30.96	31.75	12.29	7.67	5.25	6.83
4.	Productivity of Manpower*	V_d/E	PE	£000's	1703.7	1645.7	1566.8	2164.9	2402.8	2475.7	1717.5	1996.5	2223.3	2903.5
5.	Productivity of Total Resources	V/T	Y	-	1.10	1.02	.80	1.00	1.02	1.04	.81	.63	.55	.81
6.	Productivity index of remuneration	$\frac{(1)_n}{(1)_o} \times 100$	YR	%	100	85.7	69.3	86.4	84.3	84.3	67.9	52.9	48.6	72.9
7.	Productivity index of facilities	$\frac{(2)_n}{(2)_o} \times 100$	YF	%	100	149.0	125.7	163.5	181.9	203.5	186.6	152.9	115.7	160.7
8.	Productivity index of capital interest charges	$\frac{(3)_n}{(3)_o} \times 100$	YC	%	100	59.4	30.4	35.6	67.3	69.0	26.7	16.7	11.4	14.8
9.	Productivity index of manpower	$\frac{(4)_n}{(4)_o} \times 100$	YE	%	100	96.6	92.0	127.1	141.0	145.3	100.8	117.2	130.5	170.4
10.	Total productivity index	$\frac{(5)_n}{(5)_o} \times 100$	y	%	100	92.7	72.7	90.9	92.7	94.5	73.6	57.3	50.0	73.6

*Deflated nett output or added value over number of employees

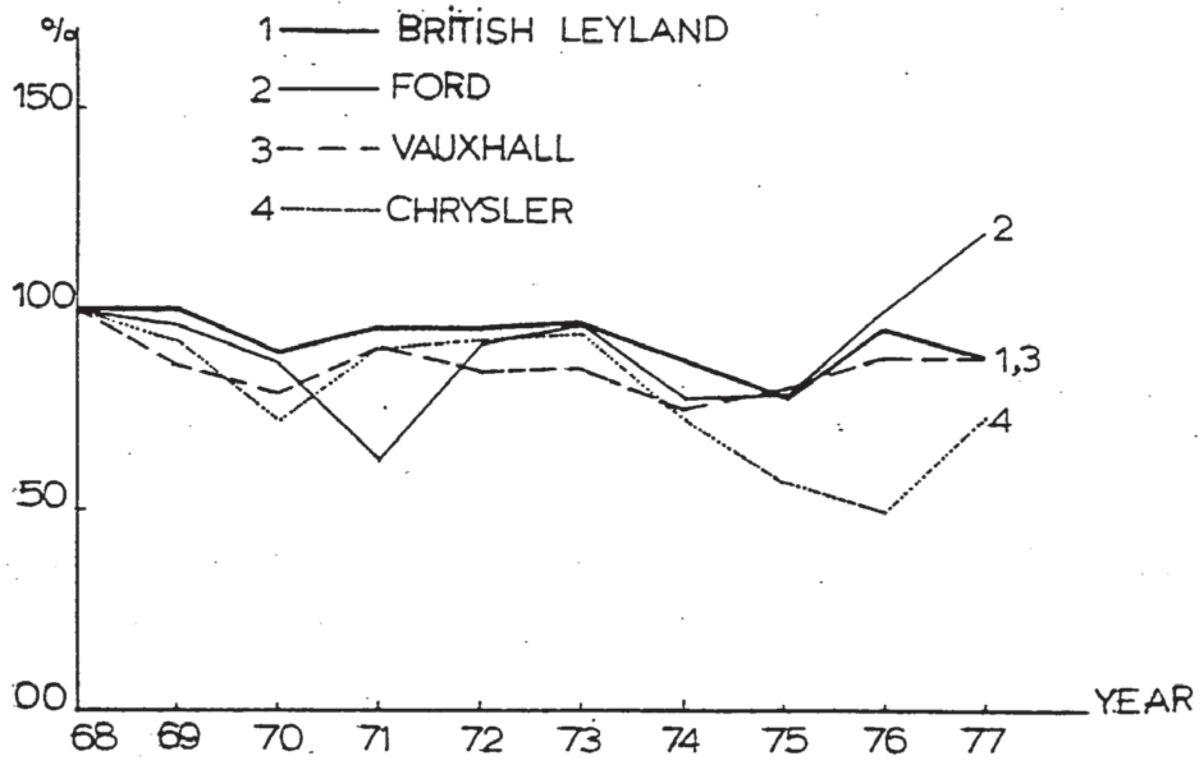

FIG. 7.1 total productivity index for 4 companies over 10 years

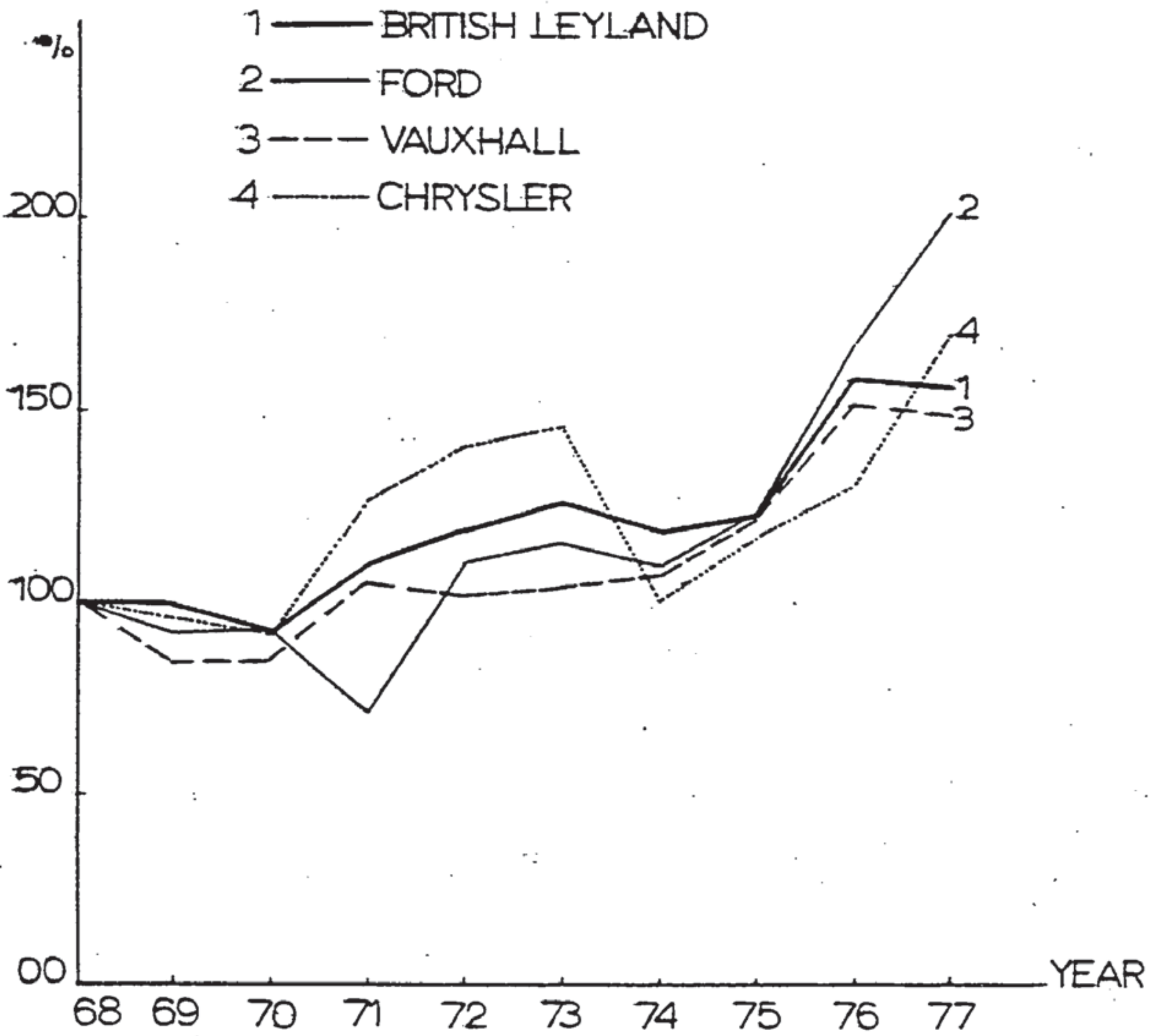

FIG. 7.2 manpower productivity index for 4 companies over 10 years (using deflated added value)

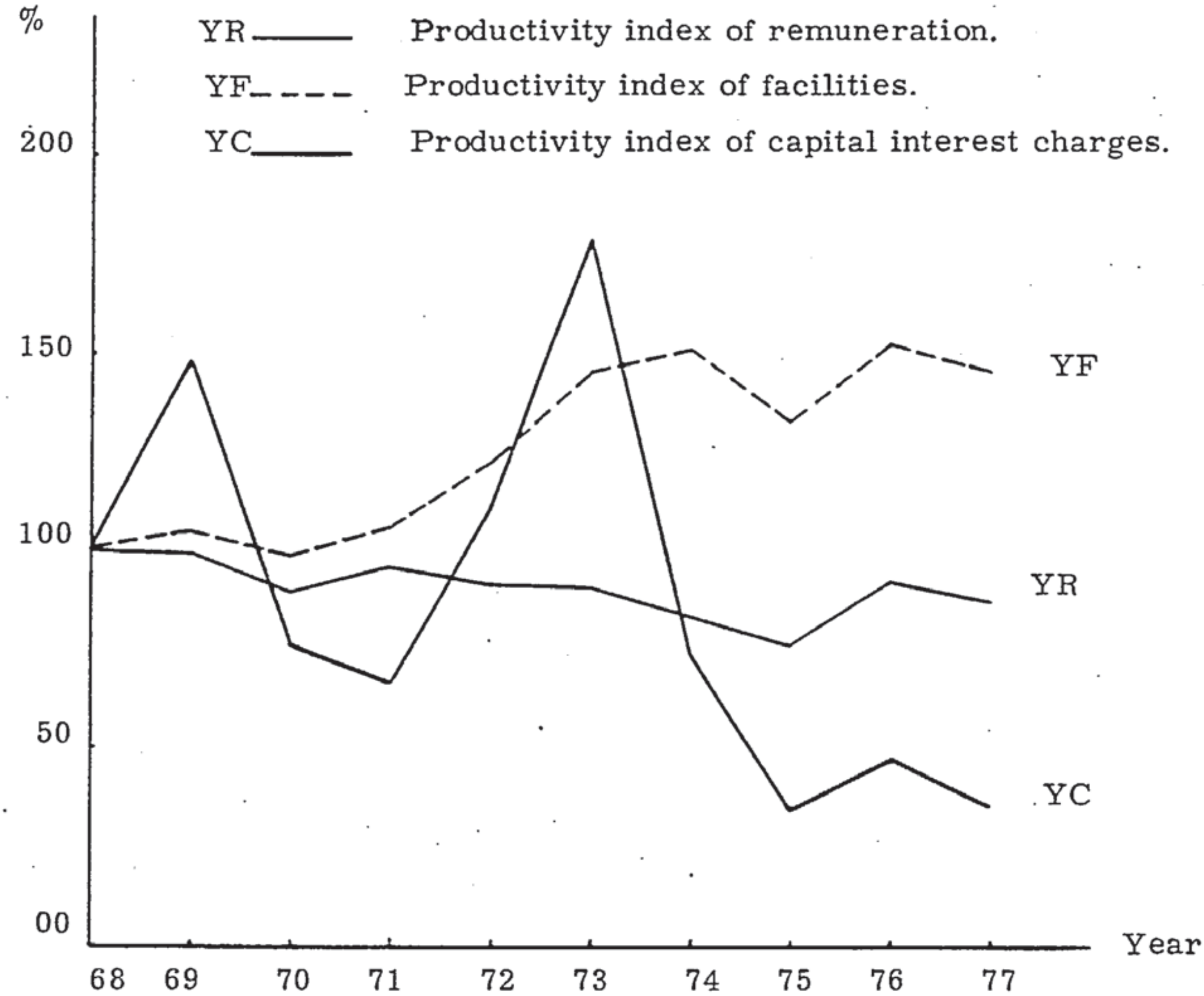

Fig. 7.3 - 3 PARTIAL PRODUCTIVITY INDICES OF B. L.

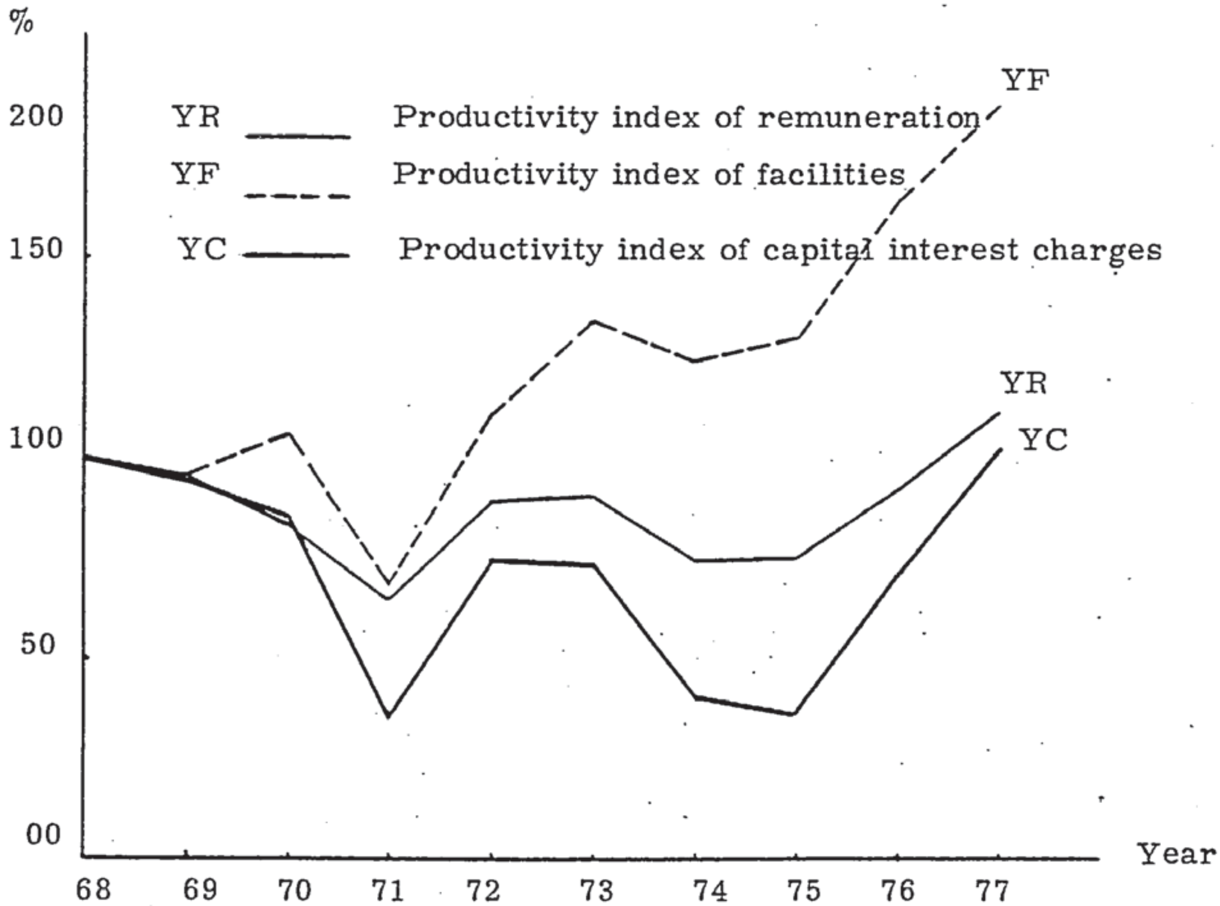

Fig. 7.4 - 3 PARTIAL PRODUCTIVITY INDICES OF FORD.

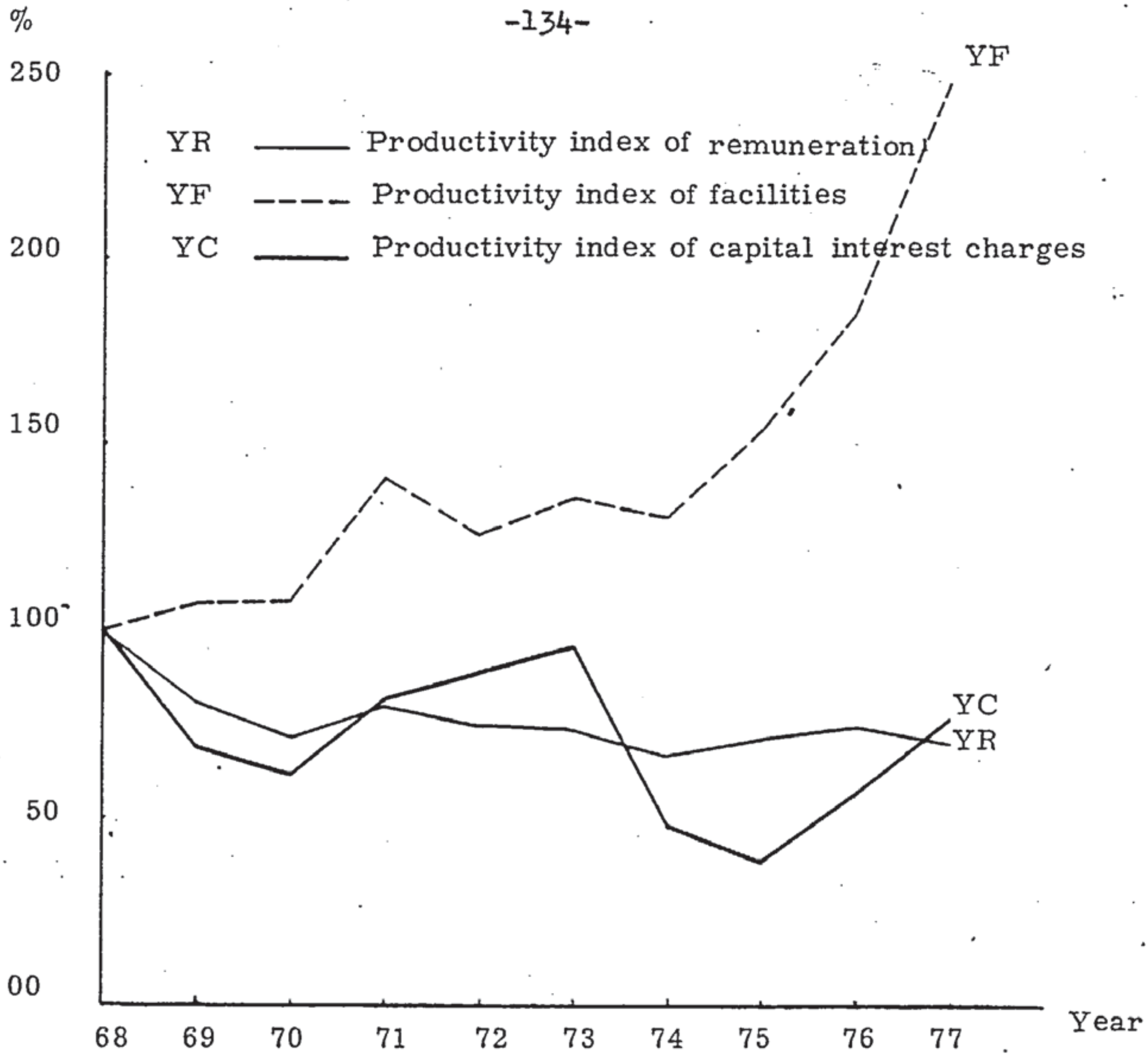

Fig. 7.5-3 PARTIAL PRODUCTIVITY INDICES OF VAUXHALL

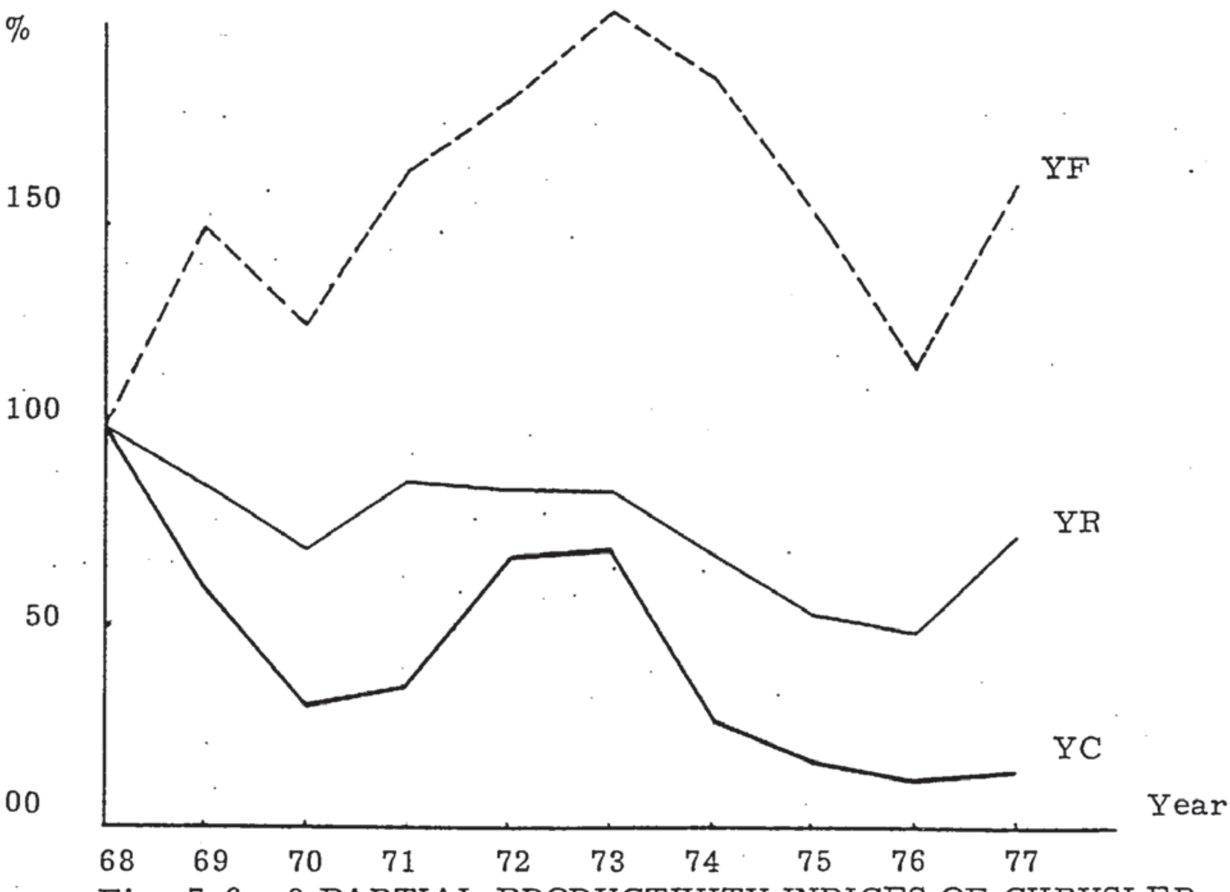

Fig. 7.6 - 3 PARTIAL PRODUCTIVITY INDICES OF CHRYSLER.

7. 2. ANALYSIS OF RESULTS

Figure 7. 1 shows that Ford has the best productivity index in 1977 and its trend is upward. B. L. and Vauxhall are behind Ford and their indices for 1977 are the same but the direction of the first one for the last period is downward whereas the direction of the second one for the last period is steady. Chrysler has the least productivity index in 1977 although it has increased with respect to the previous period. Taking the five past years, the worst period for B. L. and Ford is 1975 whereas for Vauxhall and Chrysler it is 1974 and 1976 respectively.

Referring to partial productivity indices it is possible to determine the contribution of different parts of resources to productivity changes. The improvements of manpower productivity in Fig. 7. 2 does not necessarily mean that the efficiency of manpower has grown because the remuneration productivity indices in Figs. 7. 3 to 7. 6 represent the opposite situations except for Ford. This means that although the net output or added value per man is increased in all companies, it comes not from the manpower but from other parts of resources because the trend of net output or added value over remuneration, for all but Ford, have been decreased during the past ten years. Therefore from the figures 7. 3 to 7. 6 it can be seen that the improvements in total productivity index is due to increase in productivity index of facilities such as depreciation, -amortisation, hire of plant and machinery (mainly computer) etc.

Partial productivities represent also two important points with respect to results. Firstly change in remuneration is not justified with change in added value. In fact the remuneration goes up more rapidly than added value, and this is the most serious part which for some years has kept the productivity of the British Motor Industry down. Secondly the productivity of capital interest charges is the most fluctuating partial productivity. This relates to additional capital required in different parts of the company due to price increases and also it is connected to the rate of interests and availability of capital in the market.

7.3. EXTENDING PRODUCTIVITY MEASURE INTO COMPONENT VARIABLES

In the preceeding pages of this chapter productivity is discussed with respect to major variables i. e. added value, remuneration, facilities and capital interest charges. The analysis should be continued for each variable if a precise understanding is to be had about the different changes which take place. For example when there is a change in total remuneration it should be determined whether this change relates to total number of employees, level of payments or both. Similarly when the sales revenue is changed one needs to know whether it is due to variation in unit price, the output quantity or both, and by how much. Therefore the formula of productivity can be broken down into more component variables as follows:

$$Y = \frac{S - M}{R+F+CI} = \frac{A.C - B.C}{D.E + G.C + H.C}$$

where the letters, not determined earlier are as follows:

A = Average price per unit of output.

B = Cost of bought-in input per unit of output.

C = Total output quantity.

D = Average remuneration per employee per year.

E = Total number of employees.

G = Facilities cost per unit of output.

H = Capital interest charges per unit of output.

This detailed analysis can be applied to the above 4 companies to represent a clear perspective of the amount and kind of change. Tables 7.5 to 7.8 and Figs. 7.7 to 7.10 illustrate the detailed data as a percentage of base period and the graphical representation of data respectively for the 4 above companies. The data are taken from tables 6.1 to 6.4.

These component variables are not deflated and therefore their sharp increases are mostly due to inflation. Reluctance to deflate the variables in this analysis is due to difficulties in selecting a comprehensive formula which can separate reasonably the real change from inflationary change.

TABLE 7.5 - BRITISH LEYLAND - DETAILED DATA AS % OF BASE PERIOD (1968)

Serial No.	DESCRIPTION	SUBSCRIPTS	UNITS	1968*	1969	1970	1971	1972	1973	1974	1975	1976	1977
1.	Price per unit of output	A	%	100.	103.69	120.12	128.91	131.59	155.95	181.03	255.92	341.25	383.72
2.	Cost of bought-in input per unit of output	B	%	100.	105.68	126.05	131.95	136.76	161.38	188.33	282.70	358.16	414.73
3.	Total output quantity	C	%	100.	103.14	93.71	100.67	107.33	110.57	97.14	80.48	74.76	74.76
4.	Average remuneration per employee per year	D	%	100.	101.56	123.82	128.92	133.71	160.11	201.07	276.86	337.36	378.80
5.	Total number of employees	E	%	100.	104.36	106.00	102.92	101.38	108.45	110.41	101.75	97.45	103.40
6.	Facilities per unit of output	G	%	100.	96.03	111.77	116.76	100.45	101.37	112.21	158.42	204.76	227.26
7.	Capital interest charges per unit of output	H	%	100	67.61	144.62	186.91	111.56	82.11	231.62	621.30	665.27	943.35

*Base Period

TABLE 7.6 - FORD - DETAILED DATA AS % OF BASE PERIOD (1968)

Serial No.	DESCRIPTION	SUBSCRIPTS	UNITS	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
1.	Price per unit of output	A	%	100.	115.22	126.44	156.25	164.64	192.70	234.58	313.25	368.72	464.30
2.	Cost of bought-in input per unit of output	B	%	100.	120.84	133.59	182.26	170.27	197.93	256.65	343.12	401.07	517.10
3.	Total output quantity	C	%	100.	95.65	95.08	77.25	99.30	94.66	84.55	75.00	90.45	99.44
4.	Average remuneration per employee per year	D	%	100.	109.49	136.71	172.52	175.19	202.41	265.17	347.03	339.14	334.86
5.	Total number of employees	E	%	100.	106.56	109.84	114.75	114.75	116.39	114.75	109.84	111.48	116.39
6.	Facilities per unit of output	G	%	100.	109.55	107.49	163.72	139.95	137.10	157.41	200.98	190.23	198.17
7.	Capital interest charges per unit of output	H	%	100.	111.23	132.02	316.75	207.84	249.49	480.64	717.73	437.53	363.75

TABLE 7.7 - VAUXHALL - DETAILED DATA AS % OF BASE PERIOD (1968)

Serial No.	DESCRIPTION	SUBSCRIPTS	UNITS	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
1.	Price per unit of output	A	%	100.	108.65	118.28	132.11	149.08	165.02	195.25	287.92	339.27	407.31
2.	Cost of bought-in input per unit of output	B	%	100.	120.50	126.02	143.40	160.12	174.51	217.03	330.15	404.44	505.16
3.	Total output Quantity	C	%	100.	86.81	82.01	100.67	82.92	78.63	75.93	62.40	69.97	71.19
4.	Average remuneration per employee per year	D	%	100.	109.23	146.96	141.68	174.18	201.66	237.96	305.50	308.90	348.40
5.	Total number of employees	E	%	100.	96.70	99.73	102.47	94.23	94.51	92.31	81.32	76.65	82.97
6.	Facilities per unit of output	G	%	100.	83.13	97.43	79.88	103.82	109.48	121.52	141.25	124.50	99.20
7.	Capital interest charges per unit of output	H	%	100.	129.60	171.48	139.69	146.98	154.99	329.26	575.91	406.43	320.47

TABLE 7.8 - CHRYSLER - DETAILED DATA AS % OF BASE PERIOD (1968)

Serial No.	DESCRIPTION	SUBSCRIPTS	UNITS	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
1.	Price per unit of output	A	%	100.	97.67	97.02	94.86	103.48	109.28	120.49	154.09	199.90	264.02
2.	Cost of bought-in input per unit of output	B	%	100.	93.94	96.09	90.99	99.59	100.19	119.25	167.20	220.04	276.33
3.	Total Output Quantity	C	%	100	96.16	104.77	143.66	154.54	154.72	147.82	129.54	94.31	98.61
4.	Average remuneration per employee per year	D	%	100.	127.97	145.28	124.83	138.63	164.54	184.83	211.18	277.50	308.35
5.	Total number of employees	E	%	100.	104.53	113.99	117.28	118.52	127.16	164.61	116.87	84.77	93.83
6.	Facilities per unit of output	G	%	100.	73.66	79.54	65.74	63.81	68.22	66.71	72.91	116.35	139.44
7.	Capital interest charges per unit of output	H	%	100	184.88	328.77	301.64	172.56	201.08	466.02	669.05	1178.20	1509.86

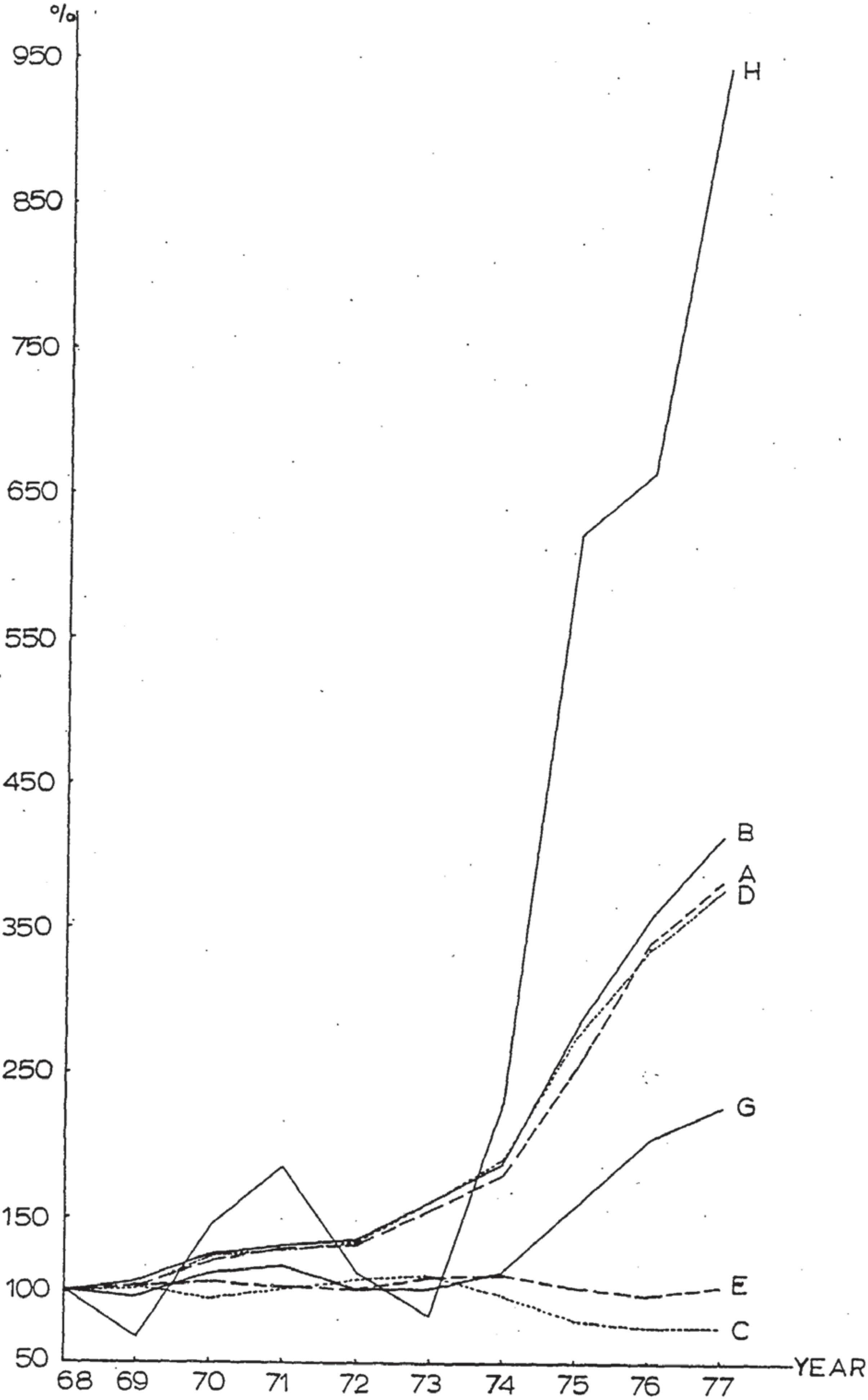

Fig. 7·7 BRITISH LEYLAND

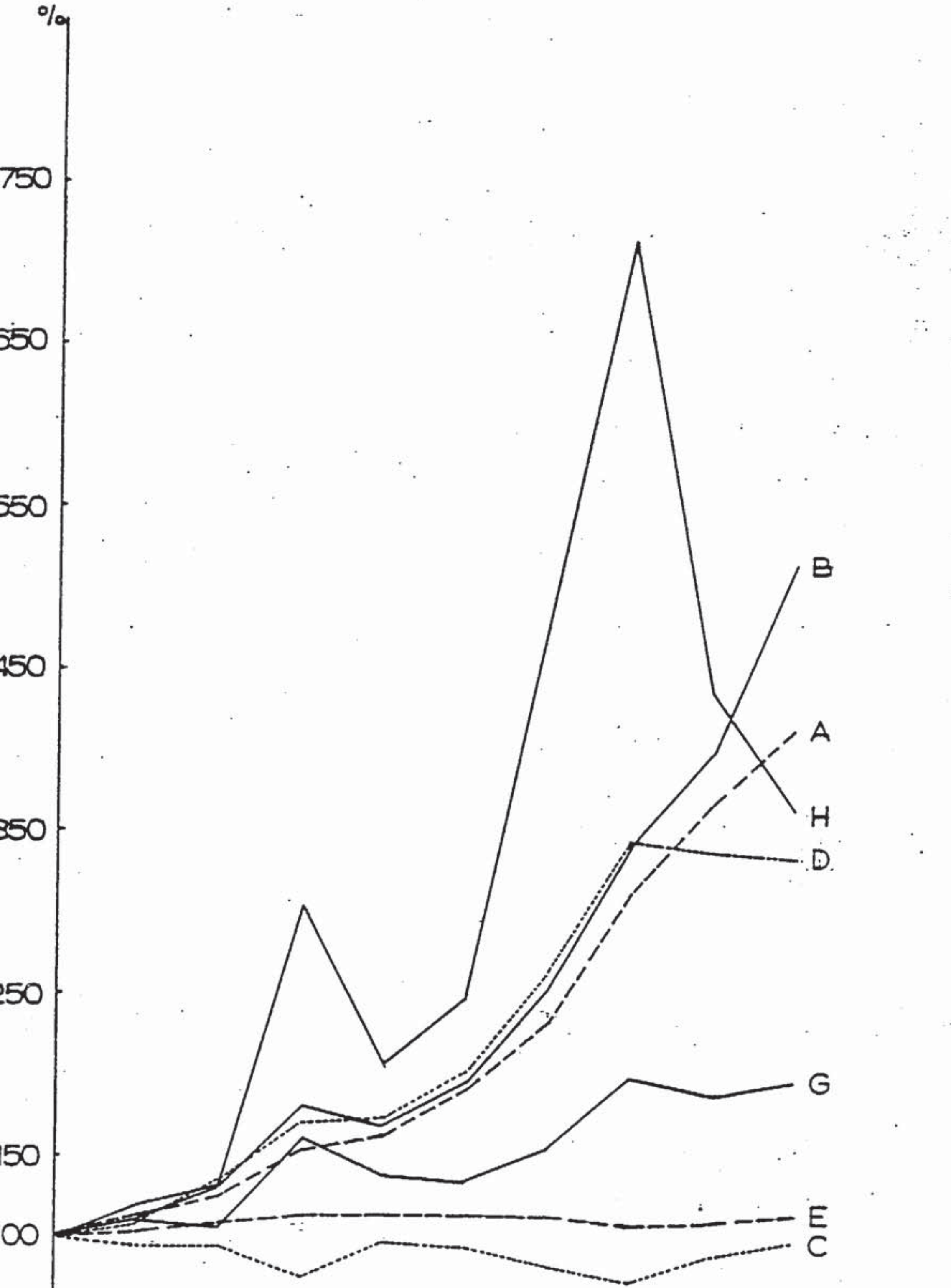
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Fig. 7.8 FORD

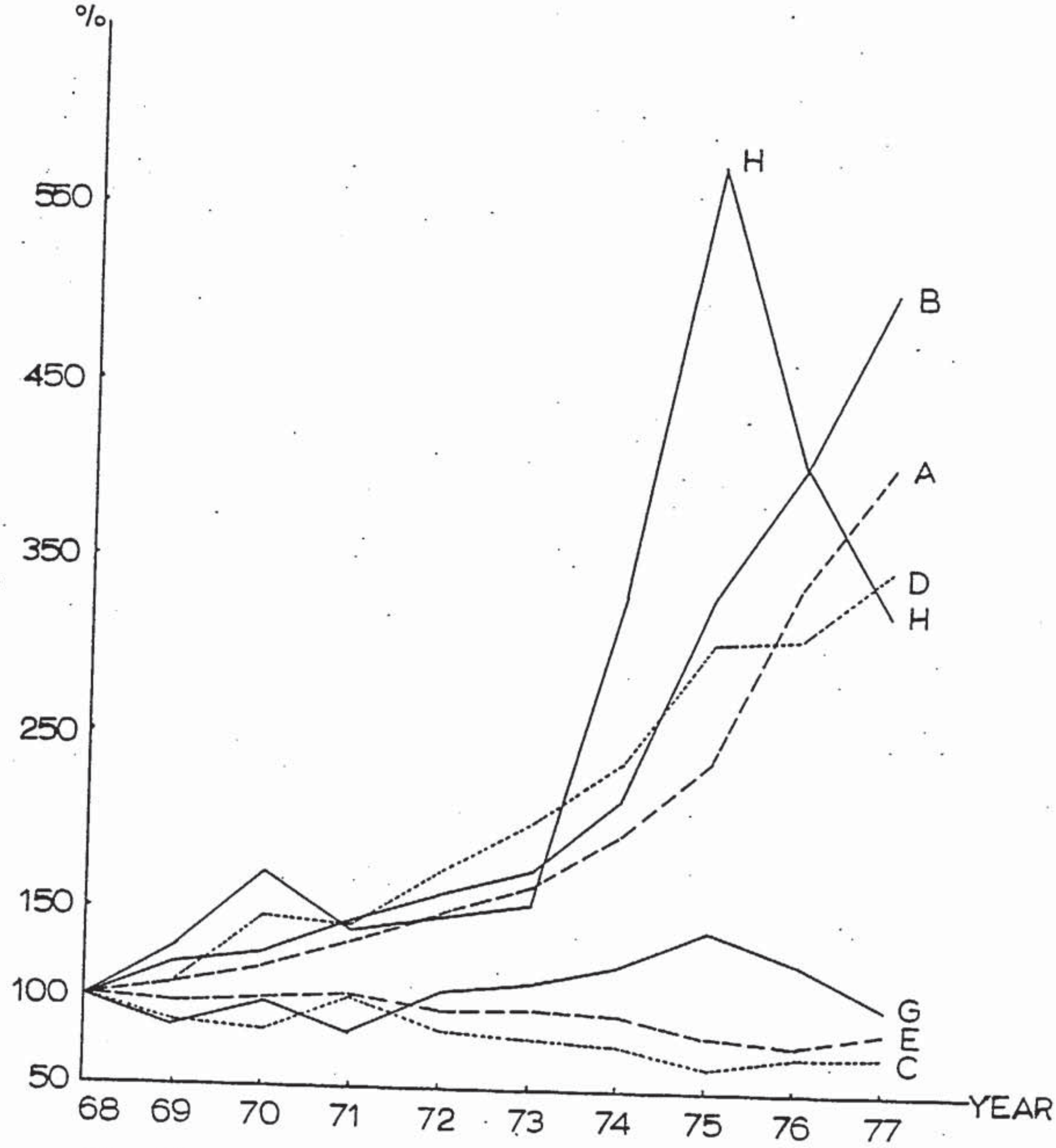
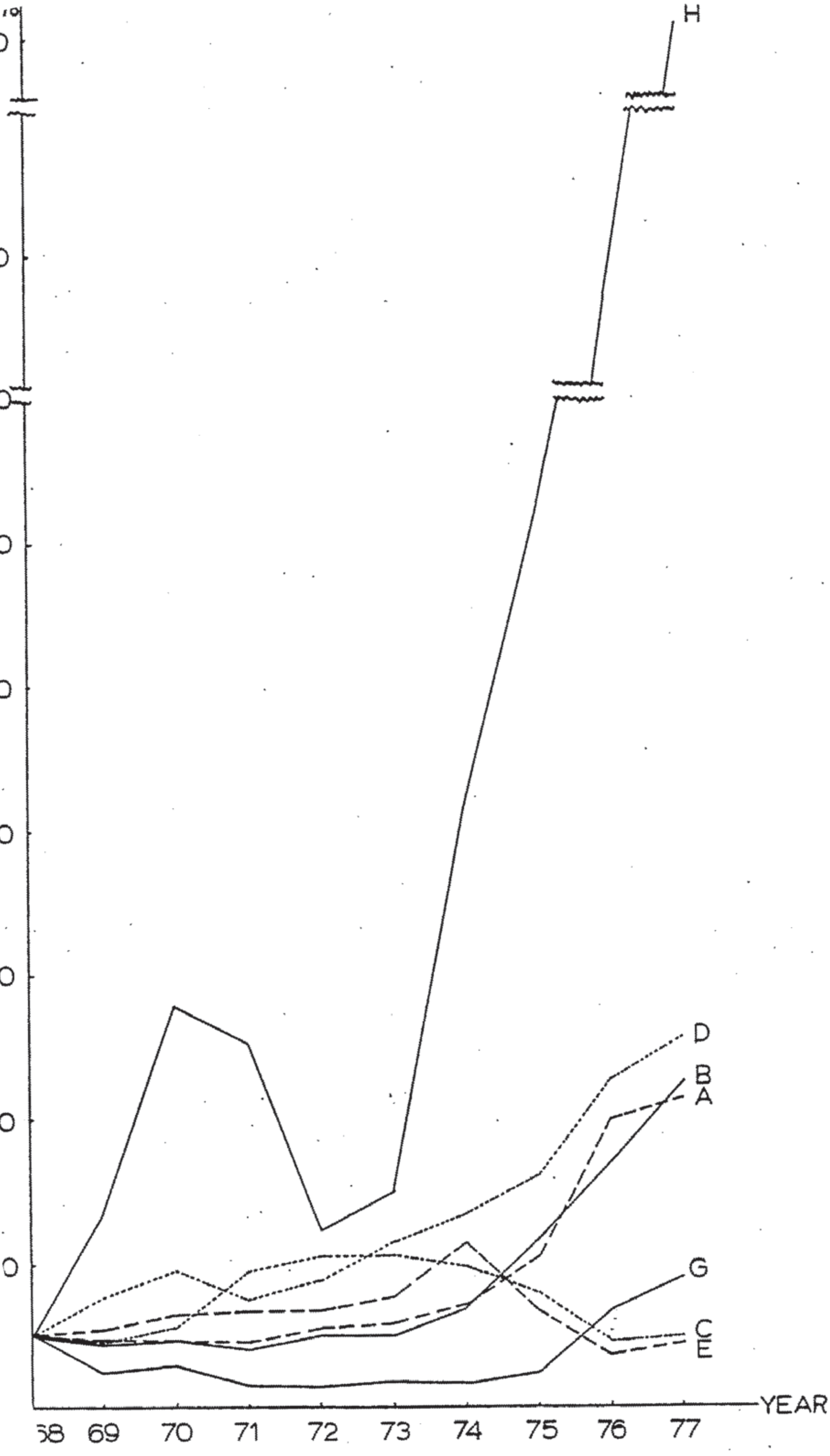


Fig. 7.9 VAUXHALL



7·10 CHRYSLER

7.4. ANALYSIS OF COMPONENT VARIABLES

The change in all variables except E and C (the number of employees and the output quantiy) are partly due to inflation particularly after 1973 where there are sharp increases. The following results can be seen from the Figs. 7.7 to 7.10.

1 - Knowing that the British motor industry consists mainly of four big motor companies discussed earlier, it is clear from the figures that the output quantity (C) of the industry as a whole has a downward trend and this is one of the most important reasons of having low productivity in the industry.

2 - The component variable H, i.e. the capital interest charge for one unit of output is the most fluctuating component and it has a tremendous rise after 1973 which relates mostly to the inflationary economic market and the need for more working capital due to rises in raw material costs specially energy.

3 - The direction of change in component E between 1974 and 1976 for all companies especially Chrysler, is downward. This is in fact the start of reduction in employment in this industry as well as other industries. However from 1976 it started to rise due to rise in output production and improvement in the economic market.

4 - The components A, B and D have a sharp upward trend in all companies especialy during years 1972 - 1976. In fact the rise in these three components which are units of sales, bought-in output and

remuneration have high positive correlation with each other mostly resulting from inflation.

5 - The facilities cost per unit of output, G. in Ford and Vauxhall have fallen after 1975, but in B. L., due to renewal of part of its machinery and in Chrysler, due to poor utilisation of machinery, they have risen.

7.5. PRODUCTIVITY YARDSTICK

A variety of measurements have been used for measuring company performance so that comparisons with other organisations can be made, such as return on investment, output per employee, dividend per share, added value per employee etc. each of them have some limitations which have been discussed mostly in chapter three.

Productivity of total resources based on the added value concept which is analysed in this chapter is a valid basis not only for measuring a company's efficiency over a number of periods, but also as a yardstick for inter-firm or inter-plant comparisons.

W. S. Smith (71) initially used this method by dividing the area of the productivity diagram into three zones, as wealth zone, survival zone and collapse zone with respect to the total productivity with value more than 1.3 between 1.0 and 1.3 and less than 1.0 respectively. This analysis comes from the fact that the total productivity is profit over total resources plus one. Therefore as W. S. Smith describes 'the wealth zone means that the manufacturing margins likely to be made at this level of productivity will be higher than needed for reinvestment, and hence surplus funds will be made. Performance in the survival zone indicates that funds for investment are being made, but may or may not be sufficient for reinvestment requirements- the collapse zone represents the productivity level which would achieve no manufacturing margin, and any investment must come from the previous year's surplus or from external sources. '

Looking at Fig. 7.-11 drawn from Table 7. 9, it is clear that only Ford from 1976 has been entered in the wealth zone and in 1977 its productivity is 1. 59 which is high and indicates its ability to make funds more than its requirements for reinvestment. British Leyland, in 1977 is on the border line of survival and any decrease in its productivity bring it to the collapse zone. Vauxhall, having been in collapse zone for more than five years has got near the border line of survival and still needs funds from outside sources to reinvest. Finally Chrysler has the worst situation and although in 1977 had a high improvement with respect to 1976 its productivity is 0. 81 which is very low in the collapse zone and needs a lot of funds for reinvestment from external sources to survive.

This analysis is compatable with the analysis which has been carried out earlier in this chapter. In chapter nine of this thesis the productivity of total resources with respect to its component variables i. e. A, B, C, D, E, G and H which are discussed here, has been used for productivity forecasting and planning.

Year	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Year Number	1	2	3	4	5	6	7	8	9	10
British Leyland	1.13	1.13	1.01	1.08	1.08	1.10	1.00	.88	1.08	1.00
Ford	1.32	1.27	1.15	.83	1.21	1.27	1.03	1.04	1.32	1.59
Vauxhall	1.12	.97	.88	1.02	.95	.96	.85	.90	.99	.99
Chrysler	1.10	1.02	.80	1.00	1.02	1.04	.81	.63	.55	.81

TABLE 7.9 - TOTAL PRODUCTIVITY OF FOUR COMPANIES (TAKEN FROM TABLES 7.1. TO 7.4).

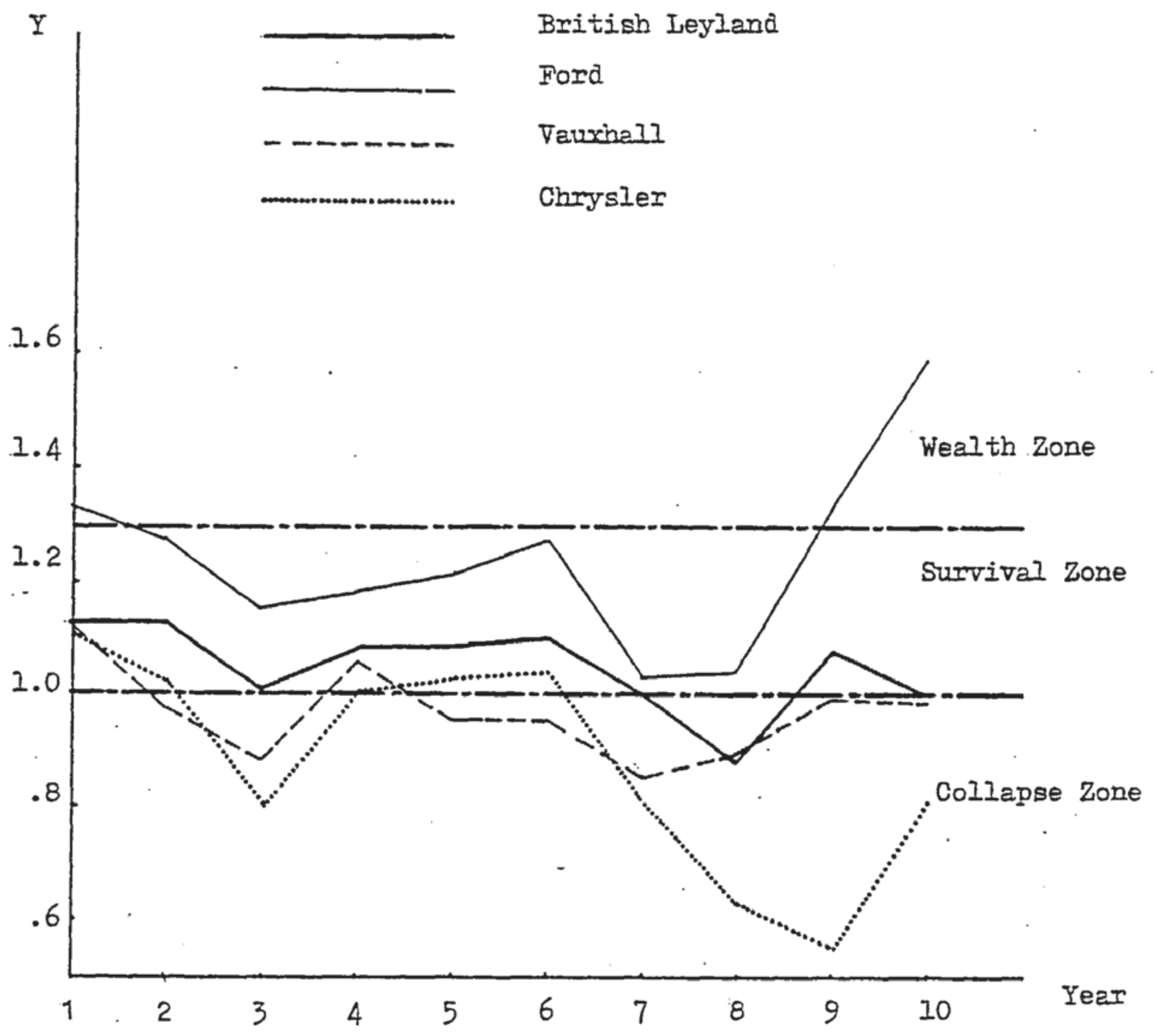


Fig. 7.11 - TOTAL PRODUCTIVITY OF FOUR COMPANIES

7.6. CONCLUSION

The productivity measurement based on added value is discussed and applied to the British motor industry consisting of four major companies.

The best and most comprehensive criterion for comparison is the total productivity index which refers to total resources. The partial productivies also represent the level of efficiency in different parts of resource utilisation. However the result of one partial productivity without keeping a close eye on the others can be misleading.

A more detailed analysis can be carried out by breaking down the formula into seven component variables, and representing graphically the change of each one over a number of years as a percentage of base period. This analysis throws more light into the measurement to represent the strengths and weaknesses of each company and finally the industry as a whole. However, the value of this analysis and measurement depends partly on how the figures are presented and interpreted. It also depends on the precision and comprehension of data used with respect to representative and unrepresentative products and also their quality and other characteristics which usually requires some kind of adjustments. Analysis has been made in chapter nine on these component variables for productivity forecasting and planning.

The productivity of total resources can be used for comparison of different companies or plants as well as comparison of a company over a number of periods. It also throws light into the requirements of funds for a company with respect to its existence into wealth, survival or collapse zones.

In the next chapter the adjustment analysis as a solution to some of the problems, discussed here, has been analysed.

CHAPTER 8

ADJUSTMENT ANALYSIS; SOLUTION TO SOME PROBLEMS

8.1. COVERAGE ADJUSTMENT ANALYSIS

When dealing with measurement on production and productivity indices, one needs adequate data for output and input. The lack of sufficient data is a common problem for all establishments, but it is more serious when they produce a number of different products with different characteristics and probably in different plants. This is more intensified when the input as well as output is hetrogeneous and numerous. The coverage adjustment analysis is a useful statistical approach to cope with problems of paucity of data.

The Census of Manufacturers (72) used this analysis as a solution to adjust the indexes of some industries which were faced with scarcity of the quantity data for certain products and also the inclusion of some product data belonging to the output of other industries. This principle is found to be quite competent to apply in the level of company as well as industry when the same difficulties arise. The following procedures are based upon this principle.

8.2. ADJUSTMENT OF GROSS OUTPUT INDEX

When it is not possible to have data for all products of a company, the unadjusted index, based on change in the represented product may be used to show the change in all products of the company provided that represented and unrepresented products change similarly on the average, both for quantity and price. However this is not always the case and more frequently the relative movements in price or quantity or both of them are different. Here it is assumed that the change in one of them, namely price which is more prevalent, is averagely similar, and proceed then to make an adjusted index of output from represented products. The approach can, of course be used on the basis of change in price when the quantity movements are averagely similar for different periods. The situation in which neither price nor quantity of represented and unrepresented products have the same index for different periods, needs more vigorous statistical treatment to find out the adjusted index. However to avoid more complication it can be arbitrarily assumed that either price or quantity, whichever is nearer to the fact, has similar average for both represented and unrepresented products in two periods.

Based on the above description the index can be obtained as follows(72).

Let p = price of product (represented and unrepresented)

q = quantity of product (represented and unrepresented)

p' = price of represented product

q' = quantity of represented product

(1) $\dfrac{\Sigma p_n \; q_n}{\Sigma p_o \; q_o}$ index of the value change for the company from period o to period n.

(2) $\dfrac{\Sigma p'_n \; q'_n}{\Sigma p'_o \; q'_o}$ index of the value change for represented product

(3) $\dfrac{\Sigma p'_o \; q'_n}{\Sigma p'_o \; q'_o}$ the base weighted unadjusted quantity index

(4) $(2) \div (3) = \dfrac{\Sigma p'_n \; q'_n}{\Sigma p'_o \; q'_n}$ = the current weighted price index for represented products.

(5) (1) $\div$ (4) = $\dfrac{\Sigma p_n \; q_n}{\Sigma p_o \; q_o} \Big/ \dfrac{\Sigma p'_n \; q'_n}{\Sigma p'_o \; q'_n}$ = the base weighted adjusted quantity index

The adjustment is based on the assumption that the price index for represented products (4) and that of all products are the same i. e.,

(6) $$\frac{\Sigma p'_n \, q'_n}{\Sigma p'_o \, q'_n} = \frac{\Sigma p_n \, q_n}{\Sigma p_o \, q_n}$$

with this assumption equation (5) is equivalent to:

(7) $\dfrac{\Sigma p_n \, q_n}{\Sigma p_o \, q_o} \Big/ \dfrac{\Sigma p_n \; q_n}{\Sigma p_o \; q_n} = \dfrac{\Sigma p_o \; q_n}{\Sigma p_o \; q_o}$ = the desired (base weighted) quantity index

There is another mathematical method which is equivalent to what is obtained above, and can be used in practice. In this method one needs, first of all, to find the 'coverage ratio' for each period which is equal to the value of represented products divided by the value of total products (company's output) in that period. Dividing the coverage ratio of the comparison period to that of the base period gives us the so called 'coverage adjustment factor'. The last operation is to divide the unadjusted quantity index by coverage adjustment factor. This method gives the same result as the previous method, and can be calculated as follows:

(8) $\dfrac{\Sigma p'_n \; q'_n}{\Sigma p_n \; q_n}$ the coverage ratio at period n

(9) $\dfrac{\Sigma p'_o \, q'_o}{\Sigma p_o \; q_o}$ the coverage ratio at period o

(10) (8) ÷ (9) $= \frac{\Sigma p'_n \quad q'_n}{\Sigma p_n \quad q_n} / \frac{\Sigma p'_o \quad q'_o}{\Sigma p_o \quad q_o}$ = the coverage adjusted factor

(11)* (3) ÷ (10) $= \frac{\Sigma p_n \quad q_n}{\Sigma p_o \quad q_o} / \frac{\Sigma p'_n \quad q'_n}{\Sigma p'_o \quad q'_n} = \frac{\Sigma p_o \quad q_n}{\Sigma p_o \quad q_o}$ = the(base weighted) adjusted quantity index.

It is clear that both equations (5) and (11) are the same.

8.3. ADJUSTMENT OF NET OUTPUT (ADDED VALUE INDEX)

The coverage adjustment analysis which is used above for gross output can be applied to net output or value added as well. For this purpose one needs to calculate the adjusted index for bought-in inputs (materials, fuel etc.) as well as output. Therefore if the symbols P, Q, P' and Q' are used to show the price and quantity of bought-in inputs for all products and represented products respectively, then the coverage adjustment factor for bought-in inputs is equal to:

$$\frac{\Sigma P_n \; Q_n}{\Sigma P_o \; Q_o} \Big/ \frac{\Sigma P'_n \; Q'_n}{\Sigma P'_o \; Q'_o}$$

Suppose the adjusted and unadjusted net output are shown by symbols v and v'. There are three alternative relationships between v and v' as follows (2).

1 - when the coverage adjustment factor for both output and bought-in input is the same i. e.

$$\frac{\Sigma p'_n \quad q'_n}{\Sigma p_n \quad q_n} \Big/ \frac{\Sigma p'_o \quad q'_o}{\Sigma p_o \quad q_o} = \frac{\Sigma P'_n \quad Q'_n}{\Sigma P_n \quad Q_n} \Big/ \frac{\Sigma P'_o \quad Q'_o}{\Sigma P_o \quad Q_o}$$

we have $v = v'$

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*See Appendix A Section 1.

2 - when the coverage adjustment factor for output is greater than that of inputs i. e.

$$\left(\frac{\Sigma p'_n \; q'_n}{\Sigma p_n \; q_n} \Big/ \frac{\Sigma p'_o \; q'_o}{\Sigma p_o \; q_o}\right) > \left(\frac{\Sigma P'_n \; Q'_n}{\Sigma P_n \; Q_n} \Big/ \frac{\Sigma P'_o \; Q'_o}{\Sigma P_o \; Q_o}\right)$$

we have $v < v'$

3 - If the coverage adjustment factor for output is less than that of inputs i. e.

$$\left(\frac{\Sigma p'_n \; q'_n}{\Sigma p_n \; q_n} \Big/ \frac{\Sigma p'_o \; q'_o}{\Sigma p_o \; q_o}\right) < \left(\frac{\Sigma P'_n \; Q'_n}{\Sigma P_n \; Q_n} \Big/ \frac{\Sigma P'_o \; Q'_o}{\Sigma P_o \; Q_o}\right)$$

we have $v > v'$

From these equations it is clear that the coverage adjustment factors would be responsible for the divergence between v and v', and therefore v' needs to be adjusted.

Referring to the net output or added value index as follows (Laspeyre type)

$$(12) \qquad v_{on} = \frac{\Sigma p_o \; q_n - \Sigma P_o \; Q_n}{\Sigma p_o \; q_o - \Sigma P_o \; Q_o}$$

it is possible to prove that

$$(13)^{*} \qquad v_{on} = s_{on} + \frac{M_o}{V_o}\left(s_{on} - m_{on} \right)$$

where v, s and m represent the adjusted net output (added value), gross output and bought-in inputs indices respectively. Symbols M_o and V_o

*See Appendix A Section 2 - See also reference (2) page 24 - 25.

also show the bought-in input and nett output (added value) in the base period. This formula shows that when s and m are adjusted separately for defective coverage, v is also automatically adjusted.

With respect to different results obtained for both adjusted and unadjusted indexes of gross output and bought-in inputs there are 9 different relationships between the indexes of adjusted and unadjusted nett output as follows when unadjusted indices of gross output and nett output are represented by s' and m'.

(1)	if	$s' = s$	and	$m' = m$	then $v = v'$
(2)	if	$s' > s$	and	$m' = m$	then $v < v'$
(3)	if	$s' < s$	and	$m' = m$	then $v > v'$
(4)	if	$s' = s$	and	$m' > m$	then $v > v'$
(5)	if	$s' = s$	and	$m' < m$	then $v < v'$
(6)	if	$s' > s$	and	$m' > m$	then ?
(7)	if	$s' > s$	and	$m' < m$	then $v < v'$
(8)	if	$s' < s$	and	$m' > m$	then $v > v'$
(9)	if	$s' < s$	and	$m' < m$	then ?

The above nine alternative situations can be used for British Leyland with semi hypothetical data as a practical example.

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* See appendix A section 2. See also reference (2) page 24 - 25.

From Table 6.1 p.108 data can be taken for periods 1968 and 1976 referring to suffixes o and n respectively and use them below:

$$\frac{M'_o}{V'_o} = \frac{571.1}{335.9} = 1.700$$

$$s'_{on} = \frac{\Sigma P_o \quad q_n}{\Sigma P_o \quad q_o} = \frac{A_o \times C_n}{A_o \times C_o} = \frac{C_n}{C_o} = \frac{785}{1050} = .748$$

$$m'_{on} = \frac{\Sigma P_o \quad Q_n}{\Sigma P_o \quad Q_o}$$

Since there is no data for input quantity, Q (because of hetrogeniety and variety of bought-in inputs) it is assumed that $m'_{on} = .900$ therefore from equation 13 it can be written that

$$v'_{on} = s'_{on} + \frac{M_o}{V_o} (s'_{on} - m'_{on}) = .748 + 1.700\ (.748 - .900) = .490$$

1 - According to situation (1) $v = v' = .490$

2 - In situation (2) the coverage adjustment factor for m is the same for 2 periods and if it is assumed that s is 10% less than s' then we have

$v = .9 \times .748 + 1.7\ (.9 \times .748 - .900) = .288$

$v = .288 < v' = .490$

3 - In situation (3) assuming $s > s'$ by 10% we have

$v = 1.10 \times .748 + 1.7\ (1.10 \times .748 - .900) = .692$

$v = .692 > v' = .490$

4 - In situation (4) assuming $m < m'$ by 10% we have

$v = .748 + 1.700\ (.748 - .9 \times .900) = .643$

$v = .643 > v' = .490$

5 - In situation (5) assuming that $m > m'$ by 10% we have

$v = .748 + 1.700\ (.748 - 1.10 \times .900) = .337$

$v = .337 < v' = .490$

6 - In situation (6) assuming that s and m are 10% less than s' and m' respectively we have

$v = .90 \times .748 + 1.700\ (.90 \times .748 - .90 \times .900) = .441$

$v = .441 < v' = .490$

(Here the value of v can also exceed that of v' provided that the difference between m' and m be greater and between s and s' smaller)

7 - In situation (7) assuming that $s < s'$ by 10% and $m > m'$ by 10% we have

$v = .9 \times .748 + 1.700\ (.9 \times .748 - 1.10 \times .900) = .135$

$v = .135 < v' = .490$

8 - In situation (8) assuming $s > s'$ by 10% and $m < m'$ by 10% we have

$v = 1.10 \times .748 + 1.700\ (1.10 \times .748 - .9 \times .900) = .845$

$v = .845 > v' = .490$

9 - In situation (9) like situation (6) we can have different relationships between v and v'. If we assume $s > s'$ by 10% and $m > m'$ by 10% we have

$v = 1.10 \times .748 + 1.700\ (1.10 \times .748 - 1.10 \times .900) = .539$

$v = .539 > v' = .490$

however if $s > s'$ by 10% and $m > m'$ by 20% then

$v = 1.10 \times .748 + 1.700\ (1.10 \times .748 - 1.20 \times .900) = .202$

$v = .202 < v' = .490$

again for the same kind of data in this situation $v = v'$.

However one has to be very cautious in making such adjustment and as G. C. Bert (2) indicates 'coverage adjustment should be made only when there is sufficient evidence of the validity of the underlying assumption'.

8.4. ADJUSTMENT FOR PRIMARY AND SECONDARY PRODUCTS

Census industries are usually defined with respect to product types and an establishment's reports are classified into special industry in relation to its products. However, an establishment may make a variety of products which are used in different industries. In this case the industrial classification of establishment (or company) can be determined by the set of products which make the principal portion of its total value of shipment which is called 'primary' products.

Again a part of the product of an establishment which is made in other companies or industries may be called 'secondary' products.

The coverage adjustment analysis can be used to find out an adjusted index based on all products, distinguished from unadjusted index based on primary products.

With respect to productivity measurement the inclusion of secondary products are significant in some industries or companies especially when their price and quantity movements are not similar to that of industry and company's actual products, and an adjustment analysis may be needed in this case. However this is more important in industry level than in company level.

8.5. ADJUSTMENT FOR QUALITY DIFFERENCES

J. W. Kendrick (8, pp. 25 - 28) refersto some adjustment analysis for quality vs quantity, when the qualitative change is significant. The minimal adjustment given by BLS* is estimating the 'pure' price change accompanying the introduction of a new model of products. This is carried out by working out the difference between cost of input and price of output of a new product compared with an old one. For example 3% increase in input cost for a unit of output and 5% increase in price represent a 2% increase in pure price. Therefore the price deflation should be based on 2% and not 5%, because 3% of it is attributed to quality improvement or change in the utility of products for purchasers.

A more sophisticated adjustment for quality discussed by Kendrick, and given by Zui Grilliches is a regression equation to calculate the relationship of prices to characteristics of new automobiles. This equation which shows 1959 prices relative to 1950 prices is as follows:

$$\log p = .026H + .200W - .014Lo - .025D_1 + .091D_2 + T + \text{constant}$$

where	p	is	list price
	H	is	brake horse power (in 100 h. p.)
	W	is	shipping weight (in 1,000 lb.)
	Lo	is	overall length (in 100 inches)
	D_1	is	dummy variable for six or eight cylinders.

*Bureau of Labour Statistics.

D_2 - is dummy variable for hard top or not

T is dummy variable for earlier and later years.

whereas the corrected average price of an automobile calculated from the above equation is 18% from 1950 to 1959, the consumer's price index reported it as 31%. Therefore 13% which is, the difference can be attributed to utility change including quality variation in the products.

It is worth noting that no formula can be found to take into account all the changes in details, such as comfort, safety and style which are intangible factors. The change in characteristics of a product is more significant over a longer period i. e., the longer the period for comparison, the more important such changes are likely to become.

8.6. CONCLUSION

Adjustment analysis can be an answer to some of the problems discussed in Chapter 5 such as the lack of quantity data for certain products, the manner in which the product data is compiled, the inclusion of some production belonging to other companies (or industries), the change in quality and other characteristics of products and so on. In addition to these problems and solutions discussed in this chapter, there are still others which can be discussed under this heading such as seasonal adjustment analysis (2), sub-product approach (24 pp. 50, 45 pp 31, 73) etc. However the use of these adjustment analyses depends to the level of precision one needs to obtain. Surely the more accurate the results in productivity measurements are required, the more complicated becomes the formula for this measurement. The function of the analyst is a trade off between accuracy needed and the complication of the analysis accepted with regard to time and resources available for this purpose.

CHAPTER 9

PRODUCTIVITY FORECASTING AND PLANNING

9.1. INTRODUCTION

In the preceeding chapters productivity measurement and analysis are discussed and models based on net output are developed to cope with problems and satisfy the needs of analysis in the level of firms, with special attention to some kinds of industries such as motor manufacturing. Having constructed a model based on historical data and concerned with added value concept, the management may want to turn their responsibilities to the predictive use of the model to calculate the inevitable changes in total productivity due to changes in its components. The management also need the appropriate models for planning the productivity with respect to company's target.

Three major methods of analysis are used in this chapter for the purpose of prediction and planning which are as follows:

Sensitivity Analysis
Deterministic Appraisal
Risk Simulation

each of them has its own use and competence. They are not mutually independent tools, and can be used together for more comprehensive analysis and planning. The first two models do not take any risk into consideration and therefore are called deterministic and the third one is called stochastic.

9.2. SENSITIVITY ANALYSIS

Sensitivity analysis is one of the most important concepts in forecasting and planning. In any kind of model one can measure the sensitivity of final results to the values of parameters, and find out the degree of variability of the result due to the predetermined changes in parameters. This analysis involves the systematic change in parameters over a percentage of interest and observation of the effects of these changes in the final results obtained from the model. If the final result i. e. total productivity, changes greatly with small change of one of these values of parameters, this can persuade on e to give more attention to that variable and to use more time and energy in forecasting, analysis and change in the amount of that variable. Inversely if the final results do not vary significantly over the high variation of some parameters, then the variables referring to those parameters are of less importance and therefore less action is justified to be taken about them. It is reasonable to note that the change in some factors such as unit remuneration have an inverse effect on productivity. This analysis is specially important in simulation or risk simulation models because of their relative dependency to their original data used (23, 74).

There are some interesting results obtained from sensitivity analysis which will be discussed after the application of this concept to the four motor manufacturing companies.

In this thesis references are made to single and group sensitivity analysis to present the change in total productivity (based on nett output or added value concept) due to a constant amount of change in a single parameter or in combination of some or all parameters respectively. This constant value of change (β) is computed with positive and negative signs.

It should be strongly noticed that the sensitivity analysis is based on the assumption that there is not a dynamic interdependency between variables. This is because the resultant change in productivity is computed due to change in one or some variables without taking into account the automatic influence of change of one variable on others. Because of this assumption the sensitivity analysis is valid only at a limited range of changes, and any large percentage of change in one or some variables such as 10% can be misleading.

9.2.1. Mathematical Approach

To facilitate the sensitivity analysis it is necessary to obtain the formula for total productivity growth or change in terms of values of component variables in the base period. Thus if Y, T and V represent the total productivity, total resources and added value (net output) as before, and suffixes o and n are used to show the base and given periods respectively it can be written:

$$Y_o = \frac{V_o}{T_o} = \frac{A.\ C - B.\ C}{D.\ E + G.\ C + H.\ C} \qquad (1)$$

$$Y_n = \frac{V_n}{T_n} = \frac{aA\ .\ cC - bB.\ cC}{dD.\ eE + gG.\ cC + hH.\ cC} \qquad (2)$$

where a, b, c, d, e, g and h are parameters to change variables A, B, C, D, E, G. and H respectively from the base period to the given period, and each of them can select one of the three values 1, $(1+\beta)$ and $(1-\beta)$. The three values 1, $(1+\beta)$ and $(1-\beta)$ refer to the zero %, β% and $-\beta$% changes respectively in the corresponding component variables*. Because the components A, B, C, D, E, G and H cannot

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*It is assumed that the absolute amount of change in component variables is always less than 100%.

be negative or zero then:

$$a,\ b,\ c,\ d,\ e,\ g,\ h\ >\ o \qquad (3)$$

and because β is a positive fraction then one should always have $\beta < 1$. The relative (or percentage in particular case) change in productivity can be written as:

$$x = (Y_n - Y_o)\ /\ Y_o$$

or $x = (V_n/\ T_n - V_o/T_o)\ /\ (V_o\ /\ T_o)$

or $x = (T_o\ V_n\ /\ T_n\ V_o) - 1 \qquad (4)$

Letting the above component variables of equations (1) and (2) into corresponding equivalent variables of equations (4) we have:

$$x = \frac{(D.E + G.C + H.C)\ (aA.cC - bB.cC)}{(dD.eE + gG.cC + hH.cC)\ (A.C - B.C)} - 1$$

since there was earlier

S = A. C . Total sales

M = B. C Bought-in input

R = D. E Total remuneration

F = G. C Total facilities

CI = H. C Total capital interest charges.

then: $x = \dfrac{(R + F + CI)\ (acS - bcM)}{(deR + gcF + hc\ CI)\ (S - M)} - 1 \qquad (5)$

<u>conditions for zero change</u>

The conditions for zero change in productivity can be obtained by letting the equation (5) equal to zero, i. e.

$x = o$

or $\dfrac{(R + F + CI)\ (acS - bcM)}{(deR + gcF + hc\ CI)\ (S - M)} = 1$

or

$$SR\begin{vmatrix} a & d \\ e & c \end{vmatrix} + MR\begin{vmatrix} d & b \\ c & e \end{vmatrix} + SF\begin{vmatrix} a & c \\ g & c \end{vmatrix} + MF\begin{vmatrix} g & c \\ b & c \end{vmatrix} + S.\,CI\begin{vmatrix} a & c \\ h & c \end{vmatrix} + M.\,CI\begin{vmatrix} h & c \\ b & c \end{vmatrix} = o \quad (6)$$

since S, M, R, F, CI $\neq$ o there should be:

$$\begin{aligned} ac &= de \\ de &= bc \\ a &= g \\ g &= b \\ h &= b \\ a &= h \end{aligned}$$

or

$$\mathrm{I} \begin{cases} a = b = g = h \\ ac = de \end{cases} \qquad \text{conditions for zero change in productivity}$$

To find out the number of cases in which x is equal to zero it is sufficient to deal with the number of cases in which the equation ac = de exists when each of these 4 parameters (a, c, d, e) can be 1, $1+\beta$ or $1-\beta$. In table 9.1 below the total possible number to satisfy this condition can be seen as 15. From this table one can see three cases in which all parameters are the same i. e., the change in all component variables are equal. These are in columns 1, 8 and 15 with values 1, $1+\beta$ and $1-\beta$ respectively

TABLE 9.1

No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
a	1	1	1	1	1	$1+\beta$	$1+\beta$	$1+\beta$	$1+\beta$	$1+\beta$	$1-\beta$	$1-\beta$	$1-\beta$	$1-\beta$	$1-\beta$
c	1	$1+\beta$	$1+\beta$	$1-\beta$	$1-\beta$	1	1	$1+\beta$	$1-\beta$	$1-\beta$	1	1	$1+\beta$	$1+\beta$	$1-\beta$
d	1	1	$1+\beta$	1	$1-\beta$	$1+\beta$	1	$1+\beta$	$1+\beta$	$1-\beta$	$1-\beta$	1	$1-\beta$	$1+\beta$	$1-\beta$
e	1	$1+\beta$	1	$1-\beta$	1	1	$1+\beta$	$1+\beta$	$1-\beta$	$1+\beta$	1	$1-\beta$	$1+\beta$	$1-\beta$	$1-\beta$

Conditions for $\pm\beta$% Change

To obtain the number of cases in which change in total productivity from one period to another, i. e. x is exactly the same as change in component variable, i. e. β we need to let equation (5) be equal to β i. e.

$x = \beta$

or $$\frac{(R + F + CI)(acS - bcM)}{(deR + gcF + hc.\ CI)(S - M)} - 1 = \beta$$

or $$SR\begin{vmatrix} a & d(1+\beta) \\ e & c \end{vmatrix} + MR\begin{vmatrix} d(1+\beta) & b \\ c & e \end{vmatrix} + SF\begin{vmatrix} a & c(1+\beta) \\ g & c \end{vmatrix} + MF\begin{vmatrix} g(1+\beta) & c \\ b & c \end{vmatrix}$$

$$+ \ S.\ CI\begin{vmatrix} a & c(1+\beta) \\ h & c \end{vmatrix} + M.\ C.\ I.\begin{vmatrix} h(1+\beta) & c \\ b & c \end{vmatrix} = o$$

then $$\begin{cases} ac = ed\,(1+\beta) \\ bc = ed\,(1+\beta) \\ a = g\,(1+\beta) \\ b = g\,(1+\beta) \\ a = h\,(1+\beta) \\ b = h\,(1+\beta) \end{cases}$$

or $$\begin{cases} a = b = g\,(1+\beta) \\ h = g \\ ac = ed\,(1+\beta) \end{cases}$$

Since $a = g\,(1+\beta)$ the parameters a and g have no alternative but to have values $1+\beta$ and 1 respectively and the conditions for change in productivity are as follows:

II $$\begin{cases} h = g = 1 \\ a = b = (1+\beta) \\ c = ed \end{cases}$$ conditions for β change in productivity

There are five cases where conditions II exist and the values of c, e and d are shown in table 9. 2.

TABLE 9. 2

No.	1	2	3	4	5
c	1	$1+\beta$	$1+\beta$	$1-\beta$	$1-\beta$
d	1	$1+\beta$	1	1	$1-\beta$
e	1	1	$1+\beta$	$1-\beta$	1

If one put equation (5) equal to $-\beta$ instead of β the same operation can be used to show that there are 5 cases in which change in productivity is equal to $-\beta$ i. e. negative change in productivity. The conditions for $-\beta$ change is as follows and the values of c, d and e are the same as before.

$$\text{III} \begin{cases} h = g = 1 \\ a = b = 1 - \beta \\ c = ed \end{cases} \qquad \text{conditions for } -\beta \text{ change in productivity}$$

Therefore the total number of cases in which the change in productivity is equal to plus or minus β is 10. The value of parameters c, d, e, h and g are the same for all 10 cases, however the values of a and b for $+\beta$ change are equal to $1+\beta$ and for $-\beta$ change are equal to $1-\beta$.

9. 2. 2. Application of Single Sensitivity Analysis

It is reasonable now to measure the sensitivity associated with the change of a certain component variable by a constant percentage, both positive and negative ($\pm\beta$%), leaving the other component variables unchanged. Tables 9. 3 and 9. 4 show the resultant changes in total productivity in four motor manufacturing companies due to +1% and - 1% change in corresponding components respectively (β= 1), keeping all the other components constant. The letter x is used to show the percentage change in total productivity. One should be aware that the data used in these two tables are concerned only with 1977 data of the four above companies. The following results can be given from the Tables 9. 3 and 9. 4.

1. The absolute changes in productivity in order of magnitude are due to changes in unit price, unit bought-in input, output quantity

TABLE 9.3 - % CHANGE IN TOTAL PRODUCTIVITY DUE TO 1% RISE IN CERTAIN COMPONENT VARIABLES

Serial No.	Component Variable	DESCRIPTION	Value of X in			
			B.Leyland	Ford	Vauxhall	Chrysler
1.	A	Price per unit of output	3.13031	3.40321	4.37745	5.01166
2.	B	Cost of bought-in input per unit of output	-2.13031	-2.40321	-3.37745	-4.01166
3.	C	Total output quantity	0.84793	0.82843	0.85538	0.79275
4.	D	Average remuneration per employee per year	-0.84205	-0.82301	-0.84933	-0.78812
5.	E	Weekly average No. of employees	-0.84205	-0.82301	-0.84933	-0.78812
6.	G	Facilities per unit of output	-0.08623	-0.12916	-0.09336	-0.08670
7.	H	Capital interest charges per unit of output	-0.06445	-0.04082	-0.04992	-0.11870

TABLE 9.4 - % CHANGE IN TOTAL PRODUCTIVITY (X), DUE TO 1% FALL IN CERTAIN COMPONENT VARIABLES

Serial No.	Component Variable	DESCRIPTION	Value of X in			
			B.Leyland	Ford	Vauxhall	Chrysler
1.	A	Price per unit of output	-3.13031	-3.40321	-4.37745	-5.01166
2.	B	Cost of bought-in input per unit of output	2.13031	2.40321	3.37745	4.01166
3.	C	Total Output Quantity	-0.85049	-0.83125	-0.85783	-0.79602
4.	D	Average remuneration per employee per year	0.85648	0.83678	0.86401	0.80074
5.	E	Weekly average number of employees	0.85648	0.83678	0.86401	0.80074
6.	G	Facilities per unit of output	0.08638	0.12949	0.09354	0.08685
7.	H	Capital interest charges per unit of output	0.06453	0.04086	0.04997	0.11899

unit remuneration and/or manpower, unit facilities and unit capital charges respectively in Table 9. 3 except in Chrysler in which unit facilities comes after unit capital charges. However in Table 9. 4 the absolute change due to output quantity has come after unit remuneration and/or manpower, but the differences in both tables in absolute terms remain small. The variables which make a greater change are price and bought-in input, which cause the productivity to change 3 to 5 times and 2 to 4 times of their own changes respectively. This refers in fact to the characteristics of the motor industries where a major part of their products are made not within the company but by external firms and enterprises.

2. The absolute change in productivity due to changes in price and bought-in input in both tables are the same. Therefore the resultant changes due to these two variables are symetric but for other variables are asymetric, although the differences are very small. Also the absolute amount of change due to incremental change (Table 9. 3) in output is less than the absolute amount due to the decremental change (Table 9. 4) of it. Inversly for the three remaining variables, i. e. remuneration, facilities and capital charges the absolute changes in productivity in the incremental table are greater than those of the decremental table.

3. The direction of change in productivity is the same as the direction of change in price and output quantity, but it is an inverse direction with respect to changes in other variables. This can be seen from positive and negative signs indicated in the tables.

4. The amount of changes due to remuneration and manpower in each company are the same irrespective of direction of change.

The results discussed in numbers 2, 3 and 4 above are the characteristics which are embedded within the model of productivity based on added value and are independent of the data used whereas the results explained in number 1 are mostly subject to the variability of the data used.

9.2.3. Application of Group Sensitivity Analysis

As discussed earlier the group sensitivity analysis is a name which is used to refer to sensitivity of total productivity related to a constant change (e.g. 1%) in some or all of 7 component variables in the productivity model in both direction (positive and negative). Therefore any variable in the model may be changed by plus or minus a constant percentage (β) of its original value. The total number of combinations obtained by this analysis is equal to 2187 which can be obtained by $3^7 = 2187$ where 3 refers to the number of choices for any variable to change as a percentage, i.e. figures $+\beta$ zero and $-\beta$ and number 7 relates to the total number of component variables in the model, i.e., A, B, C, D, E, G and H. The number 2187 includes a single case in which the change in all components are zero i.e. when no change has incurred in any component. It is clear from the explanation that the group sensitivity analysis includes 7 cases of single sensitivity analysis discussed earlier as well.

To use the group sensitivity analysis for the above four motor manufacturing companies, a computer program was written. The detailed flow chart of this computer program is given in Fig. 9.1. The flow chart is divided into the following sections.

Section I - calculates and gives 3 values for each of the 7 component variables i. e. their values without change, with β percentage change and with-β percentage change (in the flow chart NZ is used instead of β).

Section II - calculates and prints the change in total productivity, x, in all possible cases i. e. 2187, together with corresponding changes in respective components. The first part of Appendix B shows part of the results of this section as a sample.

Section III - sorts out the results of each company in ascending order.

Section IV - prints out the numbers sorted in Section III in the same order and with 10 numbers per row. The computer output for four companies are shown altogether in part two of Appendix B.

Section V - determines the mean, standard deviation, minimum value, maximum value, moment coefficient of skewness, skewness, moment coefficient of Kurtosis, and finally Kurtosis.

Section VI - arranges all the resultant numbers into a given number of class intervals (15 in our program). Then it calculates the class, class boundaries, midpoints, cumulative frequency, frequency of each class interval and finally the adjusted frequency of each class interval which gives the figures obtained for the vertical axis, in distribution diagram, relative to that of horizontal axis for all companies, to enable the comparison of the results and corresponding

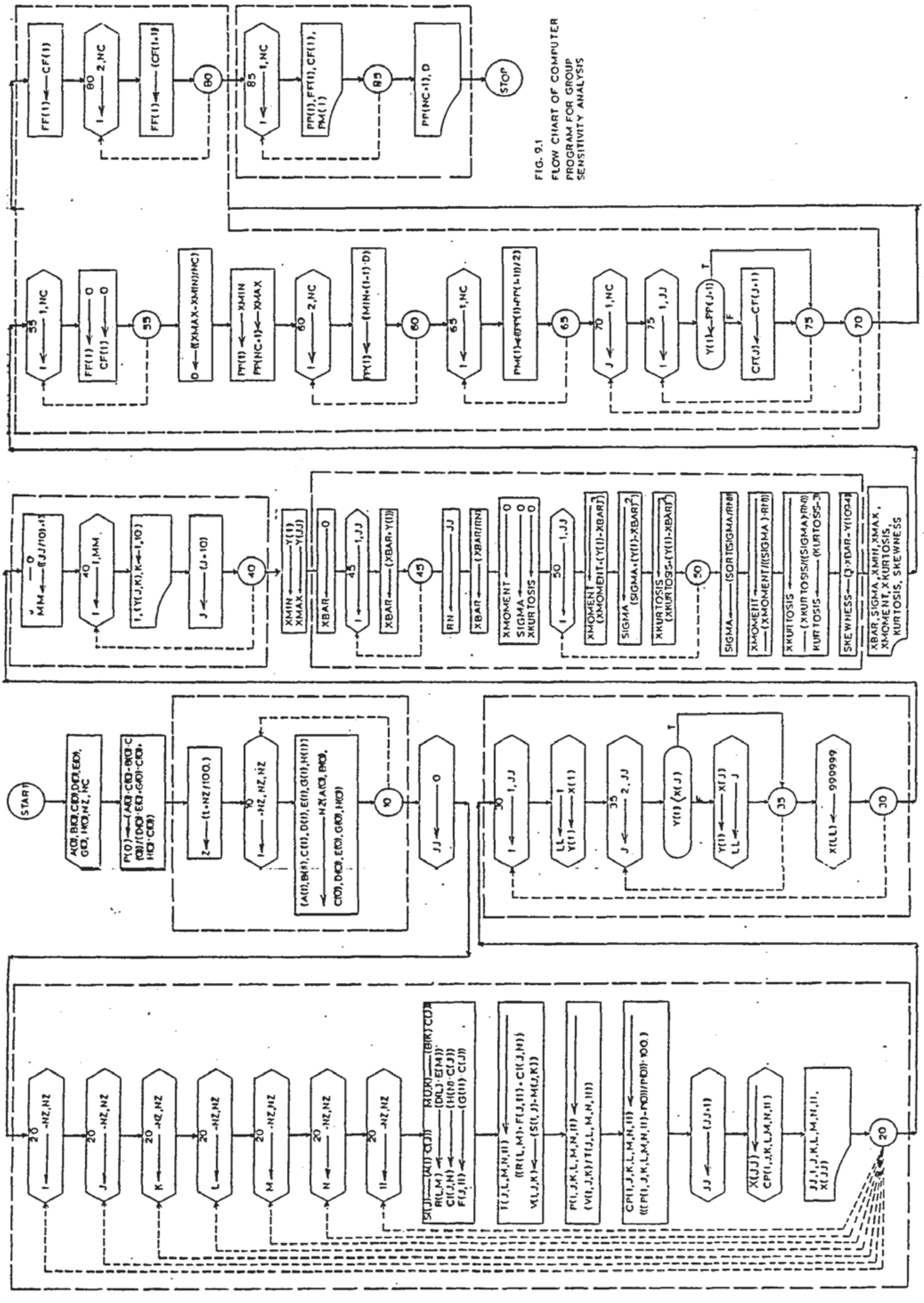

FIG. 9.1
FLOW CHART OF COMPUTER
PROGRAM FOR GROUP
SENSITIVITY ANALYSIS

graphs for all four above firms. *

Section VII - prints out all the results obtained in section VI. Part of the output of this section is shown in Tables 9. 5 to 9. 8 for British Leyland, Ford, Vauxhall and Chrysler respectively, and the remaining output is shown in Table 9. 9. The corresponding graphs are also represented in Figs. 9. 2 to 9. 9.

9. 2. 4. Analysis of Results

The group sensitivity output given in Appendix B reveals interesting and to some extent intriguing results. The general results which are independent of the data used for different companies and mostly are the same as those already obtained through the theoretical approach can be discussed as follows:

1. There are 15 cases in which the percentage change in total productivity is equal to zero. This is illustrated in Table 9. 10 . From the table it can be seen that there are three cases in which the percentage change in components are all the same. These are numbers 1, 8 and 15 with β%, zero% and -β% change respectively. In fact number 8 specified by asterisk, refers to a special case in which there is no change at all in any component.

2. The output in terms of positive and negative signs are symetrical, i. e. there are exactly the same number of positive and negative results. Part two of appendix B shows that there are

*In this analysis the frequency data of four companies are adjusted with frequency data belonging to Ford.

TABLE 9.5 - BRITISH LEYLAND

Serial No.	Class Boundaries x	Midpoints of Class Intervals M_x	Cumulative Frequency CF_x	Frequency of each class interval F_x	Adjusted Frequency size for graph $F'_x = F_x \frac{D_F}{D_B}$
1.	-7.78072	-7.24995	35	35	37
2.	-6.71919	-6.18841	91	56	60
3.	-5.65764	-5.12687	194	103	110
4.	-4.59610	-4.06533	360	166	177
5.	-3.53456	-3.00379	528	168	179
6.	-2.47302	-1.94225	761	233	248
7.	-1.41148	-0.88071	1004	243	258
8.	-0.34994	0.18083	1245	241	256
9.	0.71160	1.24237	1483	238	253
10.	1.77314	2.30391	1698	215	229
11.	2.83468	3.36545	1875	177	188
12.	3.89622	4.42699	2016	141	150
13.	4.95776	5.48853	2103	87	93
14.	6.01930	6.55007	2166	63	67
15.	7.08084	7.61161	2187	21	22
16.	8.14238				

TABLE 9.6 - FORD MOTOR COMPANY LIMITED

Serial No.	Class Boundaries x	Midpoints of Class Intervals M_x	Cumulative Frequency CF_x	Frequency of each Class Interval F_x	Adjusted Frequency size for graph $F'_x = F_x \frac{D_F}{D_F}$
1.	-8.27671	-7.71213	36	36	36
2.	-7.14755	-6.58297	90	54	54
3.	-6.01839	-5.45381	233	143	143
4.	-4.88922	-4.32464	360	127	127
5.	-3.76006	-3.19548	533	173	173
6.	-2.63090	-2.06632	794	261	261
7.	-1.50174	-0.93715	999	205	205
8.	-0.37257	0. 19201	1246	247	247
9.	0.75659	1.32117	1516	270	270
10.	1.88575	2.45033	1692	176	176
11.	3.01491	3.57950	1872	180	180
12.	4.14408	4.70866	2021	149	149
13.	5.27324	5.83782	2097	76	76
14.	6.40240	6.96698	2162	65	65
15.	7.53157	8.09615	2187	25	25
16.	8.66073				

TABLE 9.7 - VAUXHALL MOTOR COMPANY LIMITED

Serial No.	Class Boundaries X	Midpoints of Class Intervals M_x	Cumulative Frequency CF_x	Frequency of each Class Interval F_x	Adjusted Frequency size for graph $F'_x = F_x \frac{D_F}{D_V}$
1.	-10.22184	-9.52373	36	36	29
2.	-8. 82562	-8.12751	153	117	95
3.	-7. 42940	-6.73130	252	99	80
4.	-6. 03319	-5.53508	369	117	95
5.	-4. 63697	-3.93886	605	236	191
6.	-3. 24075	-2.54264	763	158	128
7.	-1. 84453	-1.14642	1008	245	198
8.	-0. 44831	0.24980	1271	263	213
9.	0. 94791	1.64602	1458	187	151
10.	2. 34413	3.04224	1700	242	196
11.	3. 74035	4.43846	1844	144	116
12.	5. 13657	5.83468	1971	127	103
13.	6. 53279	7.23090	2097	126	102
14.	7. 92900	8.62711	2151	54	44
15.	9. 32522	10.02333	2187	36	29
16.	10. 72144				

TABLE 9.8 - CHRYSLER MOTOR COMPANY LIMITED

Serial No.	Class Boundaries X	Midpoints of Class Intervals M_x	Cumulative Frequency CF_x	Frequency of each Class Interval F_x	Adjusted Frequency size for graph $F'_x = F_x \frac{D_F}{D_C}$
1.	-11.34678	-10.57241	54	54	39
2.	- 9.79803	- 9.02365	189	135	98
3.	- 8.24927	- 7.47490	253	64	47
4.	- 6.70052	- 5.92614	376	123	90
5.	- 5.15177	- 4.37739	608	232	169
6.	- 3.60301	- 2.82863	765	157	114
7.	- 2.05426	- 1.27988	1001	236	172
8.	- 0.50550	0.26887	1302	301	219
9.	1.04325	1.81763	1475	173	126
10.	2.59201	3.36638	1656	181	132
11.	4.14076	4.91514	1839	183	133
12.	5.68952	6.46389	1953	114	83
13.	7.23827	8.01265	2039	81	59
14.	8.78702	9.56140	2151	117	85
15.	10.33578	11.11016	2187	36	26
16.	11.88453				

TABLE 9.9

Serial No.	DESCRIPTION		British Leyland	Ford	Vauxhall	Chrysler
1.	Size of class interval (D)		1.06154	1.12916	1.39622	1.54875
2.	Mean (X)		0.00884	0.00836	0.00904	0.00747
3.	Median		0.00000	0.00000	0.00000	0.00000
4.	Mode		-0.88071	-5.45381 -2.06632 1.32117 3.57950	-8.12751 -3.93886 0.24980 3.04224	- 9.02365 - 4.37739 0.26887 4.91514 9.56140
5.	Maximum Value		8.14238	8.66073	10.72144	11.88453
6.	Minimum Value		-7.78072	-8.27671	-10.22184	-11.34678
7.	Range (xmax - (-xmin))		15.92310	16.93744	20.94328	23.23131
8.	Standard Deviation (SD)		3.31836	3.60067	4.67563	5.36262
9.	Moment coefficient of Skewness	$\frac{\sum(X - \bar{X})^3}{N.SD^3}$	0.02391	0.02149	0.01808	0.01385
10.	Moment coefficient of Kurtosis	$\frac{\sum(X - \bar{X})^4}{N.SD^4}$	2.35135	2.33103	2.30503	2.28252
11.	Kurtosis	(10) - 3	-0.64865	-0.66897	-0.66897	-0.71748
12.	Adjustment Factor	$\frac{(1)}{1.12916}$	1.06370	1	0.80873	0.72908
13.	Skewness	$\frac{3(\bar{X} - \text{Median})}{SD}$	0.00799	0.00697	0.00580	0.00418

N = 2187 SD = Standard Deviation $\bar{x}$ = Mean Value

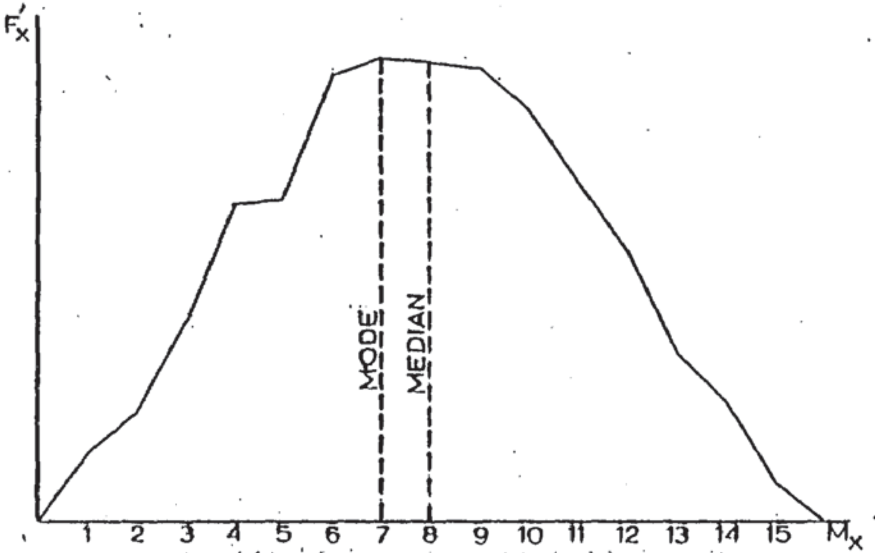

FIG. 9.2 BRITISH LEYLAND DISTRIBUTION POLYGON

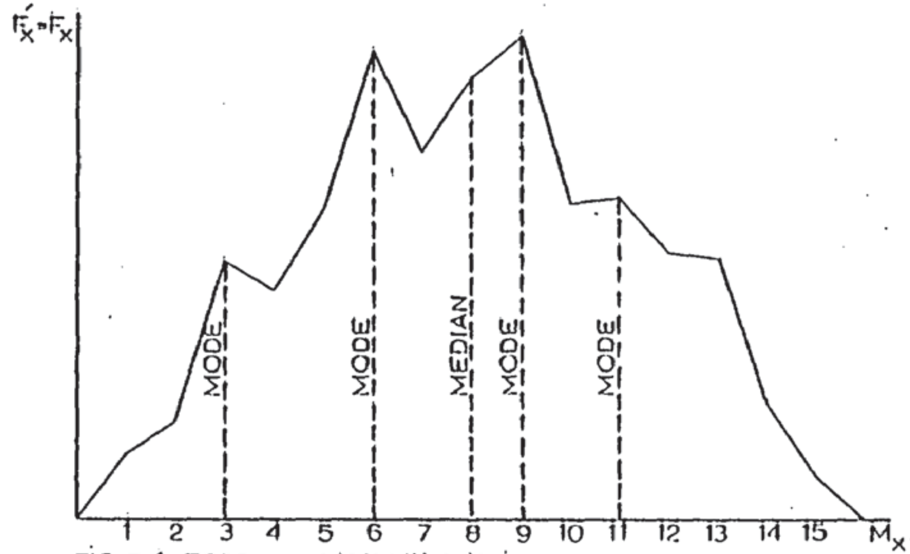

FIG. 9.4 FORD DISTRIBUTION POLYGON

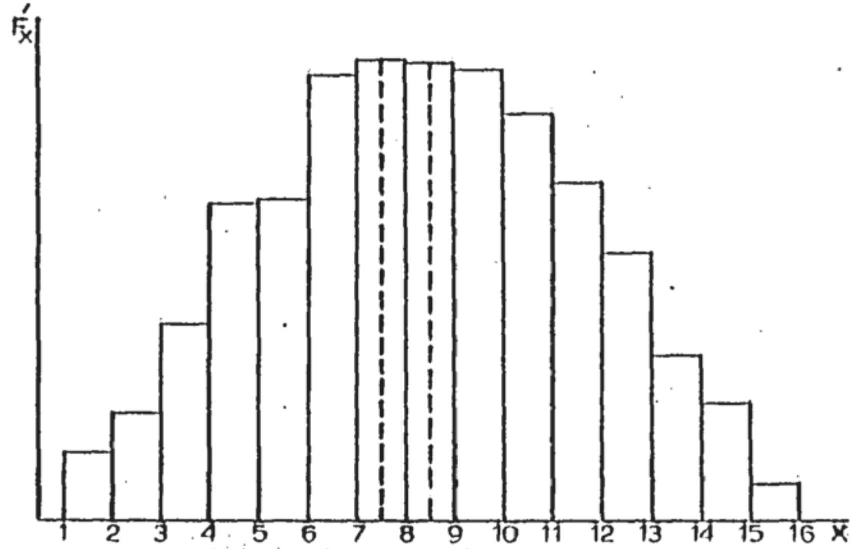

FIG. 9.3 BRITISH LEYLAND HISTOGRAM

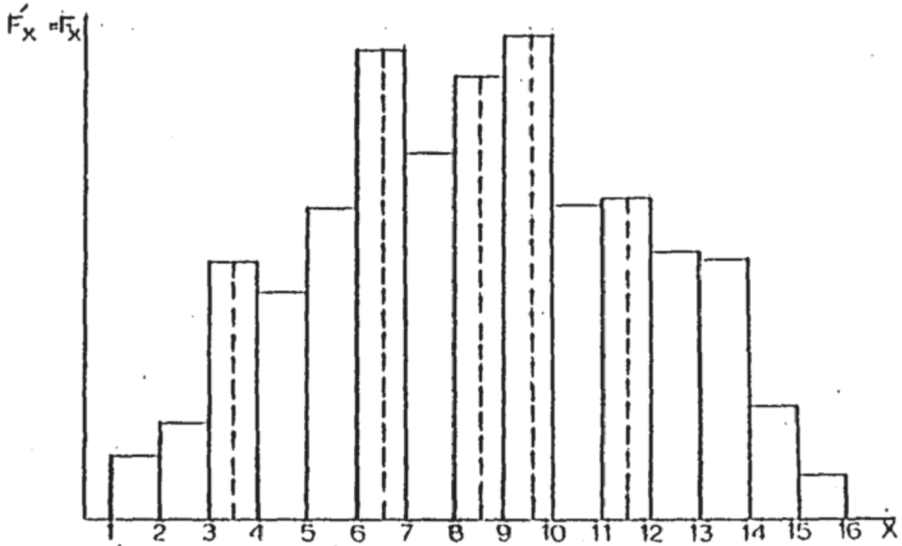

FIG. 9.5 FORD HISTOGRAM

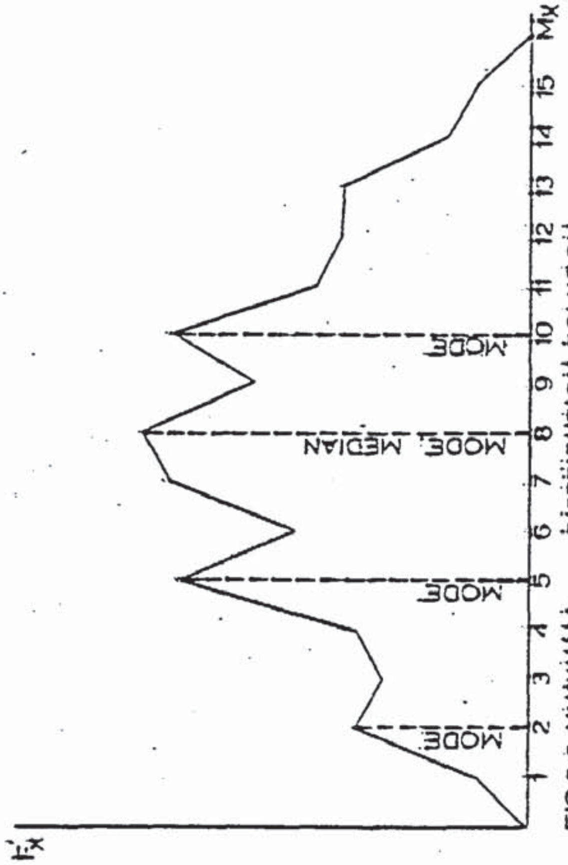

FIG. 9.6 VAUXHALL DISTRIBUTION POLYGON

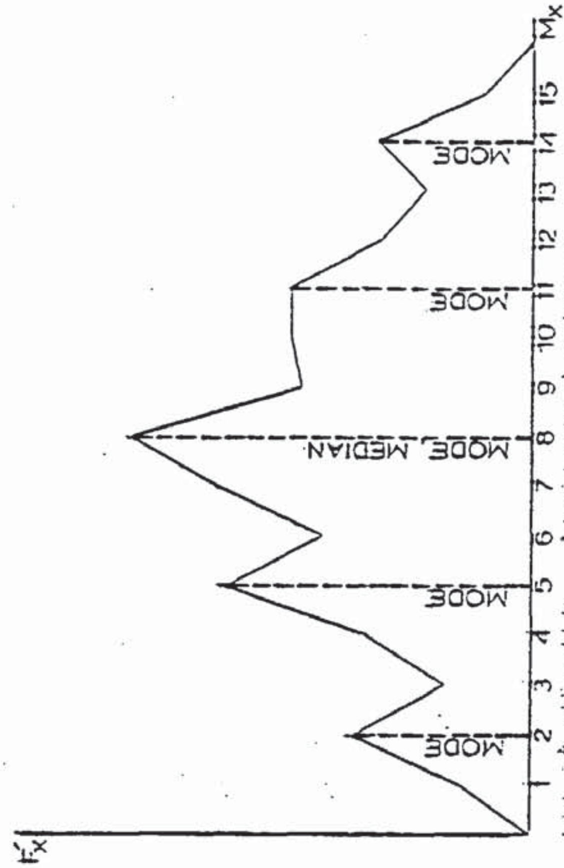

FIG. 9.8 CHRYSLER DISTRIBUTION POLYGON

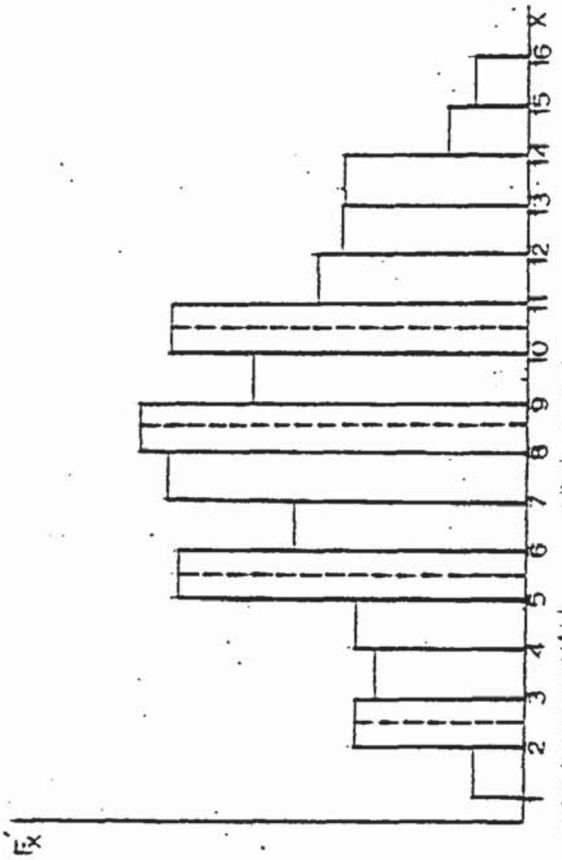

FIG. 9.7 VAUXHALL HISTOGRAM

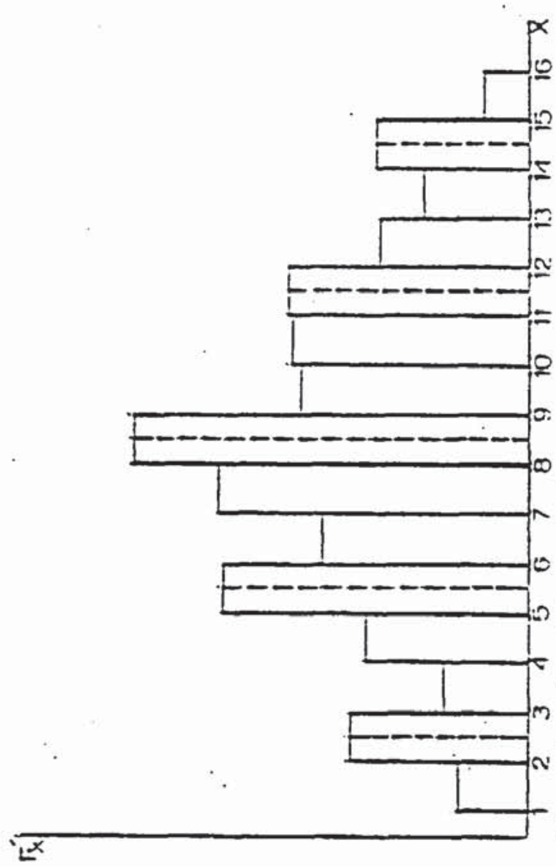

FIG. 9.9 CHRYSLER HISTOGRAM

TABLE 9.10

Component Variable	Subscripts	1	2	3	4	5	6	7	8*	9	10	11	12	13	14	15
Price per unit of output	A	β	β	β	β	β	0	0	0	0	0	$-\beta$	$-\beta$	$-\beta$	$-\beta$	$-\beta$
Output Quantity	B	β	0	0	$-\beta$	$-\beta$	β	$-\beta$	0	$-\beta$	$-\beta$	β	β	0	0	$-\beta$
Bought-in input cost per unit of output	C	β	β	β	β	β	0	0	0	0	0	$-\beta$	$-\beta$	$-\beta$	$-\beta$	$-\beta$
Remuneration per man per year	D	β	β	0	β	$-\beta$	β	0	0	0	$-\beta$	β	$-\beta$	0	$-\beta$	$-\beta$
Weekly average No. of employees	E	β	0	β	$-\beta$	β	0	β	0	$-\beta$	0	$-\beta$	β	$-\beta$	0	$-\beta$
Facilities per unit of output	G	β	β	β	β	β	0	0	0	0	0	$-\beta$	$-\beta$	$-\beta$	$-\beta$	$-\beta$
Capital interest charges per unit of output	H	β	β	β	β	β	0	0	0	0	0	$-\beta$	$-\beta$	$-\beta$	$-\beta$	$-\beta$
The resultant % change in productivity	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 9.11

Component Variable	Subscripts	1	2	3	4	5	6	7	8	9	10
Price per unit of output	A	β	β	β	β	β	$-\beta$	$-\beta$	$-\beta$	$-\beta$	$-\beta$
Output Quantity	B	β	β	0	$-\beta$	$-\beta$	β	β	0	$-\beta$	$-\beta$
Bought-in input cost per unit of output	C	β	β	β	β	β	$-\beta$	$-\beta$	$-\beta$	$-\beta$	$-\beta$
Remuneration per man per year	D	β	0	0	0	$-\beta$	β	0	0	0	$-\beta$
Weekly average number of employees	E	0	β	0	$-\beta$	0	0	β	0	$-\beta$	0
Facilities per unit of output	G	0	0	0	0	0	0	0	0	0	0
Capital interest charges per unit of output	H	0	0	0	0	0	0	0	0	0	0
The resultant % change in productivity	X	β	β	β	β	β	$-\beta$	$-\beta$	$-\beta$	$-\beta$	$-\beta$

β = percentage change which may be applied to each of the 7 variables

* Special case when there is no change at all

1086 negative, 15 zero and 1086 positive results. Therefore the median (number 1094 in output) is always equal to zero.

3. There are 10 cases in which the percentage of absolute amount of change is equal to β , which is the absolute amount of change chosen for components. This is represented in Table 9. 11 in which percentage change in total productivity in 5 cases are equal to β and in another five cases equal to $-\beta$. Therefore one can see five cases equal to 1 and 5 cases equal to - 1 since β in this analysis is equal to 1.

4. The absolute amount of percentage change in total productivity with positive sign in most cases are greater than the absolute amount of percentage change in corresponding negative number. For example the greatest result with positive sign for British Leyland is 8.14238 whereas the greatest result with negative sign is 7.78072 which is less than previous one. Therefore as one can see from the Table 9. 9 the mean value of the overall output is positive for every company, and it is equal to .00884, .00836, .00904 and .00747 for B. L., Ford, Vauxhall and Chrysler respectively.

5. The skewness for all distributions are positive independent of the number of class intervals chosen. The skewness or the degree of asymetry can be calculated using the following statistical formula:

$$\text{Skewness} = \frac{3\ (\text{mean} - \text{median})}{\text{standard Deviation.}}$$

In Table 9. 9 the skewness is given as . 00799, . 00697, . 00580, and . 00418 for B. L., Ford, Vauxhall and Chrysler respectively. Therefore all distribution polygons (or curves) are skewed to the right, and the results discussed in number 4 about mean values confirm this argument. Another measure of skewness used by mathematical statisticians (58, 59) is moment coefficient of skewness defined as $\frac{\sum(x - \bar{x})^3}{N.\, SD^3}$ where x, $\bar{x}$, n and SD are an observation, mean value of observations, total number of observations and standard deviation respectively. This measure calculated through a computer program is given in the same table as . 02391, . 02149, . 01808 and . 01385 for B. L., Ford, Vauxhall and Chrysler respectively. For a normal distribution this measure is equal to zero. Therefore from the above numbers it follows that the skewness of each of these four distributions is positive and although they are not normal distribution, the degree of asymetry is low. From both of the measures of skewness it is clear that in terms of closeness to the normal distribution the companies can be ranked as Chrysler, Vauxhall, Ford and B. L. respectively. This can be seen from the Figs. 9. 2 to 9. 9 as well.

6. Another characteristic of any distribution with respect to normality is its measure of Kurtosis. This is used to describe the degree of peakedness in a distribution. It can be calculated by subtracting the moment coefficient of Kurtosis from 3 where :

$$\text{Moment coefficient of Kurtosis} = \frac{\sum(x - \bar{x})^4}{N.\, SD^4}$$

therefore Kurtosis = $\dfrac{\Sigma(x - \bar{x})^4}{N.\ SD^4} - 3$

where the measure of Kurtosis is positive, it is called leptokurtic and when it is negative it is called platykurtic. In fact leptokurtic refers to the distribution which has high peak whereas platykurtic describes a flat - topped distribution. The normal distribution has zero Kurtosis. Table 9. 9 gives the Kurtosis of B. L. , Ford, Vauxhall and Chrysler as - . 64865, - . 66897, - . 66897 and - . 71748 respectively. Therefore all the distributions represented in Figs. 9. 2 to 9. 9 are of the platykurtic kind. The closeness to normality from the Kurtosis point of view for the above four companies are in order of B. L. , Ford, Vauxhall and Chrysler, which is opposite to that of skewness, and it is difficult to see which one is really nearer to normality from both points of view.

Numbers 1 to 5 above and partly number 6 are general characteristics which are in fact embedded within the model used and less dependent on data used. However there are some other results which are more dependent on the data used and on the way of representation as follows:

1. The amount of mode and also the number of modes in each polygon depends both on the data and the number of class intervals chosen. From Figs. 9. 2 to 9. 9 it is clear that B. L. has only one mode whereas Ford, Vauxhall and Chrysler have 4, 4 and 5 modes respectively. The number of modes may change if one changes the number of class intervals. In table 9. 9 the measure of modes for all analysis are given.

2. The measure of dispersion for the four companies can be seen from the range or more precisely from the standard deviation which is equal to 3. 31836, 3. 60067, 4. 67563 and 5. 36262 for B. L., Ford, Vauxhall and Chrysler respectively and depends on the data used.

9. 3. DETERMINISTIC APPRAISAL

Sensitivity analysis as discussed earlier is concerned either with a constant change in one of the variables in isolation (single sensitivity) or a constant absolute amount of change (ß) in two or more variable (group sensitivity) to observe their effects on productivity. In deterministic appraisal, however, one is interested to explore the possible effect of several changes which take place simultaneously. For example where the change in the seven variables discussed earlier are as follows:

a = 4%+1, 4= % change in component variable A where A = 3. 315

b = 1%+1, 1= % change in component variable B where B = 2.256

c = -1%+1,-1= % change in component variable C where C = 785.00

d = 6%+1, 6= % change in component variable D where D = 3. 612

e = -2%+1,-2= % change in component variable E where E = 194. 600

g = 1%+1, 1= % change in component variable G where G = . 091

h = 3%+1, 3= % change in component variable H where H = . 068

the change in productivity can be calculated using the formula given earlier as:

$$x = \frac{(D.E + G.C + H.C)(aA.cC - bB.cC)}{(dD.eE + gG.cC + hH.cC)(A.C - BC)} - 1 = 5.67189\%$$

Therefore the resultant change in productivity due to seven different changes in component variables is equal to 5.67189% with respect to its previous value.

It is clear that the sensitivity analysis, discussed earlier is a special case of deterministic appraisal in which the absolute amount of change (β) of the component variables are the same or equal to zero.

In this thesis deterministic appraisal is used in two different ways called 'range deterministic appraisal' and 'target deterministic appraisal' as follows:

9.3.1 <u>Range Deterministic Appraisal</u>

The company concerned with productivity measurement may have a range of values for each variable obtained through forecasting techniques or otherwise. Then the computation carried out in this way gives different results each of them referring to a combination of discrete values of component variables which enable the company to select an appropriate combination among them. Suppose these ranges of discrete values are calculated by the percentage change in their original values for B. L. through forecasting or otherwise as follows:

A	changes from +4% to + 8%	5 cases
B	changes from +1% to +5%	5 cases
C	changes from -1% to +2% incl. zero	4 cases
D	changes from +6% to +10%	5 cases
E	changes from -2% to +2% incl. zero	5 cases
G	changes from +1% to +4%	4 cases
H	changes from -1% to +4% incl. zero	6 cases

In terms of integer percentage values from the above ranges it can be easily found that there are 60,000 combinations calculated from

$5 \times 5 \times 4 \times 5 \times 5 \times 4 \times 6 = 60,000$

To enable the company to have access to all results with corresponding combinations of values a computer program has been written. The flow chart of this program is given in figure 9.10. This computer program consists of different sections as follows:

1. Section I comes after the original data for the 7 component variables are read and the productivity based on them is calculated. In this section all component variables are calculated after their assumed percentage of changes take place.

2. In section II the change in productivity is calculated for all possible combinations of change in component variables which are equal to 60,000 cases.

3. Section III prints out all 60,000 results with their corresponding changes in component variables obtained in Section II.

4. Section IV arrange all 60,000 results in ascending order using a package (library file in Aston University, Computer Centre).

5. Section V prints the results of Section IV in which each line consists of ten numbers.

Section one and two of Appendix B represents part of the results of the range deterministic appraisal with and without their

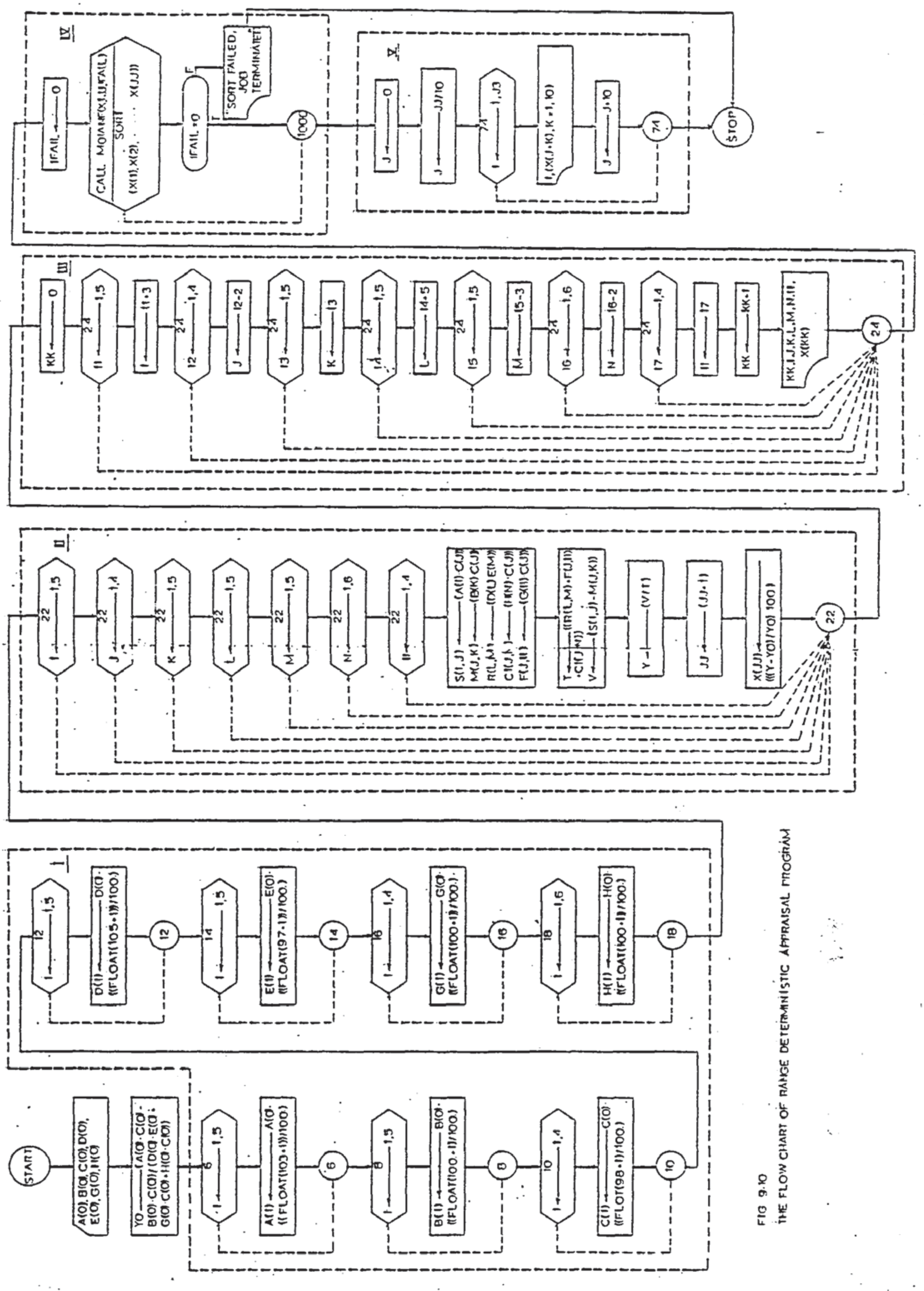

FIG 9.10
THE FLOW CHART OF RANGE DETERMINISTIC APPRAISAL PROGRAM

respective change in component variables.

9. 3. 2. Target Deterministic Appraisal

In range deterministic appraisal one is faced with a large number of results based on the ranges of values that component variables can select. It is very difficult for the manager to select one combination of change, in component variables out of the large number, namely 60, 000. The problem can be overcome to some sense by knowing the target of the company with respect to the productivity. In this situation having determined the range of change for both controllable and uncontrollable variables (A, i. e. price can be assumed as controllable and the others uncontrollable) through forecasting or otherwise, and having put forward a target for productivity change, the number of combinations will be restricted to a small number with respect to range deterministic appraisal.

A computer program is written for this appraisal and its detail flow chart is represented in Figure 9. 11 which can be described as follows:

1. Sections I and II are nearly the same as explained in Fig. 9. 10 which reads the data for variables and target figure of productivity, and calculates the percentage change in productivity due to change in values of component variables.

2. Section III calculate all numbers and select those results which satisfy the target figure for productivity (target figure i. e., y is 12% which means 12% increase in productivity and a range of 11. 9

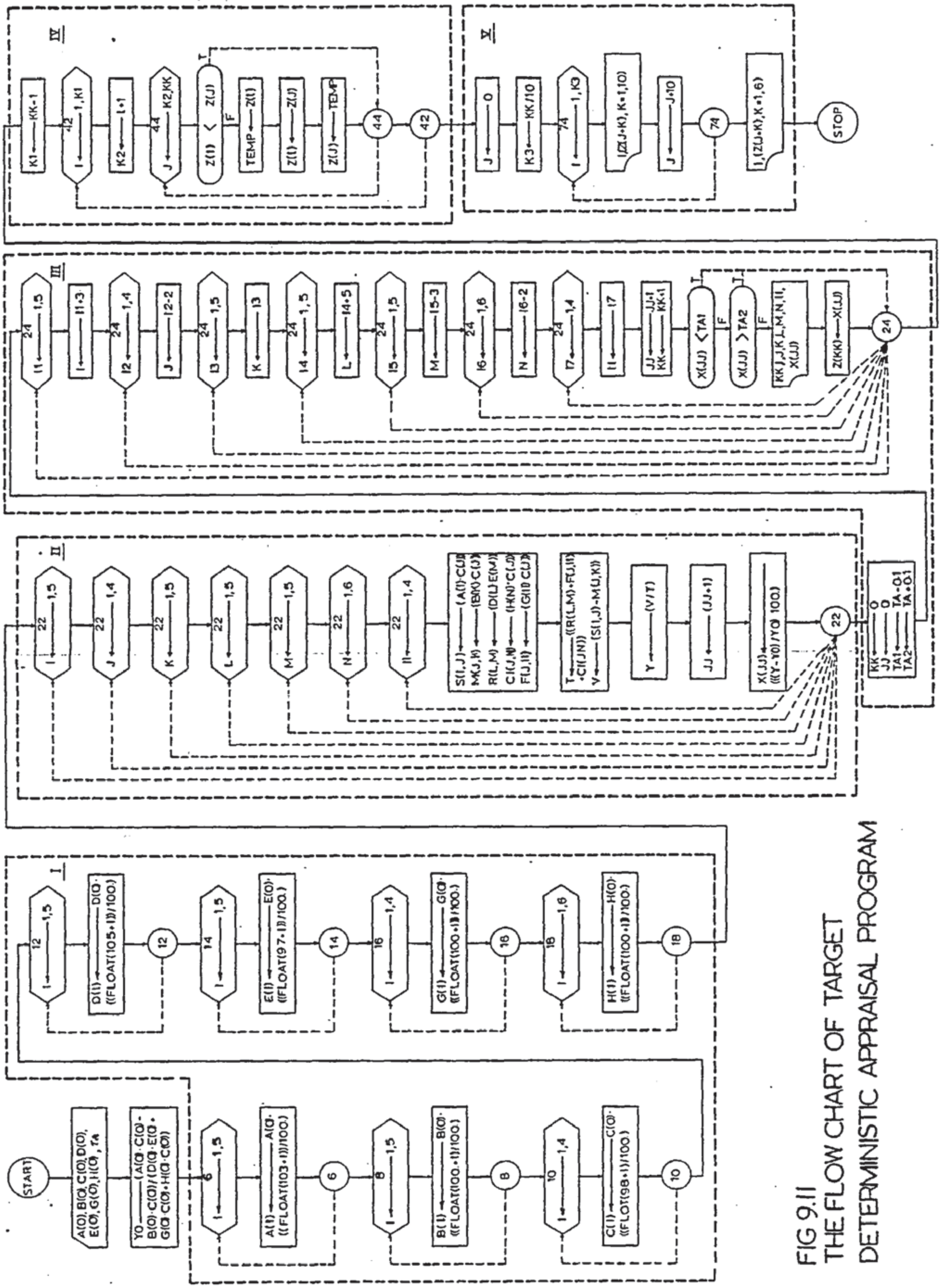

FIG 9.11
THE FLOW CHART OF TARGET
DETERMINISTIC APPRAISAL PROGRAM

to 12.1, i.e. 12 $\pm$ .1 is acceptable). It also prints these results together with change in their component variables.

3. Section IV arrange all accepted results in ascending order using a sorting program and section V prints all of these results.

In appendix C section three shows part of the results with their component variables and section four represents the whole results of target deterministic appraisal.

9.3.3. Deterministic Appraisal Analysis

Deterministic appraisal gives the analyst a good insight into the range of change which take place due to change in component variables. Looking at the spectrum of change enable him to be in a better position for making a decision for productivity planning. It represents how wide the resultant range of change could be with a narrow range of change in component variables. For example in B.L. the change in component variables are not more than 5% of their original values but the results varies from - 8.98471 to +20.99202 which is about 30% change from the original value. The target deterministic appraisal throws light onto the range of changes which give a pre-determined target for productivity changes.

9.4 RISK SIMULATION

Since the sensitivity analysis is a special case of deterministic appraisal, both methods discussed earlier can be brought under a general title, deterministic model. In the deterministic approach it is assumed that the changes in component variables are known precisely in advance and therefore every set of selected values, as relative change in component variables produces a single and precise answer for change in productivity. These selected values are based on the best estimates obtained through forecasting techniques or otherwise. The productivity growth computation based on the estimates of the change in component variables as input variables leave out the critical dimension of risk. The range deterministic appraisal described earlier with a large number of values still does not provide any basis for estimating the likelihood of these various sets occurring.

Risk simulation, however, is a stochastic model and method concerned with ranges of values based on probability distributions rather than a single estimate, to take into account the appropriate risk. Therefore as the productivity is computed from a set of values of component variables so can a probability distribution of the productivity be computed from the probability distribution of the component variables. The difference between this model and deterministic model can be seen in Figs. 9.12 and 9.13 below:

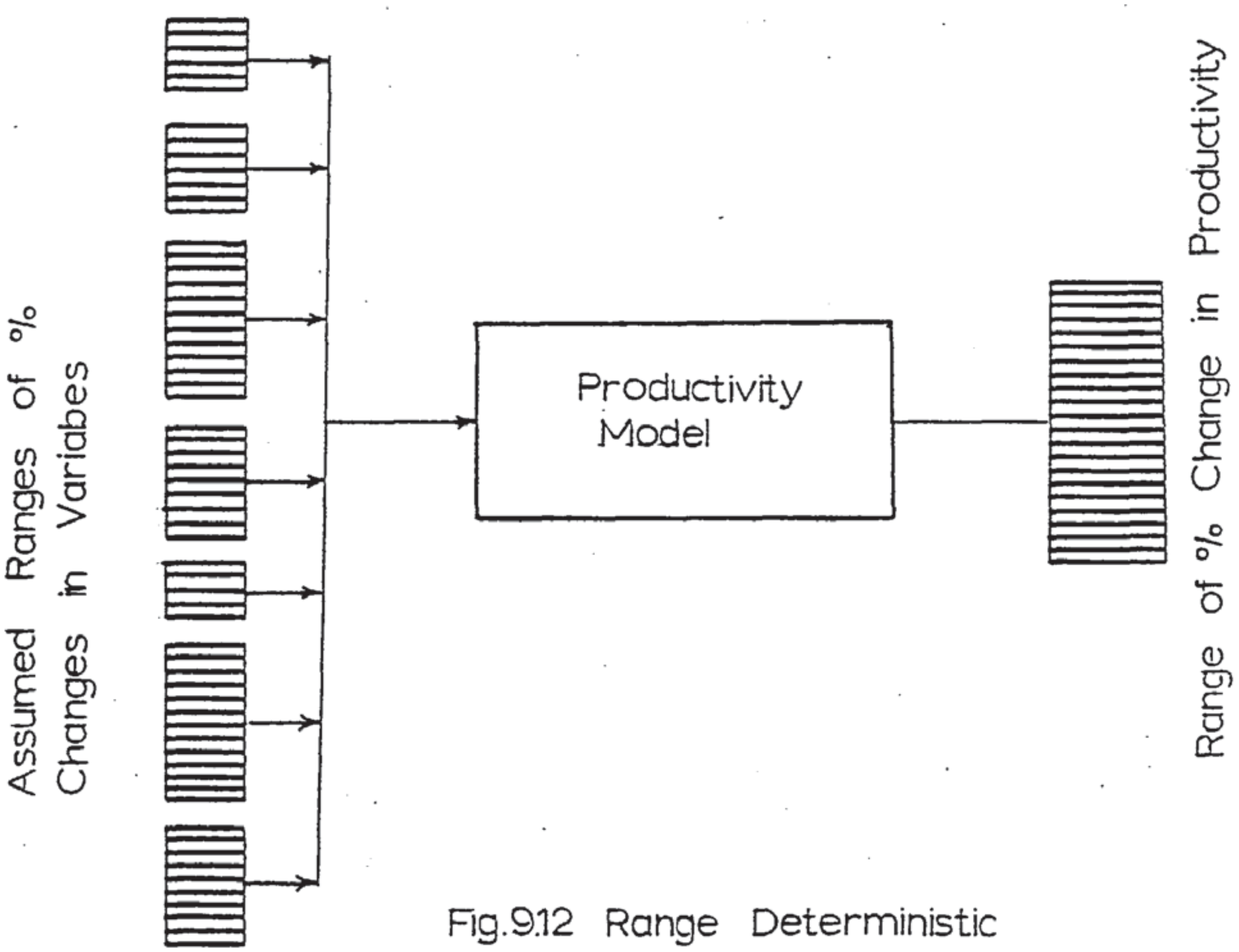

Fig.9.12 Range Deterministic
(Deterministic Model)

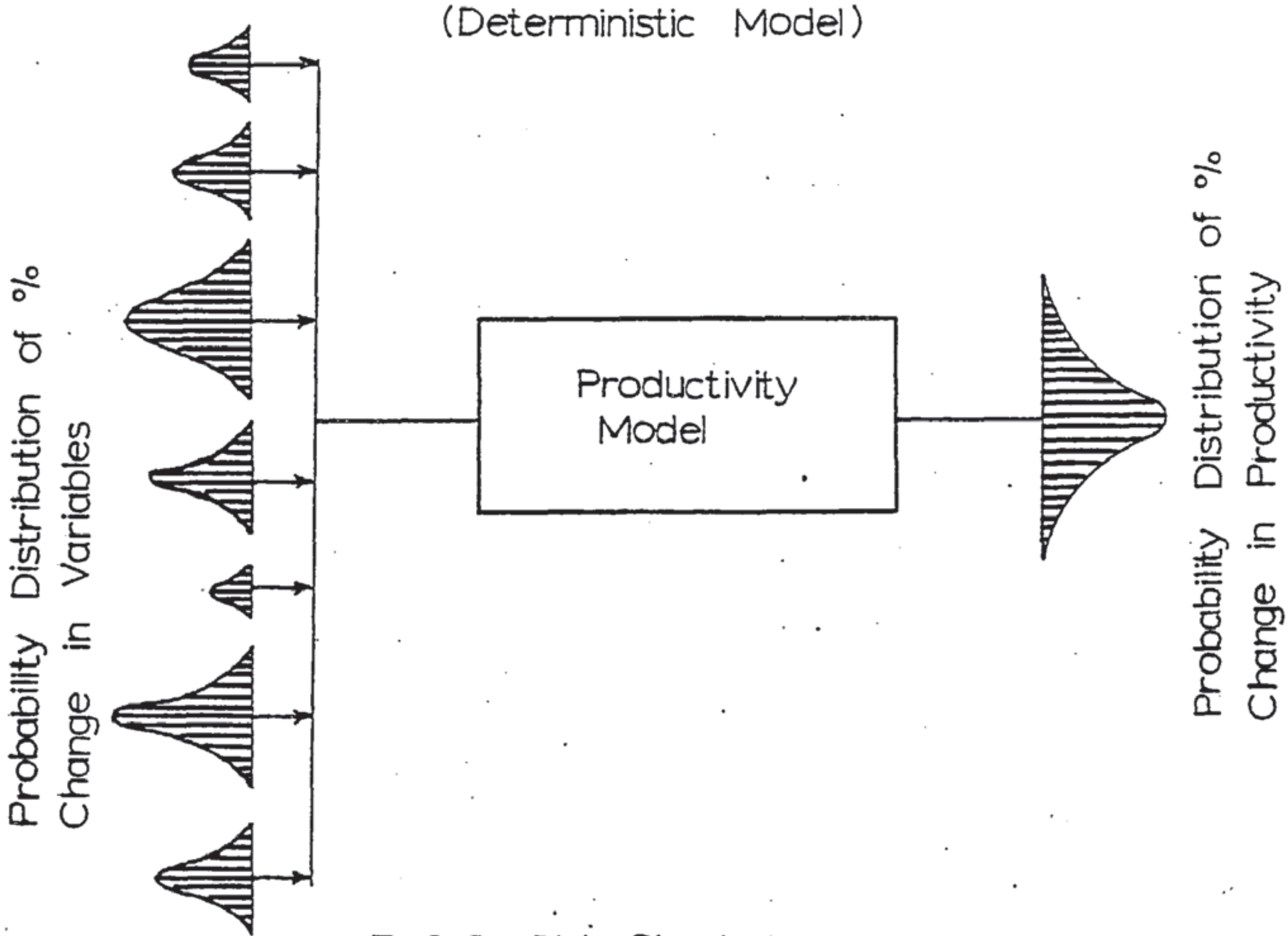

Fig.9.13 Risk Simulation
(Stochastic Model)

In the literature adequate attention has not yet been paid to the risk simulation approach. However as a general method in obtaining probability distribution of the selected performance criterion it is introduced and/or used by Grove (75), Hess and Quigley (76), Economos (77) and recently Eilon (78, 23) on the assumption of normality and independent variables. Hess and Quigley following the analytical approach of Grove have come to the conclusion that usually with more than one variable subject to uncertainty, it is difficult to specify the probability distribution, so they designed a program to use the so called Monte Carlo simulation technique which gives a relatively high degree of accuracy even with a low number of runs (e. g. 100 which is practical to apply by a desk calculator in the absence of computer facilities).

The risk simulation method in productivity analysis based on the value added concept used in this thesis assumes statistical independence between individual variables and the existance of normality in their probability distributions. This set of values is then substituted into the model and the first sample value of the productivity (or change in productivity) is computed.

The individual values of productivity (or change in productivity) so obtained will give us the true probability distribution when the sample size is large enough.

The large number of computations required for this risk simulation necessitates computer facilities for efficient solution. The facilities can include also a package of random number generation based on the normal probability distribution.

The objectives of this stochastic approach are two-fold. The first one is to forecast the effects of composite changes in all component variables on productivity. The second one is concerned with calculating the necessary change in unit price as a controllable variable against a target which is put forward for change in productivity.

For both of these analyses two values for each variable are needed, mean and standard deviation, which can be obtained through a forecasting technique based on historical data or management guess with respect to the market's information. The application of risk simulation for this analysis is discussed below.

9.4.1. Application

Four computer programs are written as follows:

(i) A computer program called 'risk' which calculates the mean and standard deviation of productivity growth (change) distribution, having had the means and standard deviations of change in each component variable distribution. It also gives the frequency and the mean value of a number of class intervals for drawing the frequency distribution curve. Figure 9.14 represents the flow chart of this program and consists of the following sections:

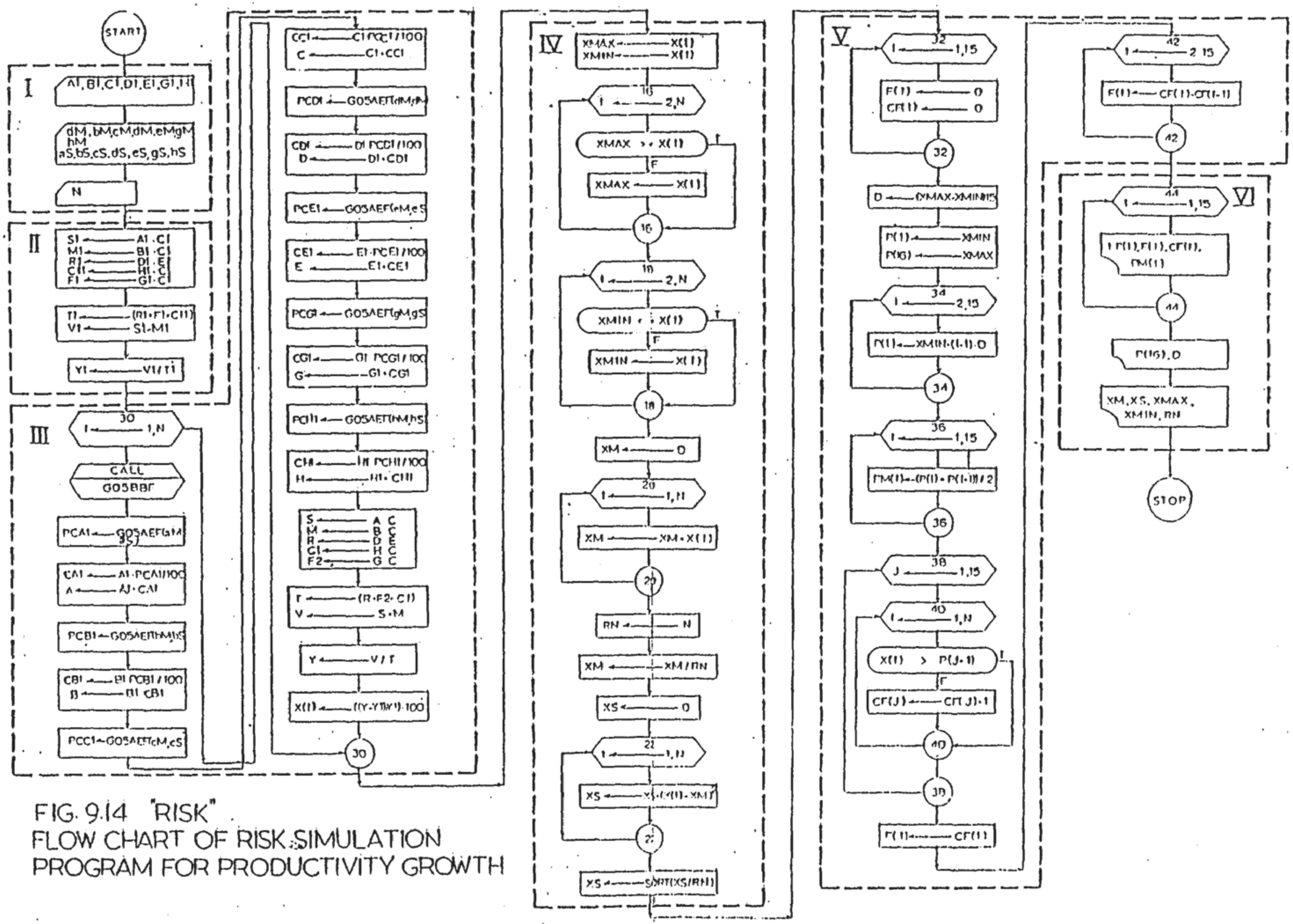

FIG. 9.14 "RISK"
FLOW CHART OF RISK SIMULATION
PROGRAM FOR PRODUCTIVITY GROWTH

1. Section I reads N, the number of runs, and three sets of values; values of component variables before change represented by A1 to H1, values of percentage change in component variable given by a M to hM, and values of their standard deviations given by aS to hS.

2. Section II calculates the productivity value before change in variables.

3. Section III calculates the change in productivity due to the change in component variables. This computation takes place n times (800). Each time the change in each component variable is obtained by giving the mean and standard deviation of that variable and calling a computer sub-routine of random variate generation for normal distribution called GOSAEF as part of library program called NAG*. Having calculated this change, the new value of that component variable is calculated. The productivity value for these new values and finally the percentage change in productivity with respect to the previous one is obtained.

4. Section IV calculates the maximum, the minimum, the mean value and the standard deviation of all values of changes in productivity.

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* Random variate generation method of package is described in Appendix D

5. Section V divides all values into 15 number of class intervals and calculates the frequency distribution and the mean value of each class interval.

6. Section VI prints the results obtained in sections IV and V.

(ii) A computer program called 'risktarget' calculates the mean and standard deviation of change in unit price as a controllable variable, having given mean and standard deviation of % change in productivity (XM and XS) as target to be achieved and mean and standard deviation of other component variables as uncontrollable parameters.

The structure of this program is the same as previous program with some differences resulted from interchange of places of two variables which can be seen from the flow chart represented in Figure 9.15.

To run the programs (i) and (ii) assumptions are made given in Table 9.12 and 9.13 respectively about percentage change in component variables (the original values A1 to H1 are real data of British Leyland).

TABLE 9.12

Original Value		Mean Value of % change		Standard Deviation	
A1 =	3.315	aM =	5.5	aS =	.18
B1 =	2.256	bM =	3.0	bS =	.21
C1 =	785.000	cM =	.5	cS =	.28
D1 =	3.612	dM =	7.5	dS =	.41
E1 =	194.6	eM =	0.0	eS =	.27
G1 =	.091	gM =	2.5	gS =	.15
H1 =	.068	hM =	1.5	hS =	.18

TABLE 9.13

Original Value		Mean Value of % Change		Standard Deviation	
A1 =	3.315	XM =	5.0	XS =	.55
B1 =	2.256	bM =	3.0	bS =	.65
C1 =	785.000	cM =	.5	cS =	.60
D1 =	3.612	dM =	7.5	dS =	.85
E1 =	194.6	eM =	0.0	eS =	.70
G1 =	.091	gM =	2.5	gS =	.50
H1 =	.068	hM =	1.5	hS =	.40

The results of running program (i) i.e. the sample mean and standard deviation of % change in productivity, using sample of 800, are equal to:

Mean = XM = 4.300

S.D. = XS = .847

The results of program (ii) i.e. the mean and standard deviation of change in unit price using the same sample size, are equal to:

Mean = aM = 5.748 %

S.D. = aS = .619 %

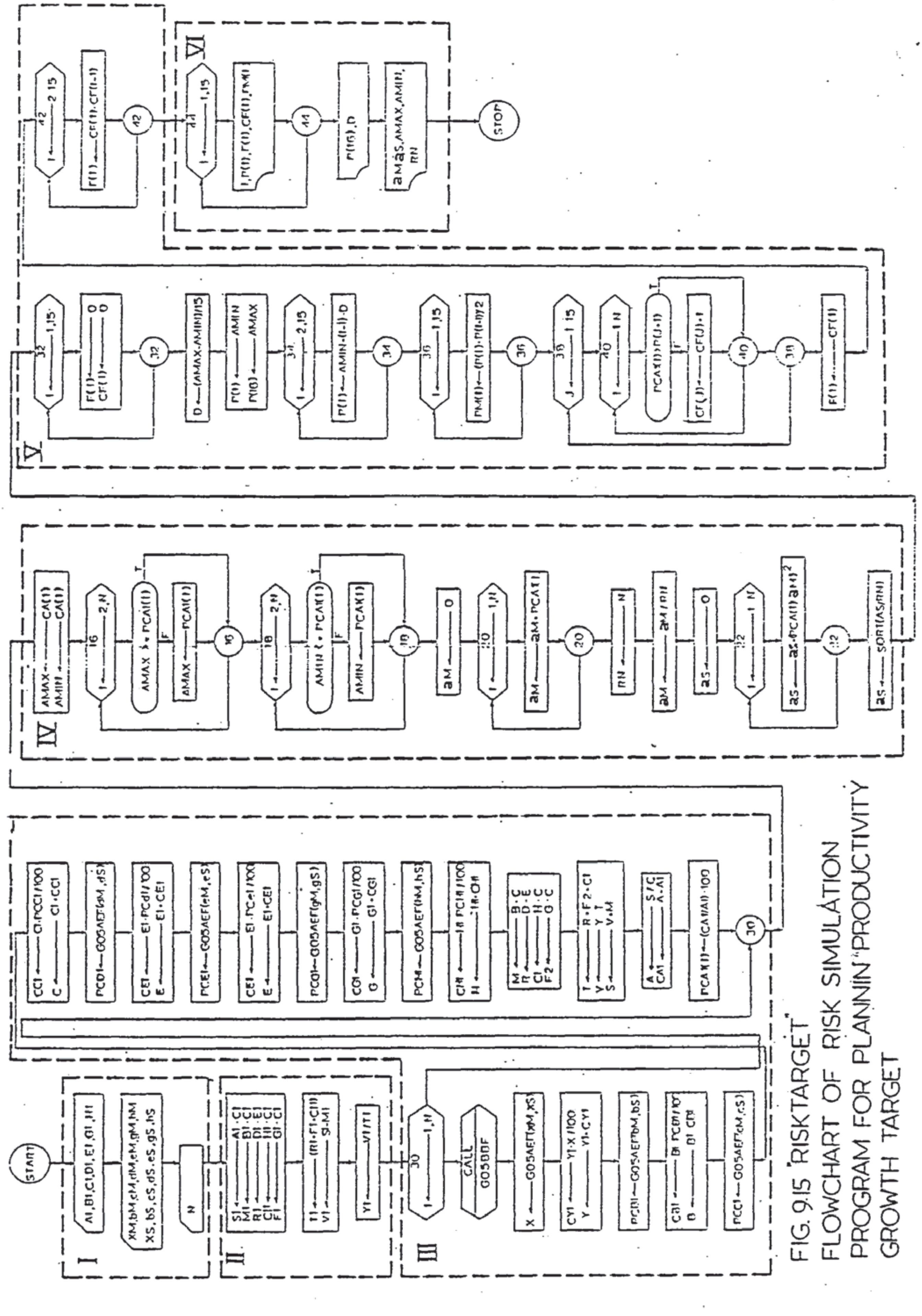

FIG. 9.15 "RISKTARGET"
FLOWCHART OF RISK SIMULATION
PROGRAM FOR PLANNIN "PRODUCTIVITY
GROWTH TARGET

Programs (i) and (ii) are concerned with change in values of variables rather than their values themselves. However most of the companies use and have access to mean and standard deviation of actual values of variables. Therefore the remaining two programs are following the same objectives as before but they are concerned with values rather than percentage change in values. Figures 9.16 and 9.17 illustrate the probability distribution curves of programs (i) and (ii).

(iii) A computer program called 'risk-y' which calculates the mean and standard deviation of the productivity distribution with respect to means and standard deviations of all component variables.

Figure 9.18 show the flow chart of this program in which the same number of sections as program (i) exists. However in this program the nomenclatures aM to hM and aS to hS are replaced with AM to HM and AS to HS respectively to show the values of variables rather than their percentage changes.

(iv) A computer program called 'risk-y target' which calculates the mean and standard deviation of unit price (A) as controllable variable, having had mean and standard deviation of productivity as target to be achieved, and means and standard deviations of other component variables as uncontrollable variables.

Figure 9.19 represents the flow chart of this program with the same number of sections as program (i).

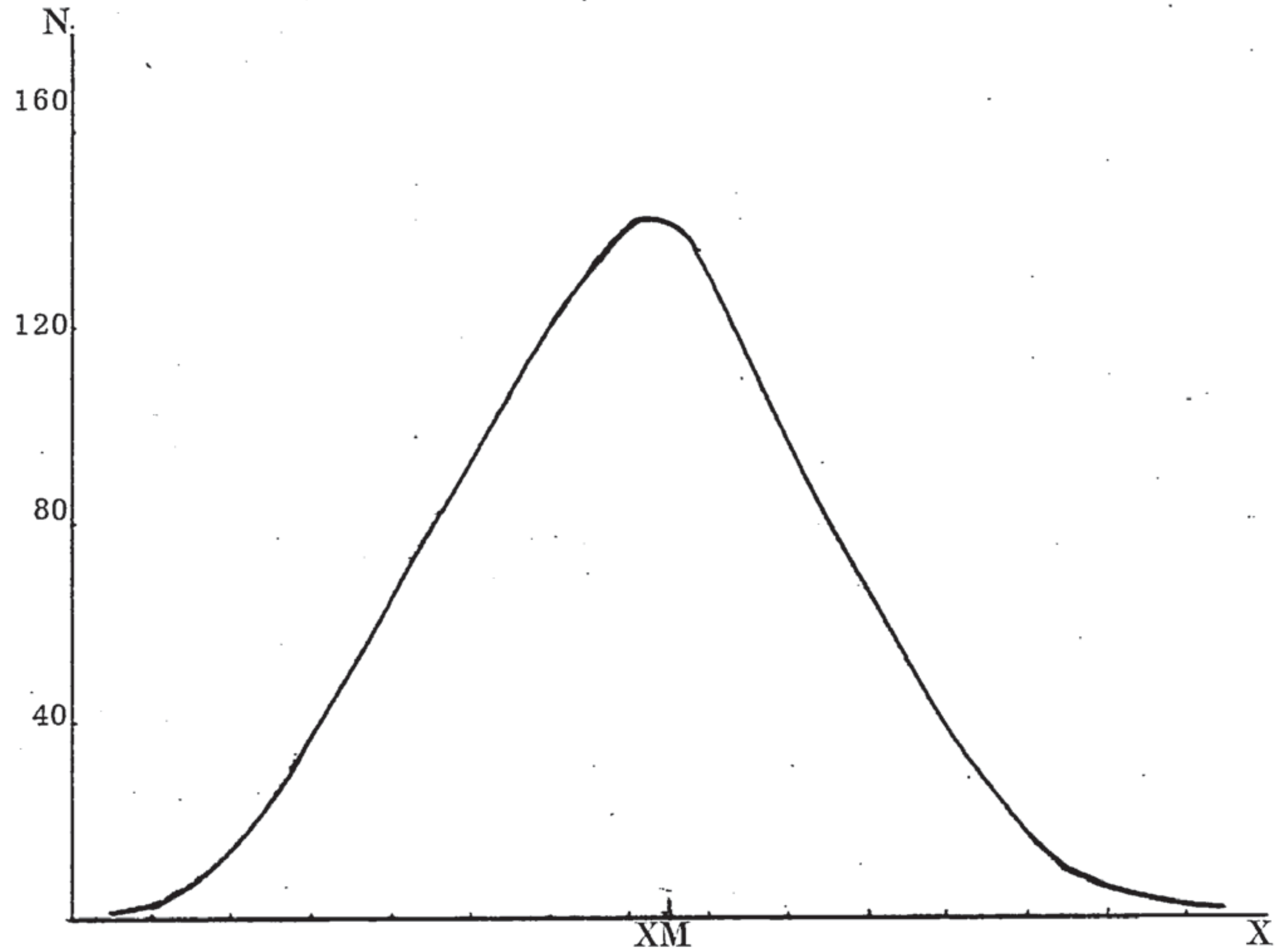

Fig. 9.16 - PROBABILITY DISTRIBUTION OF 'RISK' PROGRAM

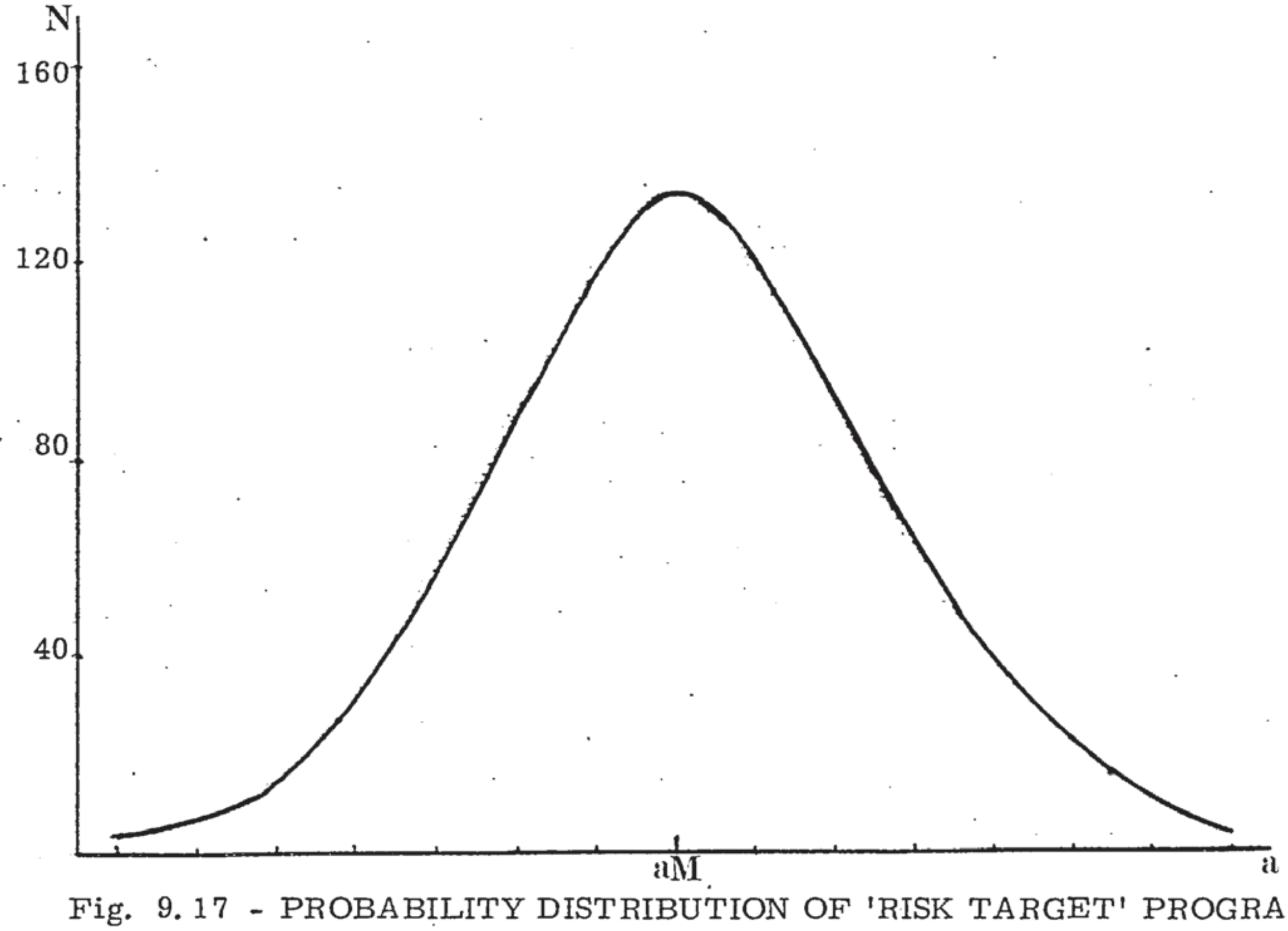

Fig. 9.17 - PROBABILITY DISTRIBUTION OF 'RISK TARGET' PROGRAM.

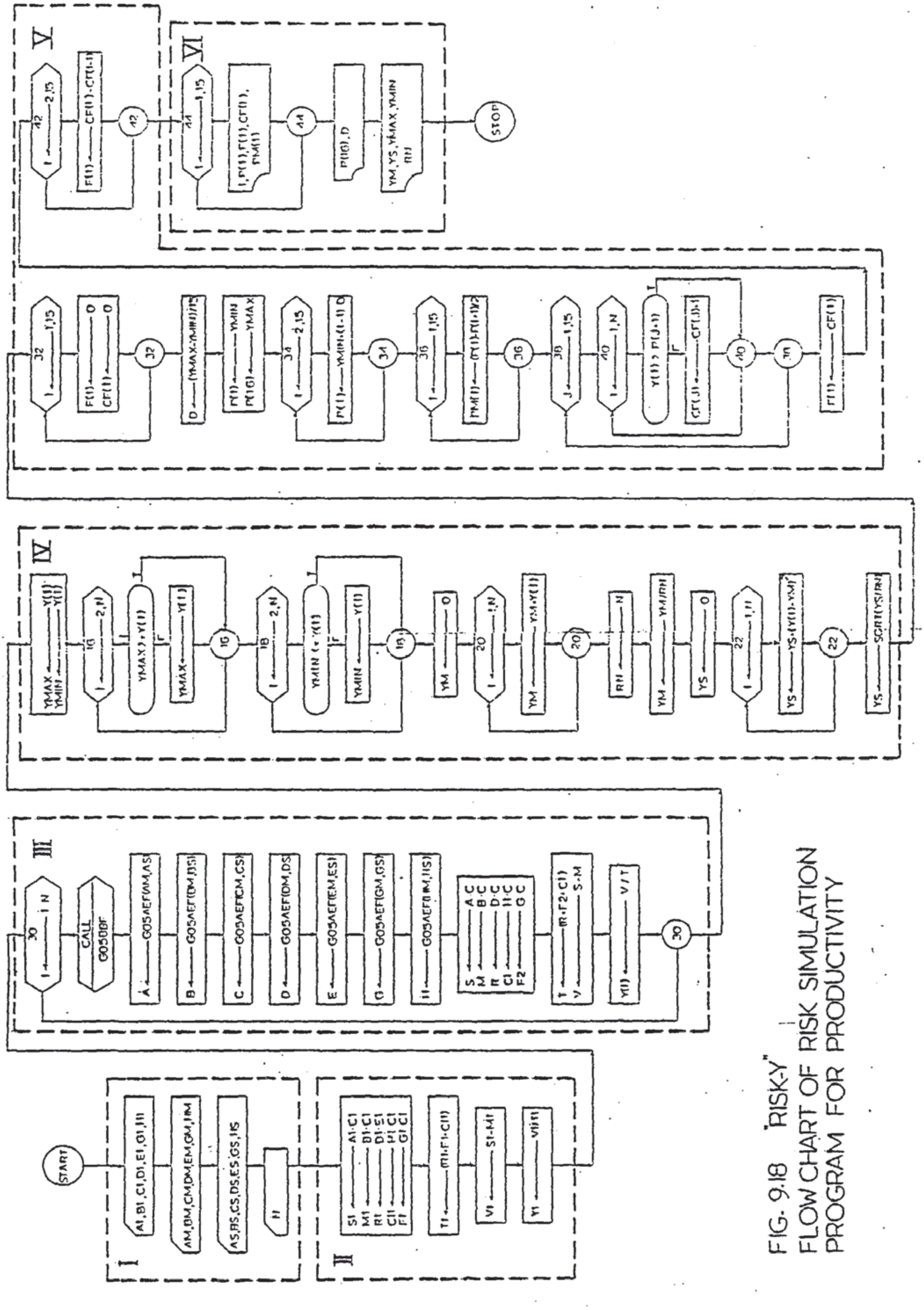

FIG. 9.18 "RISK-Y"
FLOW CHART OF RISK SIMULATION
PROGRAM FOR PRODUCTIVITY

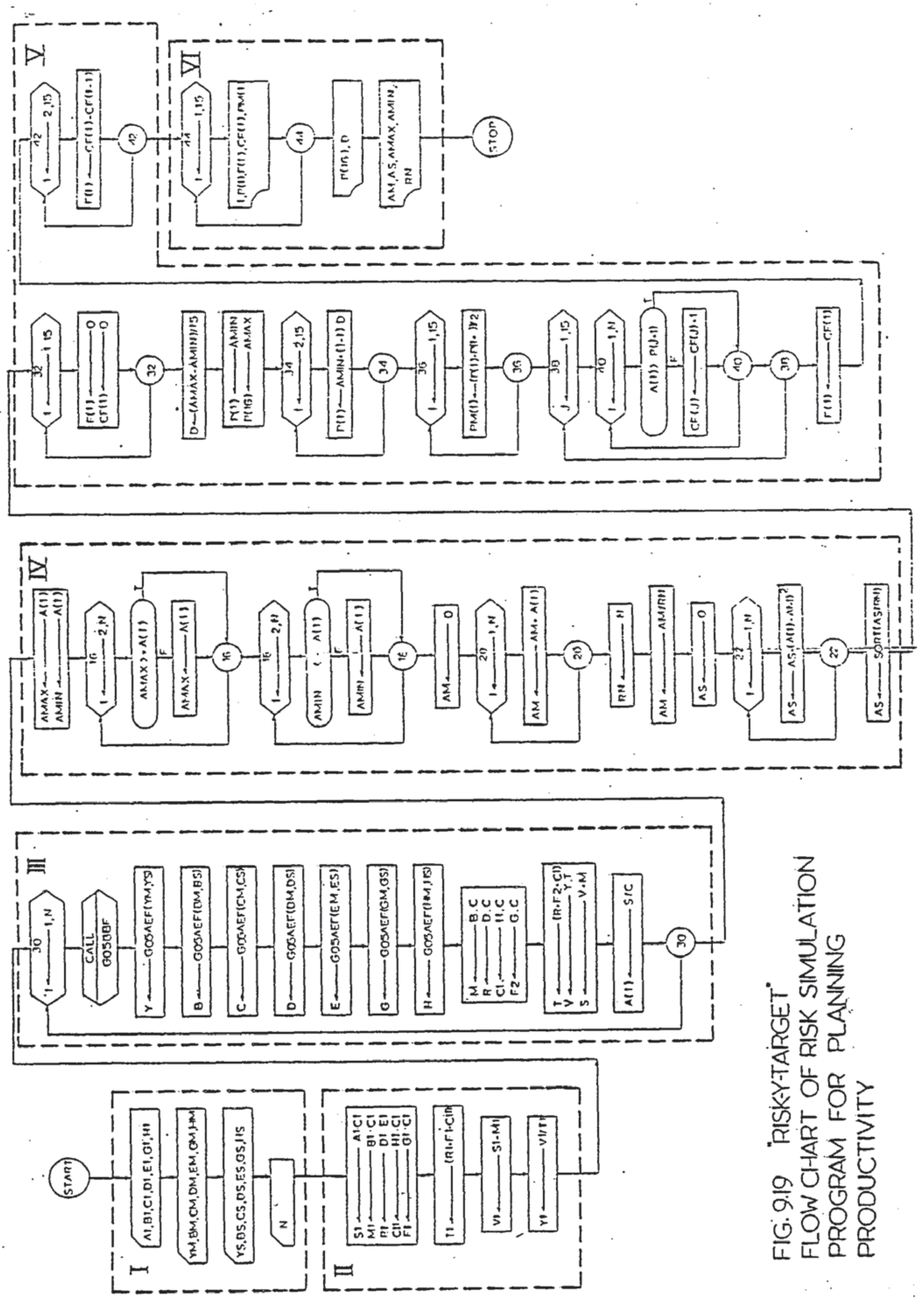

FIG. 9.19 "RISKY-TARGET" FLOW CHART OF RISK SIMULATION PROGRAM FOR PLANNING PRODUCTIVITY

Examples of programs (iii) and (iv) can be given using the real data of B. L. The first step is to calculate the mean and standard deviation of all component variables using forecasting techniques.

The actual data of these component variables over past 10 years are used to forecast their means and standard deviations for next year through their trend curves. From the figures 7. 7 in Chapter 7 it can be seen that the structure of trend curves for all variables are not the same. The mathematical trend equations used in this thesis to forecast the variables A, B, C, D, E, G and H are polynomials of degree four. The calculation of these equations with their respective standard deviations and trend curves are given in Appendix E. The two sets of values resulting from forecasting analysis together with the original values of variables can be seen in Table 9. 14 below:

TABLE 9. 14

Original Value		Mean Value of Variables		Standard Deviations	
A1 =	3. 315	AM =	3. 753	AS =	. 090
B1 =	2. 341	BM =	2. 532	BS =	. 059
C1 =	814. 933	CM =	798. 197	CS =	51. 308
D1 =	4. 020	DM =	3. 919	DS =	. 080
E1 =	194. 407	EM =	194. 230	ES =	6. 691
G1 =	. 091	GM =	. 103	GS =	. 004
H1 =	. 068	HM =	. 077	HS =	. 005

Putting the above data into program (iii) the mean and standard deviation of productivity for B. L. are calculated and equal to:

Mean = YM = 1. 088

S. D. = YS = . 114

where the original value for productivity is equal to Y1 = 1. 006 program (iv) is run using the same data as above and a value target for productivity equal to 1. 036 (3% increase with respect to original value of 1. 006) and its standard deviation equal to . 025 to find out the mean and standard deviation for price (A). The results of this program are equal to:

Mean = AM = 3. 711

S. D. = AS = . 095

The probability distributions of these two sets of results of programs (iii) and (iv) are illustrated in Figures 9. 20 and 9. 21.

9. 4. 2 Discussion of Results

The results of four risk simulation programs each of 800 runs can be discussed as follows:

(i) Given means and standard deviations of percentage change in component variables as in Table 9. 12, the expected change in productivity for next year has mean and standard deviation equal to 4. 3 and . 847 respectively. This means that one can be 90% confident that productivity of next year with respect to this year will have a change between 2. 90% and 5. 70% (4. 3 $\pm$ 1. 65 x . 847). Having had the value of productivity of this year equal to 1. 006, the next year productivity will be between 1. 035 and 1. 063.

(ii) Knowing means and standard deviation of change in productivity as the target to be achieved and means and standard

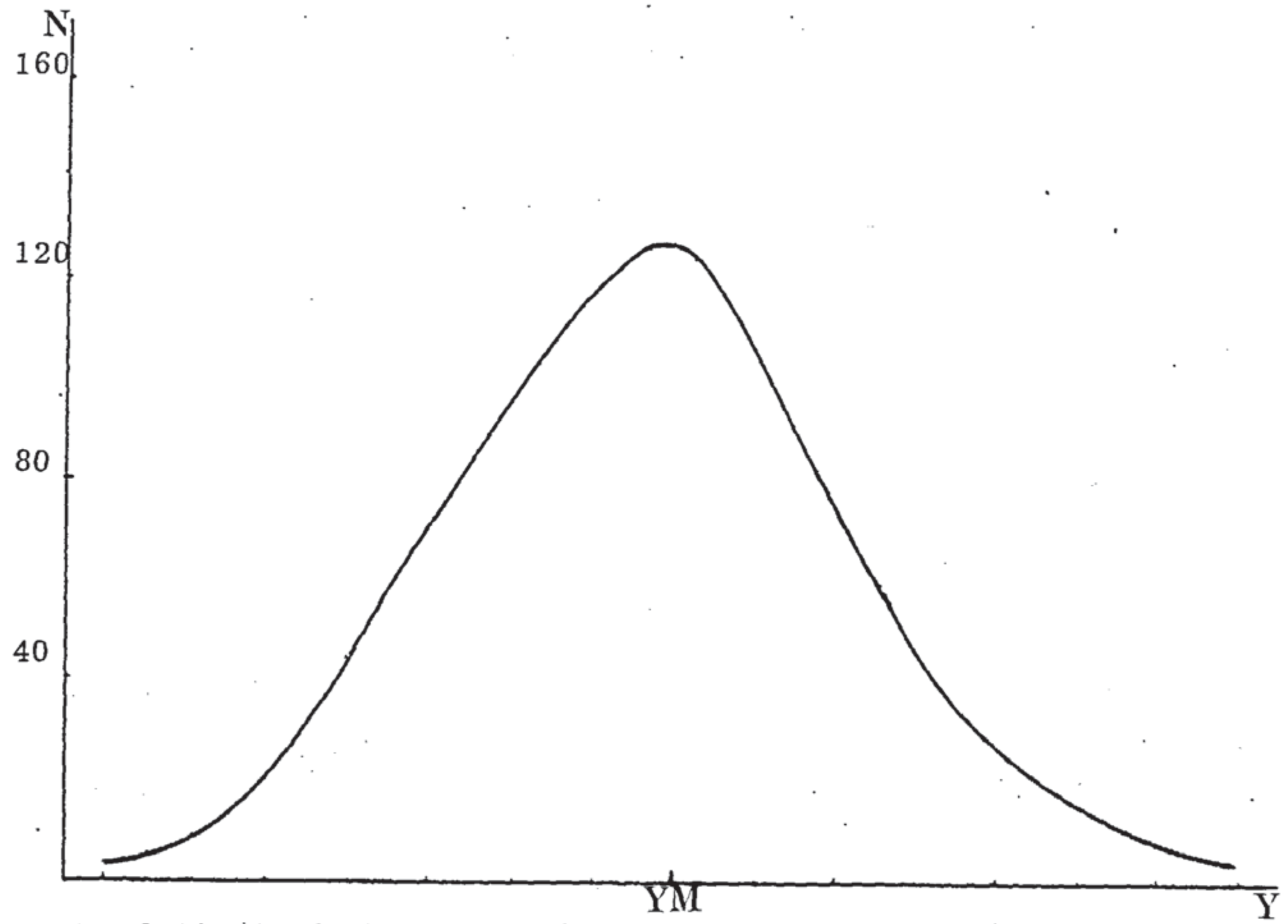

Fig. 9.20 - PROBABILITY DISTRIBUTION CURVE OF 'RISKY' PROGRAM

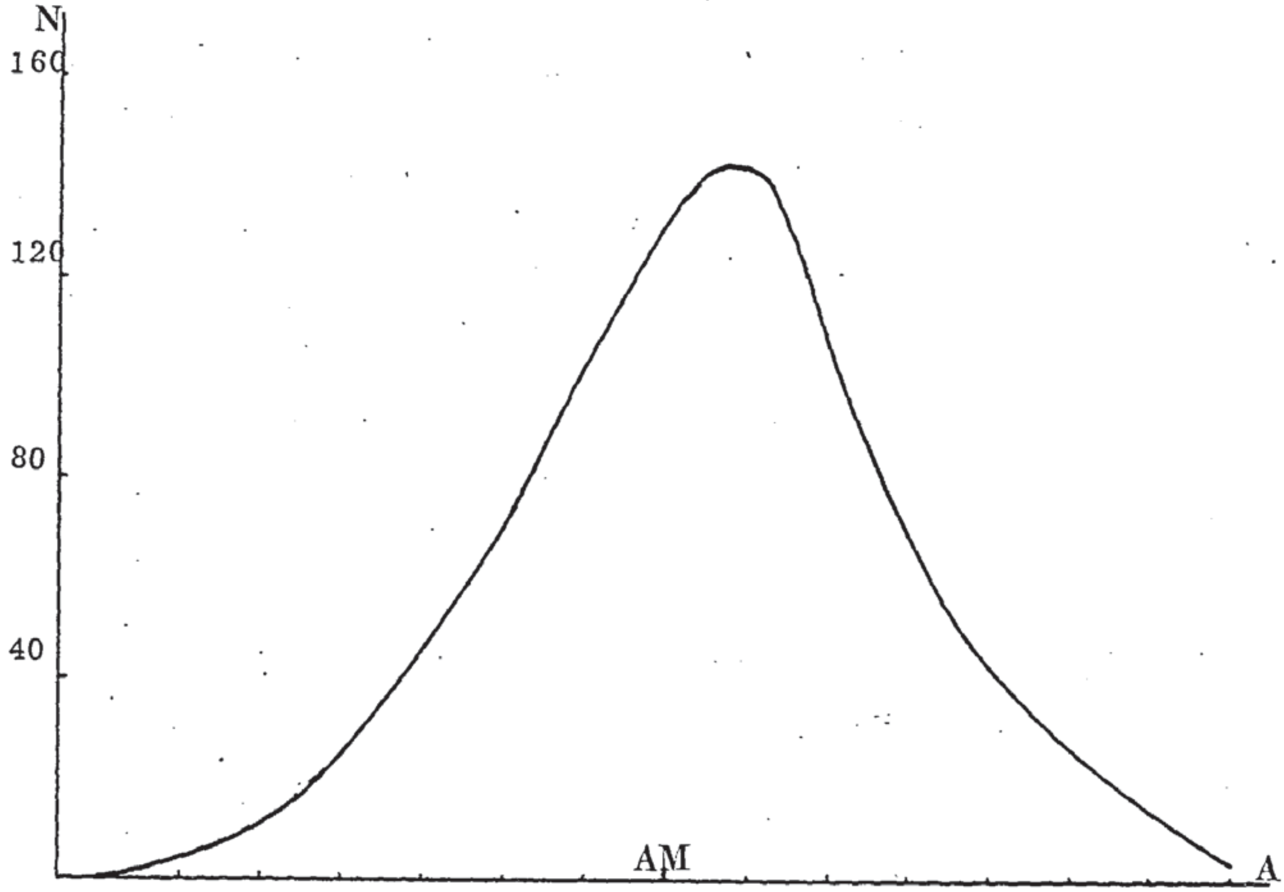

Fig. 9.21 - PROBABILITY DISTRIBUTION CURVE OF 'RISKY TARGET' PROGRAM.

deviation of other component variables as controllable ones given in Table 9.13, then mean and standard deviation of percentage change in price is obtained through program 'risk-target' equal to 5. 748 and . 619 respectively. Therefore with 90% confidence interval, change in next year's price with respect to this year should be set up between 4. 73% and 6. 77%.

(iii) The results of program 'risk-y' using data of British Leyland shows that mean and standard deviation of productivity for next year will be equal to 1. 088 and . 114 respectively. Again with 90% confidence level, the value of productivity will be betwen . 90 and 1, 28.

(iv) With the same data from British Leyland and a target for productivity equal to 1. 036 with standard deviation of . 025, the value of price as controllable variable has been obtained equal to 3. 711 with standard deviation . 095. This means that with 90% confidence interval, price should be set up between £3711 ± £157 or between £3, 554 and £3868.

Distribution of these four risk simulations are approximately normal as represented in Figs. 9.16 , 9.17, 9. 20 and 9. 21.

9. 4. 3 Test of the Model

Fishman and Kiviat (155) divide the process of testing a model into three categories as follows:

Verification

This category ensures one that the model behaves the same as the experimentor wants.

Validation

It examines the agreement between the behaviour of the model and that of the real world system.

Problem Analysis

This category deals with the analysis and interpretation of the results generated by the experimentors.

The first category, refers to choosing a particular model, its limitations and competence in comparison with other models and with respect to the objectives to be achieved. The reasons behind the choosing of the model are given and discussed in Chapters 3, 6 and 7 (Sections of the added value base measure).

The third category is concerned with problems from data collection to the interpretation of results. These problems are either general which are discussed in Chapter 5, or specific which are looked at in relevant chapters under analysis or discussion of results. Therefore the second category i. e. validation is left to discuss here.

Validation

Validation is in fact an attempt to verify the model's ability to predict the behaviour of the real world system, and this is particularly important in simulation models.

Since all models contain both simplifications and abstractions of the real world system, no model is absolutely correct, and correctness is in fact a matter of degree which relates to the cost of the model and time taken by it. Even though one has succeeded in developing a model that appears to be reasonable and adequately reproduces the past performance of the system, the question still remains about its validation for predicting the future. In fact the strongest verification of any simulation model occurs when one demonstrates that the model can successfully predict events which have not yet transpired.

When there is adequate data of the past to make a mathematical model, one way of supporting the validity of the model is to use a mathematical model and compare its results with that of simulation within an acceptable level of accuracy.

Having had the data of British Leyland over the past ten years, a polynomial model of degree four has been used to forecast the productivity for 1978 by extrapolation. This polynomial equation is given below (using the computer package).

$$Y_t = 1.2775 - .19585\,x + .066\,828\,x^2 - .0094454\,x^3 + .00044726\,x^4$$

where x refer to the number of the year and Y_t to the forecasting value of productivity.

TABLE 9.15

Year		1	2	3	4	5	6	7	8	9	10	11
Actual value of Productivity	Y	1.13	1.13	1.01	1.08	1.08	1.10	1.00	.88	1.08	1.00	
Forecast value of Productivity	Y_t	1.139	1.085	1.073	1.073	1.068	1.048	1.015	.984	.977	1.029	1.186

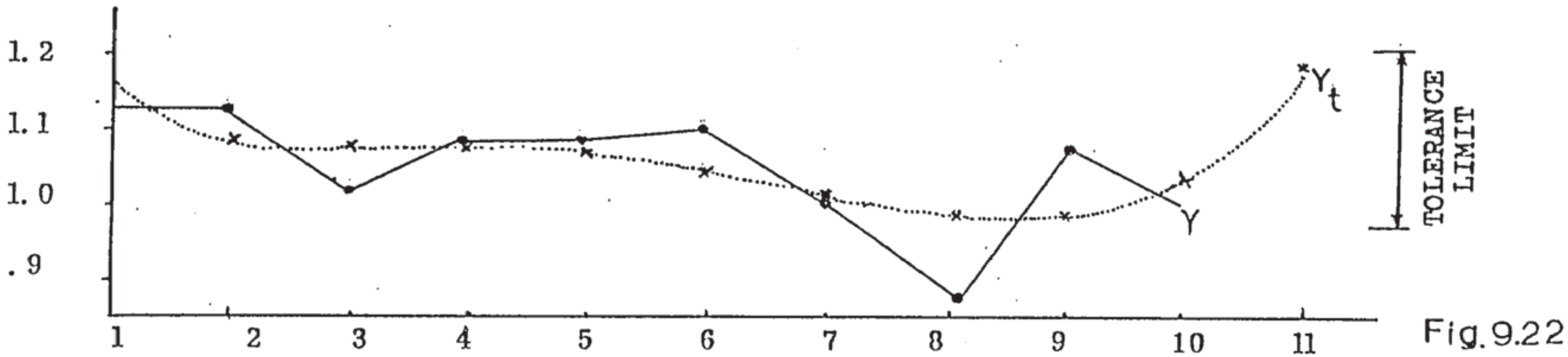

Fig.9.22

Accepting $\pm$ 10% tolerance limits for accuracy, the forecast value i.e. 1.186 should be within the range

$1.088 \pm .96 \times .114$ ($Z = \frac{1.088 \times 10\%}{.114} = .96$) or .978 and 1.198 which covers the value 1.186

9. 4. 4. Criticisms and Modifications

When it is not possible to obtain the very low values for standard deviations of component variables, the range of values computed for productivity or price might be so wide as to be meaningless. For example if one uses linear trend instead of polynomial of degree four to calculate the standard deviation for component variables and putting them in the program 'risk-y' using 400 runs, the mean and standard deviation of productivity will be equal to . 965 and . 468 respectively. This mean and standard deviation will give a range which is meaningless for decision making.

In such a situation two methods can be used to bring the results into a sensible range. The first is to use a deterministic rather than a stochastic method for some of the component variables, giving an exact value instead of range of values, when they are found out, using sensitivity analysis, not to be sensitive. Since much of the data upon which the design of the model is based may well be questionable, one needs to know how far off the data could be without changing the basic conclusions. Sensitivity analysis can tell how the model can be simplified by dropping one or more sub-systems from the model. Looking at the results of single sensitivity analysis for British Leyland in Tables 9. 3 and 9. 4 it is clear that the component variables G and H are insensitive with respect to other component variables, and 1% change in their values bring only . 08% and . 06% change in productivity . Looking at group sensitivity and also range deterministic appraisal, again the lack of sensitivity of these two variables are clear.

The second method of bringing the results into the meaningful range is to use the population mean rather than actual value as the criterion. Then if 400 runs of the simulation are taken as sample size, the range of the mean for productivity with 90% confidence interval in above example will be as follows:

$Y = .965 \pm 1.65 \times .468/ \sqrt{400} = .965 \pm .039$

Therefore the variation will be within the range $\pm$ 4% which is reasonable although it is not used in the same concept for variations as before.

Another problem facing the model is when there is not enough data of the past to forecast the parameter values of component variables. If it will not be possible for management to have reasonable estimates for component variables even through economic trend of the market the last resort is to employ a standard simulation technique (such as Monte Carlo simulation) to forecast the parameters of component variables and use them as input variables forrisk simulation to compute the value of productivity.

9. 5. SUMMARY AND CONCLUSION

This chapter was concerned with modelling techniques for forecasting and planning productivity and productivity growth. Three non-mutually independent models have been employed i. e. sensitivity analysis, deterministic appraisal and risk simulation. The first two are deterministic and the third one, stochastic.

Sensitivity analysis is used when the values of the component variables of the productivity model are not accurately known. In this case one can compute the results for a range of possible values and determine the sensitivity of the results to reasonable variations in these values.

Applying the sensitivity analysis to the productivity model based on the added value concept, using data from motor manufacturing companies, showed that:

- The sensitivity of the results to variables A and B are very high, to variables C, D and E are moderate and to variables G and H are very low. These variations of sensitivity are connected to the data and therefore to the nature of the products and industry.

- The sensitivity of results over an equal range in both direction for variables A and B are symetric whereas for other variables are asymetric. These show the characteristics of the productivity formula and are independent of the data used. However the deviation from the symetry for other variables are low and can be ignored.

By isolating the areas of sensitivity, time and resources can be allocated to them, thus reducing the likelihood and probable cost of measurement errors and post decision changes in the environment.

Deterministic appraisal is an extension of sensitivity analysis which shows the change in productivity due to different percentage values of change in component variables which take place simultaneously. Given the range of values of variables, the productivity and productivity growth can be calculated for all possible combinations of values of variables. This method is inefficient and expensive when the ranges of change in values are wide. However in planning productivity targets, the range of the values for controllable variables (e. g. price) is narrow and the method is therefore practical. The analysis of the deterministic method shows the conditions for zero, positive and negative changes in productivity.

The stochastic approach has the advantage over the deterministic approach in that the critical dimension of risk is taken into account. It relates to a composite set of factors derived from the total probability distributions of the component variables in the productivity model.

Developing the stochastic approach using a probability distribution of the productivity and productivity growth allows the analyst to make a quantitative assessment of the risks involved in approving a particular decision. The chances of achieving a minimum desired growth can be determined so that one knows the size of the risk one has undertaken.

The risk simulation models of productivity developed in this chapter have been tested and the results were satisfactory within $\pm$ 10% levels of accuracy.

Modifications are discussed for both models and its statistical treatment for the situation when the model cannot give meaningful answers to the overall problem or when it does not satisfy the test. In these cases either the model should be simplified by dropping one or more component variables from the model when the final result is not sensitive to them using sensitivity analysis, or the results should be examined within the range of mean value of distribution rather than the actual value of it.

The stochastic approach enables a complex system to be analysed and assessed and to study complicated situations for which it is not possible to set up an analytical model of performance either because the rules covering the decision processes involved in the system cannot be formulated mathematically or because the effect of interactions between the component parts of the system are too complicated to be simplified precisely in advance. Moreover it is not necessary for the distributions used to be capable of being expressed mathematically.

Deterministic approach may be used to provide a broad background against which a series of detailed simulations can be played representing several discrete conditions of particular interest. Therefore all models discussed in this chapter can be employed to complement one another.

CHAPTER 10

GENERAL CONCLUSION AND SUGGESTIONS FOR FURTHER RESEARCH

10.1. GENERAL CONCLUSION

The field of productivity measurement and analysis at company level have been examined in depth and a better understanding of the term productivity and its use may be seen. A suitable definition of productivity in this context is 'the nett output in a given period from a known input of resources'.

There are numerous ways of measuring productivity with respect to this definition which have been evaluated and compared. The most suitable measure for industrial use was found to be an added value base measure.

Models of overall and partial productivity measurement and analysis based on the added value concept which have been developed and used in this thesis are appropriate methods particularly for those firms with a wide range of inputs and outputs and many inter-related units.

Limitations and problems facing the method, whether embodied within the models used or coming from statistical treatment, lack of adequate data and interpretation of results are evaluated with respect to objectives. Different adjustment analysis can be used as approximate solutions to some of these problems.

Considering the concept and method, deterministic and stochastic models have been developed to deal with analysis and planning taking into account possible limitations and problems.

When the values of the component variables are not accurately known, computation needs to be made for a range of possible values to determine the sensitivity of the results to the values of component variables and perform the type of analysis that will yield an estimate of the variability of the productivity as a function of the variability of those component variables, using sensitivity analysis and deterministic appraisal.

Deterministic approach made with the best estimates or forecast of component variables leave out the critical dimension of risk, and while it allows management to see the effect of these changes it does not provide any base for estimating the likelihood of these changes occurring. This likelihood can be generated from the probability distributions of each input variables. The analytical approach for calculating probability distribution of productivity from probability distributions of component variables become unwieldy and difficult when the number of component variables (parameters) gets more than two.

Having seven component variables in the productivity model used in this thesis a stochastic approach has been designed, employing risk simulation as an approximation to exact solution by use of normal random variates.

Developing the probability distribution of the productivity allows management to make a quantitative assessment of the risk involved in approving a particular plan for productivity.

Applications are made to the productivity model and procedures, using the data of four British motor manufacturing companies. The results and the computation process show that the model has the advantage of bridging the gap between simple productivity models, having little relevance in the practical situation and sophisticated mathematical theory requiring a wide range of detailed data not available. The computer programs designed are also flexible enough and can be used with different computer hardware according to capacity and speed.

Modifications have been analysed of the risk simulation model and its statistical treatment when the model cannot give meaningful answers to the overall probem or it does not satisfy the test.

10. 2. SUGGESTION FOR FURTHER RESEARCH

Further research in the line of this work can be continued in three directions:

(a) To investigate the possibility of removing assumptions of normality and independency of component variables. This needs research to establish the nature of the variability of the variables for companies under consideration. It also requires verifying the interdependency of the variables using correlation analysis.

(b) To investigate the feasibility and applicability of extending the boundary of the planning model of total productivity to a wider model which also includes the inter-related activities of the partial productivities with respect to labour, capital etc.

(c) To carry out research for integrating the standard simulation models with that of risk simulation, making a more comprehensive stochastic model for longer term planning with paucity of data.

APPENDIX A

A1. PROOF OF THE BASE WEIGHTED ADJUSTED QUANTITY INDEX

$$(11) = (3) \div (10) = \frac{\sum p'_o q'_n}{\sum p'_o q'_o} \Big/ \frac{\dfrac{\sum p'_n q'_n}{\sum p_n q_n}}{\dfrac{\sum p'_o q'_o}{\sum p_o q_o}} =$$

$$\frac{\sum p'_o q'_n}{\sum p'_o q'_o} \times \frac{\dfrac{\sum p'_o q'_o}{\sum p_o q_o}}{\dfrac{\sum p'_n q'_n}{\sum p_n q_n}} = \frac{\sum p'_o q'_n}{\sum p'_o q'_o} \times \frac{\dfrac{\sum p_n q_n}{\sum p_o q_o}}{\dfrac{\sum p'_n q'_n}{\sum p'_o q'_o}} = \frac{\sum p'_o q'_n}{\sum p'_n q'_n} \times \frac{\sum p_n q_n}{\sum p_o q_o}$$

$$= \frac{\sum p_n q_n}{\sum p_o q_o} \Big/ \frac{\sum p'_n q'_n}{\sum p'_o q'_n} = (5)$$

A2. - MANIPULATING THE ADDED VALUE INDEX FORMULA

Recalling the following subscripts and relations:

p	=	price per unit of output.	
q	=	quantity of output produced.	
P	=	price per unit of bought-in input.	
Q	=	quantity of bought-in input.	
M	=	value of bought-in input	$= \sum PQ$
S	=	value of gross output	$= \sum pq = M+V$
V	=	value of net output (added value)	
m	=	bought-in input index.	
s	=	gross output index.	
v	=	net output (added value) index.	

and knowing that suffixes o and n represent the base and current periods respectively and $\sum$ is the summation over all items in question, the Laspeyres type of net output index formula can be written as:

$$v = \frac{\sum p_o q_n - \sum P_o Q_n}{\sum p_o q_o - \sum P_o Q_o} = \frac{\sum p_o q_n}{\sum p_o q_o - \sum P_o Q_o} - \frac{\sum P_o Q_n}{\sum p_o q_o - \sum P_o Q_o}$$

$$= \frac{\sum p_o q_n}{V_o} - \frac{\sum P_o Q_n}{V_o} = \left(\frac{\sum p_o q_o}{\sum p_o q_o} \times \frac{\sum p_o q_n}{V_o}\right) - \left(\frac{\sum P_o Q_o}{\sum P_o Q_o} \times \frac{\sum P_o Q_n}{V_o}\right)$$

$$= \left(\frac{\sum p_o q_n}{\sum p_o q_o} \times \frac{\sum p_o q_o}{V_o}\right) - \left(\frac{\sum P_o Q_n}{\sum P_o Q_o} \times \frac{\sum P_o Q_o}{V_o}\right) = \left(s \frac{\sum p_o q_o}{V_o}\right) - \left(m \frac{M_o}{V_o}\right)$$

$$= \left(s \frac{M_o + V_o}{V_o}\right) - \left(m \frac{M_o}{V_o}\right) = \left(s \frac{M_o}{V_o} + s\right) - \left(m \frac{M_o}{V_o}\right)$$

$$= s + s \frac{M_o}{V_o} - m \frac{M_o}{V_o} = s + \frac{M_o}{V_o} (s - m)$$

$$\text{or} \quad v_{on} = s_{on} - \frac{M_o}{V_o} (s_{on} - m_{on})$$

APPENDIX B

B1: A SAMPLE OF GROUP SENSITIVITY OUTPUT WITH THEIR RESPECTIVE COMPONENT VALUES.

B2: WHOLE OUTPUT OF GROUP SENSITIVITY ANALYSIS IN ASCENDING ORDER.

B1 OUTPUT OF GROUP SENSITIVITY ANALYSIS
****

BRITISH LEYLAND
****

KK= SERIAL NUMBER
I = % CHANGE IN A
J = % CHANGE IN B
K = % CHANGE IN C
L = % CHANGE IN D
M = % CHANGE IN E
N = % CHANGE IN H
II= % CHANGE IN G
X = % CHANGE IN PRODUCTIVITY

KK= 1	I= 1	J= 1	K= 1	L= 1	M= 1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 0.00000
KK= 2	I= 1	J= 1	K= 1	L= 1	M= 1	N= 1	II= 0	X(I,J,K,L,M,N,II)= 0.08552
KK= 3	I= 1	J= 1	K= 1	L= 1	M= 1	N= 1	II=-1	X(I,J,K,L,M,N,II)= 0.17119
KK= 4	I= 1	J= 1	K= 1	L= 1	M= 1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 0.06389
KK= 5	I= 1	J= 1	K= 1	L= 1	M= 1	N= 0	II= 0	X(I,J,K,L,M,N,II)= 0.14953
KK= 6	I= 1	J= 1	K= 1	L= 1	M= 1	N= 0	II=-1	X(I,J,K,L,M,N,II)= 0.23530
KK= 7	I= 1	J= 1	K= 1	L= 1	M= 1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 0.12787
KK= 8	I= 1	J= 1	K= 1	L= 1	M= 1	N=-1	II= 0	X(I,J,K,L,M,N,II)= 0.21361
KK= 9	I= 1	J= 1	K= 1	L= 1	M= 1	N=-1	II=-1	X(I,J,K,L,M,N,II)= 0.29950
KK= 10	I= 1	J= 1	K= 1	L= 1	M= 0	N= 1	II= 1	X(I,J,K,L,M,N,II)= 0.84793
KK= 11	I= 1	J= 1	K= 1	L= 1	M= 0	N= 1	II= 0	X(I,J,K,L,M,N,II)= 0.93491
KK= 12	I= 1	J= 1	K= 1	L= 1	M= 0	N= 1	II=-1	X(I,J,K,L,M,N,II)= 1.02204
KK= 13	I= 1	J= 1	K= 1	L= 1	M= 0	N= 0	II= 1	X(I,J,K,L,M,N,II)= 0.91291
KK= 14	I= 1	J= 1	K= 1	L= 1	M= 0	N= 0	II= 0	X(I,J,K,L,M,N,II)= 1.00000
KK= 15	I= 1	J= 1	K= 1	L= 1	M= 0	N= 0	II=-1	X(I,J,K,L,M,N,II)= 1.08724
KK= 16	I= 1	J= 1	K= 1	L= 1	M= 0	N=-1	II= 1	X(I,J,K,L,M,N,II)= 0.97797
KK= 17	I= 1	J= 1	K= 1	L= 1	M= 0	N=-1	II= 0	X(I,J,K,L,M,N,II)= 1.06518
KK= 18	I= 1	J= 1	K= 1	L= 1	M= 0	N=-1	II=-1	X(I,J,K,L,M,N,II)= 1.15253
KK= 19	I= 1	J= 1	K= 1	L= 1	M=-1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 1.71035
KK= 20	I= 1	J= 1	K= 1	L= 1	M=-1	N= 1	II= 0	X(I,J,K,L,M,N,II)= 1.79883
KK= 21	I= 1	J= 1	K= 1	L= 1	M=-1	N= 1	II=-1	X(I,J,K,L,M,N,II)= 1.88746
KK= 22	I= 1	J= 1	K= 1	L= 1	M=-1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 1.77645
KK= 23	I= 1	J= 1	K= 1	L= 1	M=-1	N= 0	II= 0	X(I,J,K,L,M,N,II)= 1.86504
KK= 24	I= 1	J= 1	K= 1	L= 1	M=-1	N= 0	II=-1	X(I,J,K,L,M,N,II)= 1.95379
KK= 25	I= 1	J= 1	K= 1	L= 1	M=-1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 1.84264
KK= 26	I= 1	J= 1	K= 1	L= 1	M=-1	N=-1	II= 0	X(I,J,K,L,M,N,II)= 1.93134
KK= 27	I= 1	J= 1	K= 1	L= 1	M=-1	N=-1	II=-1	X(I,J,K,L,M,N,II)= 2.02020
KK= 28	I= 1	J= 1	K= 1	L= 0	M= 1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 0.84793
KK= 29	I= 1	J= 1	K= 1	L= 0	M= 1	N= 1	II= 0	X(I,J,K,L,M,N,II)= 0.93491
KK= 30	I= 1	J= 1	K= 1	L= 0	M= 1	N= 1	II=-1	X(I,J,K,L,M,N,II)= 1.02204
KK= 31	I= 1	J= 1	K= 1	L= 0	M= 1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 0.91291
KK= 32	I= 1	J= 1	K= 1	L= 0	M= 1	N= 0	II= 0	X(I,J,K,L,M,N,II)= 1.00000
KK= 33	I= 1	J= 1	K= 1	L= 0	M= 1	N= 0	II=-1	X(I,J,K,L,M,N,II)= 1.08724
KK= 34	I= 1	J= 1	K= 1	L= 0	M= 1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 0.97797
KK= 35	I= 1	J= 1	K= 1	L= 0	M= 1	N=-1	II= 0	X(I,J,K,L,M,N,II)= 1.06518
KK= 36	I= 1	J= 1	K= 1	L= 0	M= 1	N=-1	II=-1	X(I,J,K,L,M,N,II)= 1.15253
KK= 37	I= 1	J= 1	K= 1	L= 0	M= 0	N= 1	II= 1	X(I,J,K,L,M,N,II)= 1.70174
KK= 38	I= 1	J= 1	K= 1	L= 0	M= 0	N= 1	II= 0	X(I,J,K,L,M,N,II)= 1.79020
KK= 39	I= 1	J= 1	K= 1	L= 0	M= 0	N= 1	II=-1	X(I,J,K,L,M,N,II)= 1.87882
KK= 40	I= 1	J= 1	K= 1	L= 0	M= 0	N= 0	II= 1	X(I,J,K,L,M,N,II)= 1.76783
KK= 41	I= 1	J= 1	K= 1	L= 0	M= 0	N= 0	II= 0	X(I,J,K,L,M,N,II)= 1.85641
KK= 42	I= 1	J= 1	K= 1	L= 0	M= 0	N= 0	II=-1	X(I,J,K,L,M,N,II)= 1.94513
KK= 43	I= 1	J= 1	K= 1	L= 0	M= 0	N=-1	II= 1	X(I,J,K,L,M,N,II)= 1.83400
KK= 44	I= 1	J= 1	K= 1	L= 0	M= 0	N=-1	II= 0	X(I,J,K,L,M,N,II)= 1.92269
KK= 45	I= 1	J= 1	K= 1	L= 0	M= 0	N=-1	II=-1	X(I,J,K,L,M,N,II)= 2.01154
KK= 46	I= 1	J= 1	K= 1	L= 0	M=-1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 2.57014
KK= 47	I= 1	J= 1	K= 1	L= 0	M=-1	N= 1	II= 0	X(I,J,K,L,M,N,II)= 2.66012
KK= 48	I= 1	J= 1	K= 1	L= 0	M=-1	N= 1	II=-1	X(I,J,K,L,M,N,II)= 2.75025
KK= 49	I= 1	J= 1	K= 1	L= 0	M=-1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 2.63736
KK= 50	I= 1	J= 1	K= 1	L= 0	M=-1	N= 0	II= 0	X(I,J,K,L,M,N,II)= 2.72746
KK= 51	I= 1	J= 1	K= 1	L= 0	M=-1	N= 0	II=-1	X(I,J,K,L,M,N,II)= 2.81771
KK= 52	I= 1	J= 1	K= 1	L= 0	M=-1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 2.70467
KK= 53	I= 1	J= 1	K= 1	L= 0	M=-1	N=-1	II= 0	X(I,J,K,L,M,N,II)= 2.79489
KK= 54	I= 1	J= 1	K= 1	L= 0	M=-1	N=-1	II=-1	X(I,J,K,L,M,N,II)= 2.88526
KK= 55	I= 1	J= 1	K= 1	L=-1	M= 1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 1.71035
KK= 56	I= 1	J= 1	K= 1	L=-1	M= 1	N= 1	II= 0	X(I,J,K,L,M,N,II)= 1.79883
KK= 57	I= 1	J= 1	K= 1	L=-1	M= 1	N= 1	II=-1	X(I,J,K,L,M,N,II)= 1.88746
KK= 58	I= 1	J= 1	K= 1	L=-1	M= 1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 1.77645
KK= 59	I= 1	J= 1	K= 1	L=-1	M= 1	N= 0	II= 0	X(I,J,K,L,M,N,II)= 1.86504
KK= 60	I= 1	J= 1	K= 1	L=-1	M= 1	N= 0	II=-1	X(I,J,K,L,M,N,II)= 1.95379
KK= 61	I= 1	J= 1	K= 1	L=-1	M= 1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 1.84264
KK= 62	I= 1	J= 1	K= 1	L=-1	M= 1	N=-1	II= 0	X(I,J,K,L,M,N,II)= 1.93134
KK= 63	I= 1	J= 1	K= 1	L=-1	M= 1	N=-1	II=-1	X(I,J,K,L,M,N,II)= 2.02020
KK= 64	I= 1	J= 1	K= 1	L=-1	M= 0	N= 1	II= 1	X(I,J,K,L,M,N,II)= 2.57014
KK= 65	I= 1	J= 1	K= 1	L=-1	M= 0	N= 1	II= 0	X(I,J,K,L,M,N,II)= 2.66012
KK= 66	I= 1	J= 1	K= 1	L=-1	M= 0	N= 1	II=-1	X(I,J,K,L,M,N,II)= 2.75025
KK= 67	I= 1	J= 1	K= 1	L=-1	M= 0	N= 0	II= 1	X(I,J,K,L,M,N,II)= 2.63736
KK= 68	I= 1	J= 1	K= 1	L=-1	M= 0	N= 0	II= 0	X(I,J,K,L,M,N,II)= 2.72746
KK= 69	I= 1	J= 1	K= 1	L=-1	M= 0	N= 0	II=-1	X(I,J,K,L,M,N,II)= 2.81771
KK= 70	I= 1	J= 1	K= 1	L=-1	M= 0	N=-1	II= 1	X(I,J,K,L,M,N,II)= 2.70467
KK= 71	I= 1	J= 1	K= 1	L=-1	M= 0	N=-1	II= 0	X(I,J,K,L,M,N,II)= 2.79489
KK= 72	I= 1	J= 1	K= 1	L=-1	M= 0	N=-1	II=-1	X(I,J,K,L,M,N,II)= 2.88526
KK= 73	I= 1	J= 1	K= 1	L=-1	M=-1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 3.44459
KK= 74	I= 1	J= 1	K= 1	L=-1	M=-1	N= 1	II= 0	X(I,J,K,L,M,N,II)= 3.53611
KK= 75	I= 1	J= 1	K= 1	L=-1	M=-1	N= 1	II=-1	X(I,J,K,L,M,N,II)= 3.62779
KK= 76	I= 1	J= 1	K= 1	L=-1	M=-1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 3.51296
KK= 77	I= 1	J= 1	K= 1	L=-1	M=-1	N= 0	II= 0	X(I,J,K,L,M,N,II)= 3.60460
KK= 78	I= 1	J= 1	K= 1	L=-1	M=-1	N= 0	II=-1	X(I,J,K,L,M,N,II)= 3.69640

KK= 79	I= 1	J= 1	K= 1	L=-1	M=-1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 3.58142
KK= 80	I= 1	J= 1	K= 1	L=-1	M=-1	N=-1	II= 0	X(I,J,K,L,M,N,II)= 3.67318
KK= 81	I= 1	J= 1	K= 1	L=-1	M=-1	N=-1	II=-1	X(I,J,K,L,M,N,II)= 3.76511
KK= 82	I= 1	J= 1	K= 0	L= 1	M= 1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 2.10922
KK= 83	I= 1	J= 1	K= 0	L= 1	M= 1	N= 1	II= 0	X(I,J,K,L,M,N,II)= 2.19655
KK= 84	I= 1	J= 1	K= 0	L= 1	M= 1	N= 1	II=-1	X(I,J,K,L,M,N,II)= 2.28402
KK= 85	I= 1	J= 1	K= 0	L= 1	M= 1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 2.17446
KK= 86	I= 1	J= 1	K= 0	L= 1	M= 1	N= 0	II= 0	X(I,J,K,L,M,N,II)= 2.26190
KK= 87	I= 1	J= 1	K= 0	L= 1	M= 1	N= 0	II=-1	X(I,J,K,L,M,N,II)= 2.34949
KK= 88	I= 1	J= 1	K= 0	L= 1	M= 1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 2.23979
KK= 89	I= 1	J= 1	K= 0	L= 1	M= 1	N=-1	II= 0	X(I,J,K,L,M,N,II)= 2.32734
KK= 90	I= 1	J= 1	K= 0	L= 1	M= 1	N=-1	II=-1	X(I,J,K,L,M,N,II)= 2.41506
KK= 91	I= 1	J= 1	K= 0	L= 1	M= 0	N= 1	II= 1	X(I,J,K,L,M,N,II)= 2.97503
KK= 92	I= 1	J= 1	K= 0	L= 1	M= 0	N= 1	II= 0	X(I,J,K,L,M,N,II)= 3.06384
KK= 93	I= 1	J= 1	K= 0	L= 1	M= 0	N= 1	II=-1	X(I,J,K,L,M,N,II)= 3.15281
KK= 94	I= 1	J= 1	K= 0	L= 1	M= 0	N= 0	II= 1	X(I,J,K,L,M,N,II)= 3.04138
KK= 95	I= 1	J= 1	K= 0	L= 1	M= 0	N= 0	II= 0	X(I,J,K,L,M,N,II)= 3.13031
KK= 96	I= 1	J= 1	K= 0	L= 1	M= 0	N= 0	II=-1	X(I,J,K,L,M,N,II)= 3.21939
KK= 97	I= 1	J= 1	K= 0	L= 1	M= 0	N=-1	II= 1	X(I,J,K,L,M,N,II)= 3.10782
KK= 98	I= 1	J= 1	K= 0	L= 1	M= 0	N=-1	II= 0	X(I,J,K,L,M,N,II)= 3.19686
KK= 99	I= 1	J= 1	K= 0	L= 1	M= 0	N=-1	II=-1	X(I,J,K,L,M,N,II)= 3.28606
KK= 100	I= 1	J= 1	K= 0	L= 1	M=-1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 3.85565
KK= 101	I= 1	J= 1	K= 0	L= 1	M=-1	N= 1	II= 0	X(I,J,K,L,M,N,II)= 3.94599
KK= 102	I= 1	J= 1	K= 0	L= 1	M=-1	N= 1	II=-1	X(I,J,K,L,M,N,II)= 4.03649
KK= 103	I= 1	J= 1	K= 0	L= 1	M=-1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 3.92314
KK= 104	I= 1	J= 1	K= 0	L= 1	M=-1	N= 0	II= 0	X(I,J,K,L,M,N,II)= 4.01360
KK= 105	I= 1	J= 1	K= 0	L= 1	M=-1	N= 0	II=-1	X(I,J,K,L,M,N,II)= 4.10422
KK= 106	I= 1	J= 1	K= 0	L= 1	M=-1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 3.99072
KK= 107	I= 1	J= 1	K= 0	L= 1	M=-1	N=-1	II= 0	X(I,J,K,L,M,N,II)= 4.08130
KK= 108	I= 1	J= 1	K= 0	L= 1	M=-1	N=-1	II=-1	X(I,J,K,L,M,N,II)= 4.17203
KK= 109	I= 1	J= 1	K= 0	L= 0	M= 1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 2.97503
KK= 110	I= 1	J= 1	K= 0	L= 0	M= 1	N= 1	II= 0	X(I,J,K,L,M,N,II)= 3.06384
KK= 111	I= 1	J= 1	K= 0	L= 0	M= 1	N= 1	II=-1	X(I,J,K,L,M,N,II)= 3.15281
KK= 112	I= 1	J= 1	K= 0	L= 0	M= 1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 3.04138
KK= 113	I= 1	J= 1	K= 0	L= 0	M= 1	N= 0	II= 0	X(I,J,K,L,M,N,II)= 3.13031
KK= 114	I= 1	J= 1	K= 0	L= 0	M= 1	N= 0	II=-1	X(I,J,K,L,M,N,II)= 3.21939
KK= 115	I= 1	J= 1	K= 0	L= 0	M= 1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 3.10782
KK= 116	I= 1	J= 1	K= 0	L= 0	M= 1	N=-1	II= 0	X(I,J,K,L,M,N,II)= 3.19686
KK= 117	I= 1	J= 1	K= 0	L= 0	M= 1	N=-1	II=-1	X(I,J,K,L,M,N,II)= 3.28606
KK= 118	I= 1	J= 1	K= 0	L= 0	M= 0	N= 1	II= 1	X(I,J,K,L,M,N,II)= 3.84686
KK= 119	I= 1	J= 1	K= 0	L= 0	M= 0	N= 1	II= 0	X(I,J,K,L,M,N,II)= 3.93718
KK= 120	I= 1	J= 1	K= 0	L= 0	M= 0	N= 1	II=-1	X(I,J,K,L,M,N,II)= 4.02766
KK= 121	I= 1	J= 1	K= 0	L= 0	M= 0	N= 0	II= 1	X(I,J,K,L,M,N,II)= 3.91434
KK= 122	I= 1	J= 1	K= 0	L= 0	M= 0	N= 0	II= 0	X(I,J,K,L,M,N,II)= 4.00478
KK= 123	I= 1	J= 1	K= 0	L= 0	M= 0	N= 0	II=-1	X(I,J,K,L,M,N,II)= 4.09538
KK= 124	I= 1	J= 1	K= 0	L= 0	M= 0	N=-1	II= 1	X(I,J,K,L,M,N,II)= 3.98191
KK= 125	I= 1	J= 1	K= 0	L= 0	M= 0	N=-1	II= 0	X(I,J,K,L,M,N,II)= 4.07247
KK= 126	I= 1	J= 1	K= 0	L= 0	M= 0	N=-1	II=-1	X(I,J,K,L,M,N,II)= 4.16319
KK= 127	I= 1	J= 1	K= 0	L= 0	M=-1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 4.73357
KK= 128	I= 1	J= 1	K= 0	L= 0	M=-1	N= 1	II= 0	X(I,J,K,L,M,N,II)= 4.82545
KK= 129	I= 1	J= 1	K= 0	L= 0	M=-1	N= 1	II=-1	X(I,J,K,L,M,N,II)= 4.91748
KK= 130	I= 1	J= 1	K= 0	L= 0	M=-1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 4.80221
KK= 131	I= 1	J= 1	K= 0	L= 0	M=-1	N= 0	II= 0	X(I,J,K,L,M,N,II)= 4.89421
KK= 132	I= 1	J= 1	K= 0	L= 0	M=-1	N= 0	II=-1	X(I,J,K,L,M,N,II)= 4.98636
KK= 133	I= 1	J= 1	K= 0	L= 0	M=-1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 4.87094
KK= 134	I= 1	J= 1	K= 0	L= 0	M=-1	N=-1	II= 0	X(I,J,K,L,M,N,II)= 4.96305
KK= 135	I= 1	J= 1	K= 0	L= 0	M=-1	N=-1	II=-1	X(I,J,K,L,M,N,II)= 5.05533
KK= 136	I= 1	J= 1	K= 0	L=-1	M= 1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 3.85565
KK= 137	I= 1	J= 1	K= 0	L=-1	M= 1	N= 1	II= 0	X(I,J,K,L,M,N,II)= 3.94599
KK= 138	I= 1	J= 1	K= 0	L=-1	M= 1	N= 1	II=-1	X(I,J,K,L,M,N,II)= 4.03649
KK= 139	I= 1	J= 1	K= 0	L=-1	M= 1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 3.92314
KK= 140	I= 1	J= 1	K= 0	L=-1	M= 1	N= 0	II= 0	X(I,J,K,L,M,N,II)= 4.01360
KK= 141	I= 1	J= 1	K= 0	L=-1	M= 1	N= 0	II=-1	X(I,J,K,L,M,N,II)= 4.10422
KK= 142	I= 1	J= 1	K= 0	L=-1	M= 1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 3.99072
KK= 143	I= 1	J= 1	K= 0	L=-1	M= 1	N=-1	II= 0	X(I,J,K,L,M,N,II)= 4.08130
KK= 144	I= 1	J= 1	K= 0	L=-1	M= 1	N=-1	II=-1	X(I,J,K,L,M,N,II)= 4.17203
KK= 145	I= 1	J= 1	K= 0	L=-1	M= 0	N= 1	II= 1	X(I,J,K,L,M,N,II)= 4.73357
KK= 146	I= 1	J= 1	K= 0	L=-1	M= 0	N= 1	II= 0	X(I,J,K,L,M,N,II)= 4.82545
KK= 147	I= 1	J= 1	K= 0	L=-1	M= 0	N= 1	II=-1	X(I,J,K,L,M,N,II)= 4.91748
KK= 148	I= 1	J= 1	K= 0	L=-1	M= 0	N= 0	II= 1	X(I,J,K,L,M,N,II)= 4.80221
KK= 149	I= 1	J= 1	K= 0	L=-1	M= 0	N= 0	II= 0	X(I,J,K,L,M,N,II)= 4.89421
KK= 150	I= 1	J= 1	K= 0	L=-1	M= 0	N= 0	II=-1	X(I,J,K,L,M,N,II)= 4.98636
KK= 151	I= 1	J= 1	K= 0	L=-1	M= 0	N=-1	II= 1	X(I,J,K,L,M,N,II)= 4.87094
KK= 152	I= 1	J= 1	K= 0	L=-1	M= 0	N=-1	II= 0	X(I,J,K,L,M,N,II)= 4.96305
KK= 153	I= 1	J= 1	K= 0	L=-1	M= 0	N=-1	II=-1	X(I,J,K,L,M,N,II)= 5.05533
KK= 154	I= 1	J= 1	K= 0	L=-1	M=-1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 5.62646
KK= 155	I= 1	J= 1	K= 0	L=-1	M=-1	N= 1	II= 0	X(I,J,K,L,M,N,II)= 5.71991
KK= 156	I= 1	J= 1	K= 0	L=-1	M=-1	N= 1	II=-1	X(I,J,K,L,M,N,II)= 5.81353
KK= 157	I= 1	J= 1	K= 0	L=-1	M=-1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 5.69628
KK= 158	I= 1	J= 1	K= 0	L=-1	M=-1	N= 0	II= 0	X(I,J,K,L,M,N,II)= 5.78985
KK= 159	I= 1	J= 1	K= 0	L=-1	M=-1	N= 0	II=-1	X(I,J,K,L,M,N,II)= 5.88359
KK= 160	I= 1	J= 1	K= 0	L=-1	M=-1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 5.76018
KK= 161	I= 1	J= 1	K= 0	L=-1	M=-1	N=-1	II= 0	X(I,J,K,L,M,N,II)= 5.85963
KK= 162	I= 1	J= 1	K= 0	L=-1	M=-1	N=-1	II=-1	X(I,J,K,L,M,N,II)= 5.95374
KK= 163	I= 1	J= 1	K=-1	L= 1	M= 1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 4.21844
KK= 164	I= 1	J= 1	K=-1	L= 1	M= 1	N= 1	II= 0	X(I,J,K,L,M,N,II)= 4.30757
KK= 165	I= 1	J= 1	K=-1	L= 1	M= 1	N= 1	II=-1	X(I,J,K,L,M,N,II)= 4.39685
KK= 166	I= 1	J= 1	K=-1	L= 1	M= 1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 4.28503
KK= 167	I= 1	J= 1	K=-1	L= 1	M= 1	N= 0	II= 0	X(I,J,K,L,M,N,II)= 4.37427
KK= 168	I= 1	J= 1	K=-1	L= 1	M= 1	N= 0	II=-1	X(I,J,K,L,M,N,II)= 4.46367
KK= 169	I= 1	J= 1	K=-1	L= 1	M= 1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 4.35170
KK= 170	I= 1	J= 1	K=-1	L= 1	M= 1	N=-1	II= 0	X(I,J,K,L,M,N,II)= 4.44106
KK= 171	I= 1	J= 1	K=-1	L= 1	M= 1	N=-1	II=-1	X(I,J,K,L,M,N,II)= 4.53057
KK= 172	I= 1	J= 1	K=-1	L= 1	M= 0	N= 1	II= 1	X(I,J,K,L,M,N,II)= 5.10213
KK= 173	I= 1	J= 1	K=-1	L= 1	M= 0	N= 1	II= 0	X(I,J,K,L,M,N,II)= 5.19278
KK= 174	I= 1	J= 1	K=-1	L= 1	M= 0	N= 1	II=-1	X(I,J,K,L,M,N,II)= 5.28359

KK= 175	I= 1	J= 1	K=-1	L= 1	M= 0	N= 0	II= 1	X(I,J,K,L,M,N,II)=	5.16986
KK= 176	I= 1	J= 1	K=-1	L= 1	M= 0	N= 0	II= 0	X(I,J,K,L,M,N,II)=	5.26062
KK= 177	I= 1	J= 1	K=-1	L= 1	M= 0	N= 0	II=-1	X(I,J,K,L,M,N,II)=	5.35155
KK= 178	I= 1	J= 1	K=-1	L= 1	M= 0	N=-1	II= 1	X(I,J,K,L,M,N,II)=	5.23767
KK= 179	I= 1	J= 1	K=-1	L= 1	M= 0	N=-1	II= 0	X(I,J,K,L,M,N,II)=	5.32855
KK= 180	I= 1	J= 1	K=-1	L= 1	M= 0	N=-1	II=-1	X(I,J,K,L,M,N,II)=	5.41959
KK= 181	I= 1	J= 1	K=-1	L= 1	M=-1	N= 1	II= 1	X(I,J,K,L,M,N,II)=	6.00094
KK= 182	I= 1	J= 1	K=-1	L= 1	M=-1	N= 1	II= 0	X(I,J,K,L,M,N,II)=	6.09315
KK= 183	I= 1	J= 1	K=-1	L= 1	M=-1	N= 1	II=-1	X(I,J,K,L,M,N,II)=	6.18552
KK= 184	I= 1	J= 1	K=-1	L= 1	M=-1	N= 0	II= 1	X(I,J,K,L,M,N,II)=	6.06983
KK= 185	I= 1	J= 1	K=-1	L= 1	M=-1	N= 0	II= 0	X(I,J,K,L,M,N,II)=	6.16216
KK= 186	I= 1	J= 1	K=-1	L= 1	M=-1	N= 0	II=-1	X(I,J,K,L,M,N,II)=	6.25464
KK= 187	I= 1	J= 1	K=-1	L= 1	M=-1	N=-1	II= 1	X(I,J,K,L,M,N,II)=	6.13881
KK= 188	I= 1	J= 1	K=-1	L= 1	M=-1	N=-1	II= 0	X(I,J,K,L,M,N,II)=	6.23125
KK= 189	I= 1	J= 1	K=-1	L= 1	M=-1	N=-1	II=-1	X(I,J,K,L,M,N,II)=	6.32386
KK= 190	I= 1	J= 1	K=-1	L= 0	M= 1	N= 1	II= 1	X(I,J,K,L,M,N,II)=	5.10213
KK= 191	I= 1	J= 1	K=-1	L= 0	M= 1	N= 1	II= 0	X(I,J,K,L,M,N,II)=	5.19278
KK= 192	I= 1	J= 1	K=-1	L= 0	M= 1	N= 1	II=-1	X(I,J,K,L,M,N,II)=	5.28359
KK= 193	I= 1	J= 1	K=-1	L= 0	M= 1	N= 0	II= 1	X(I,J,K,L,M,N,II)=	5.16986
KK= 194	I= 1	J= 1	K=-1	L= 0	M= 1	N= 0	II= 0	X(I,J,K,L,M,N,II)=	5.26062
KK= 195	I= 1	J= 1	K=-1	L= 0	M= 1	N= 0	II=-1	X(I,J,K,L,M,N,II)=	5.35155
KK= 196	I= 1	J= 1	K=-1	L= 0	M= 1	N=-1	II= 1	X(I,J,K,L,M,N,II)=	5.23767
KK= 197	I= 1	J= 1	K=-1	L= 0	M= 1	N=-1	II= 0	X(I,J,K,L,M,N,II)=	5.32855
KK= 198	I= 1	J= 1	K=-1	L= 0	M= 1	N=-1	II=-1	X(I,J,K,L,M,N,II)=	5.41959
KK= 199	I= 1	J= 1	K=-1	L= 0	M= 0	N= 1	II= 1	X(I,J,K,L,M,N,II)=	5.99197
KK= 200	I= 1	J= 1	K=-1	L= 0	M= 0	N= 1	II= 0	X(I,J,K,L,M,N,II)=	6.08416
KK= 201	I= 1	J= 1	K=-1	L= 0	M= 0	N= 1	II=-1	X(I,J,K,L,M,N,II)=	6.17651
KK= 202	I= 1	J= 1	K=-1	L= 0	M= 0	N= 0	II= 1	X(I,J,K,L,M,N,II)=	6.06084
KK= 203	I= 1	J= 1	K=-1	L= 0	M= 0	N= 0	II= 0	X(I,J,K,L,M,N,II)=	6.15316
KK= 204	I= 1	J= 1	K=-1	L= 0	M= 0	N= 0	II=-1	X(I,J,K,L,M,N,II)=	6.24563
KK= 205	I= 1	J= 1	K=-1	L= 0	M= 0	N=-1	II= 1	X(I,J,K,L,M,N,II)=	6.12981
KK= 206	I= 1	J= 1	K=-1	L= 0	M= 0	N=-1	II= 0	X(I,J,K,L,M,N,II)=	6.22224
KK= 207	I= 1	J= 1	K=-1	L= 0	M= 0	N=-1	II=-1	X(I,J,K,L,M,N,II)=	6.31483
KK= 208	I= 1	J= 1	K=-1	L= 0	M=-1	N= 1	II= 1	X(I,J,K,L,M,N,II)=	6.89700
KK= 209	I= 1	J= 1	K=-1	L= 0	M=-1	N= 1	II= 0	X(I,J,K,L,M,N,II)=	6.99077
KK= 210	I= 1	J= 1	K=-1	L= 0	M=-1	N= 1	II=-1	X(I,J,K,L,M,N,II)=	7.08471
KK= 211	I= 1	J= 1	K=-1	L= 0	M=-1	N= 0	II= 1	X(I,J,K,L,M,N,II)=	6.96706
KK= 212	I= 1	J= 1	K=-1	L= 0	M=-1	N= 0	II= 0	X(I,J,K,L,M,N,II)=	7.06095
KK= 213	I= 1	J= 1	K=-1	L= 0	M=-1	N= 0	II=-1	X(I,J,K,L,M,N,II)=	7.15501
KK= 214	I= 1	J= 1	K=-1	L= 0	M=-1	N=-1	II= 1	X(I,J,K,L,M,N,II)=	7.03721
KK= 215	I= 1	J= 1	K=-1	L= 0	M=-1	N=-1	II= 0	X(I,J,K,L,M,N,II)=	7.13122
KK= 216	I= 1	J= 1	K=-1	L= 0	M=-1	N=-1	II=-1	X(I,J,K,L,M,N,II)=	7.22541
KK= 217	I= 1	J= 1	K=-1	L=-1	M= 1	N= 1	II= 1	X(I,J,K,L,M,N,II)=	6.00094
KK= 218	I= 1	J= 1	K=-1	L=-1	M= 1	N= 1	II= 0	X(I,J,K,L,M,N,II)=	6.09315
KK= 219	I= 1	J= 1	K=-1	L=-1	M= 1	N= 1	II=-1	X(I,J,K,L,M,N,II)=	6.18552
KK= 220	I= 1	J= 1	K=-1	L=-1	M= 1	N= 0	II= 1	X(I,J,K,L,M,N,II)=	6.06983
KK= 221	I= 1	J= 1	K=-1	L=-1	M= 1	N= 0	II= 0	X(I,J,K,L,M,N,II)=	6.16216
KK= 222	I= 1	J= 1	K=-1	L=-1	M= 1	N= 0	II=-1	X(I,J,K,L,M,N,II)=	6.25464
KK= 223	I= 1	J= 1	K=-1	L=-1	M= 1	N=-1	II= 1	X(I,J,K,L,M,N,II)=	6.13881
KK= 224	I= 1	J= 1	K=-1	L=-1	M= 1	N=-1	II= 0	X(I,J,K,L,M,N,II)=	6.23125
KK= 225	I= 1	J= 1	K=-1	L=-1	M= 1	N=-1	II=-1	X(I,J,K,L,M,N,II)=	6.32386
KK= 226	I= 1	J= 1	K=-1	L=-1	M= 0	N= 1	II= 1	X(I,J,K,L,M,N,II)=	6.89700
KK= 227	I= 1	J= 1	K=-1	L=-1	M= 0	N= 1	II= 0	X(I,J,K,L,M,N,II)=	6.99077
KK= 228	I= 1	J= 1	K=-1	L=-1	M= 0	N= 1	II=-1	X(I,J,K,L,M,N,II)=	7.08471
KK= 229	I= 1	J= 1	K=-1	L=-1	M= 0	N= 0	II= 1	X(I,J,K,L,M,N,II)=	6.96706
KK= 230	I= 1	J= 1	K=-1	L=-1	M= 0	N= 0	II= 0	X(I,J,K,L,M,N,II)=	7.06005
KK= 231	I= 1	J= 1	K=-1	L=-1	M= 0	N= 0	II=-1	X(I,J,K,L,M,N,II)=	7.15501
KK= 232	I= 1	J= 1	K=-1	L=-1	M= 0	N=-1	II= 1	X(I,J,K,L,M,N,II)=	7.03721
KK= 233	I= 1	J= 1	K=-1	L=-1	M= 0	N=-1	II= 0	X(I,J,K,L,M,N,II)=	7.13122
KK= 234	I= 1	J= 1	K=-1	L=-1	M= 0	N=-1	II=-1	X(I,J,K,L,M,N,II)=	7.22541
KK= 235	I= 1	J= 1	K=-1	L=-1	M=-1	N= 1	II= 1	X(I,J,K,L,M,N,II)=	7.80833
KK= 236	I= 1	J= 1	K=-1	L=-1	M=-1	N= 1	II= 0	X(I,J,K,L,M,N,II)=	7.90371
KK= 237	I= 1	J= 1	K=-1	L=-1	M=-1	N= 1	II=-1	X(I,J,K,L,M,N,II)=	7.99926
KK= 238	I= 1	J= 1	K=-1	L=-1	M=-1	N= 0	II= 1	X(I,J,K,L,M,N,II)=	7.87959

BRITISH LEYLAND

GROUP SENSITIVITY ANALYSIS

B2

OUTPUT IN ASCENDING ORDER
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1	-7,78072	-7,72279	-7,70318	-7,66479	-7,64516	-7,62551	-7,58706	-7,56739	-7,50919	-6,99641
2	-6,99641	-6,98849	-6,93749	-6,93749	-6,92957	-6,91754	-6,91754	-6,90962	-6,87850	-6,87850
3	-6,87056	-6,85853	-6,85853	-6,85059	-6,83855	-6,83855	-6,83061	-6,79943	-6,79943	-6,79149
4	-6,77943	-6,77943	-6,77142	-6,72024	-6,72024	-6,71228	-6,20660	-6,19864	-6,19864	-6,19864
5	-6,19864	-6,19864	-6,14608	-6,13870	-6,13870	-6,13870	-6,13870	-6,13870	-6,12639	-6,11842
6	-6,11842	-6,11842	-6,11842	-6,11842	-6,08668	-6,07869	-6,07869	-6,07869	-6,07869	-6,07869
7	-6,06637	-6,05838	-6,05838	-6,05838	-6,05838	-6,05838	-6,04605	-6,03806	-6,03806	-6,03806
8	-6,03806	-6,03806	-6,00627	-5,99827	-5,99827	-5,99827	-5,99827	-5,99827	-5,98592	-5,97792
9	-5,97792	-5,97792	-5,97792	-5,97792	-5,92572	-5,91770	-5,91770	-5,91770	-5,91770	-5,91770
10	-5,70707	-5,64784	-5,62779	-5,58854	-5,56846	-5,54838	-5,50906	-5,48895	-5,42944	-5,40327
11	-5,40327	-5,40327	-5,40327	-5,40327	-5,39525	-5,39525	-5,34232	-5,34232	-5,34232	-5,34232
12	-5,34232	-5,33428	-5,33428	-5,32168	-5,32168	-5,32168	-5,32168	-5,32168	-5,31365	-5,31365
13	-5,28128	-5,28128	-5,28128	-5,28128	-5,28128	-5,27324	-5,27324	-5,26062	-5,26062	-5,26062
14	-5,26062	-5,26062	-5,25258	-5,25258	-5,23995	-5,23995	-5,23995	-5,23995	-5,23995	-5,23190
15	-5,23190	-5,19949	-5,19949	-5,19949	-5,19949	-5,19949	-5,19143	-5,19143	-5,17879	-5,17879
16	-5,17879	-5,17879	-5,17879	-5,17073	-5,17073	-5,11754	-5,11754	-5,11754	-5,11754	-5,11754
17	-5,10947	-5,10947	-4,90512	-4,90512	-4,89704	-4,84488	-4,84488	-4,83678	-4,82449	-4,82449
18	-4,81639	-4,78456	-4,78456	-4,77645	-4,76414	-4,76414	-4,75603	-4,74372	-4,74372	-4,73560
19	-4,73367	-4,70372	-4,70372	-4,69560	-4,68327	-4,68327	-4,67514	-4,67383	-4,65357	-4,62275
20	-4,62275	-4,61461	-4,61392	-4,60236	-4,59430	-4,59430	-4,59430	-4,59430	-4,59430	-4,59363
21	-4,57334	-4,54039	-4,53361	-4,53230	-4,53230	-4,53230	-4,53230	-4,53230	-4,51940	-4,51330
22	-4,51131	-4,51131	-4,51131	-4,51131	-4,51131	-4,47832	-4,47022	-4,47022	-4,47022	-4,47022
23	-4,47022	-4,45730	-4,45318	-4,44920	-4,44920	-4,44920	-4,44920	-4,44920	-4,43628	-4,42818
24	-4,42818	-4,42818	-4,42818	-4,42818	-4,39512	-4,38701	-4,38701	-4,38701	-4,38701	-4,38701
25	-4,37407	-4,36596	-4,36596	-4,36596	-4,36596	-4,36596	-4,31179	-4,30366	-4,30366	-4,30366
26	-4,30366	-4,30366	-4,09756	-4,08942	-4,08942	-4,08942	-4,08942	-4,08942	-4,03629	-4,02814
27	-4,02814	-4,02814	-4,02814	-4,02814	-4,01555	-4,00739	-4,00739	-4,00739	-4,00739	-4,00739
28	-3,97494	-3,96678	-3,96678	-3,96678	-3,96678	-3,96678	-3,95418	-3,94601	-3,94601	-3,94601
29	-3,94601	-3,94601	-3,93340	-3,92523	-3,92523	-3,92523	-3,92523	-3,92523	-3,92345	-3,92345
30	-3,91527	-3,89272	-3,88454	-3,88454	-3,88454	-3,88454	-3,88454	-3,87192	-3,86374	-3,86374
31	-3,86374	-3,86374	-3,86374	-3,86258	-3,86258	-3,85440	-3,84198	-3,84198	-3,83379	-3,81036
32	-3,80217	-3,80217	-3,80217	-3,80217	-3,80217	-3,80164	-3,80164	-3,79345	-3,78781	-3,78781
33	-3,78101	-3,78101	-3,77968	-3,77281	-3,76037	-3,76037	-3,75217	-3,72476	-3,72476	-3,71997
34	-3,71997	-3,71661	-3,71176	-3,70341	-3,70341	-3,69930	-3,69930	-3,69526	-3,69109	-3,66162
35	-3,66162	-3,65346	-3,64024	-3,64024	-3,63815	-3,63815	-3,63343	-3,63209	-3,62993	-3,61886
36	-3,61886	-3,61070	-3,57700	-3,57700	-3,57290	-3,56883	-3,55558	-3,55558	-3,55240	-3,54741
37	-3,51229	-3,49223	-3,49223	-3,49177	-3,48604	-3,47124	-3,43106	-3,41051	-3,34969	-3,27617
38	-3,27617	-3,27617	-3,27617	-3,27617	-3,26796	-3,26796	-3,21384	-3,21384	-3,21384	-3,21384
39	-3,21384	-3,20563	-3,20563	-3,19274	-3,19274	-3,19274	-3,19274	-3,19274	-3,18453	-3,18453
40	-3,15144	-3,15144	-3,15144	-3,15144	-3,15144	-3,14321	-3,14321	-3,13031	-3,13031	-3,13031
41	-3,13031	-3,13031	-3,12206	-3,12206	-3,10918	-3,10918	-3,10918	-3,10918	-3,10918	-3,10755
42	-3,10095	-3,10095	-3,09932	-3,09932	-3,09932	-3,09932	-3,09932	-3,06780	-3,06780	-3,06780
43	-3,06780	-3,06780	-3,05956	-3,05956	-3,04664	-3,04664	-3,04664	-3,04664	-3,04664	-3,04564
44	-3,03840	-3,03840	-3,03741	-3,03741	-3,03741	-3,03741	-3,03741	-3,02469	-3,01645	-3,01645
45	-3,01645	-3,01645	-3,01645	-2,98402	-2,98402	-2,98402	-2,98402	-2,98402	-2,98366	-2,97576
46	-2,97576	-2,97541	-2,97541	-2,97541	-2,97541	-2,97541	-2,96757	-2,96268	-2,95443	-2,95443
47	-2,95443	-2,95443	-2,95443	-2,94169	-2,93343	-2,93343	-2,93343	-2,93343	-2,93343	-2,90343
48	-2,90059	-2,89233	-2,89233	-2,89233	-2,89233	-2,89233	-2,88172	-2,87957	-2,87131	-2,87131
49	-2,87131	-2,87131	-2,87131	-2,83921	-2,81747	-2,81738	-2,81384	-2,81384	-2,80910	-2,80910
50	-2,80910	-2,80910	-2,80910	-2,80558	-2,79572	-2,75314	-2,75228	-2,75228	-2,74400	-2,73143
51	-2,73143	-2,73136	-2,72315	-2,69063	-2,69063	-2,68236	-2,66976	-2,66976	-2,66691	-2,66147
52	-2,66003	-2,64889	-2,64889	-2,64059	-2,60801	-2,60801	-2,59971	-2,59888	-2,58711	-2,58711
53	-2,57860	-2,57819	-2,53766	-2,52525	-2,52525	-2,51694	-2,51694	-2,49621	-2,45727	-2,45562
54	-2,44901	-2,44901	-2,44901	-2,44901	-2,44901	-2,43486	-2,39388	-2,38561	-2,38561	-2,38561
55	-2,38561	-2,38561	-2,37343	-2,37242	-2,36415	-2,36415	-2,36415	-2,36415	-2,36415	-2,33041
56	-2,32213	-2,32213	-2,32213	-2,32213	-2,32213	-2,30893	-2,30064	-2,30064	-2,30064	-2,30064
57	-2,30064	-2,28743	-2,27915	-2,27915	-2,27915	-2,27915	-2,27915	-2,27767	-2,27767	-2,27767
58	-2,27767	-2,27767	-2,26939	-2,26939	-2,24835	-2,23706	-2,23706	-2,23706	-2,23706	-2,23706
59	-2,22383	-2,21553	-2,21553	-2,21553	-2,21553	-2,21553	-2,21470	-2,21470	-2,21470	-2,21470
60	-2,21470	-2,20641	-2,20641	-2,19339	-2,19339	-2,19339	-2,19339	-2,19339	-2,18509	-2,18509
61	-2,16014	-2,15183	-2,15183	-2,15183	-2,15183	-2,15183	-2,15166	-2,15166	-2,15166	-2,15166
62	-2,15166	-2,14335	-2,14335	-2,13031	-2,13031	-2,13031	-2,13031	-2,13031	-2,12200	-2,12200
63	-2,10896	-2,10896	-2,10896	-2,10896	-2,10896	-2,10064	-2,10064	-2,06715	-2,06715	-2,06715
64	-2,06715	-2,06715	-2,05883	-2,05883	-2,04577	-2,04577	-2,04577	-2,04577	-2,04577	-2,03745
65	-2,03745	-1,98852	-1,98251	-1,98251	-1,98251	-1,98251	-1,98251	-1,98020	-1,98020	-1,98020
66	-1,98020	-1,98020	-1,97417	-1,97417	-1,92590	-1,91757	-1,91757	-1,91757	-1,91757	-1,91757
67	-1,90471	-1,89637	-1,89637	-1,89637	-1,89637	-1,89637	-1,86321	-1,85486	-1,85486	-1,85486
68	-1,85486	-1,85486	-1,84193	-1,83363	-1,83363	-1,83363	-1,83363	-1,83363	-1,83217	-1,83217
69	-1,82382	-1,82075	-1,81240	-1,81240	-1,81240	-1,81240	-1,81240	-1,77918	-1,77082	-1,77082
70	-1,77082	-1,77082	-1,77062	-1,76996	-1,76998	-1,76162	-1,75792	-1,74955	-1,74955	-1,74955
71	-1,74955	-1,74955	-1,74892	-1,74892	-1,74056	-1,70771	-1,70771	-1,69934	-1,69500	-1,68663
72	-1,68663	-1,68663	-1,68663	-1,68663	-1,68663	-1,68663	-1,68663	-1,67875	-1,66554	-1,66554
73	-1,65716	-1,62437	-1,62436	-1,62436	-1,62426	-1,62426	-1,61606	-1,61587	-1,60397	-1,60314
74	-1,60314	-1,59475	-1,56304	-1,55991	-1,55991	-1,55158	-1,54211	-1,54066	-1,54066	-1,53808
75	-1,53808	-1,53226	-1,52975	-1,52117	-1,49535	-1,49535	-1,48701	-1,48017	-1,47350	-1,47350
76	-1,46515	-1,45921	-1,45163	-1,45163	-1,45032	-1,44329	-1,44197	-1,44197	-1,44197	-1,44197
77	-1,44197	-1,40883	-1,40883	-1,40047	-1,39716	-1,38693	-1,38693	-1,38628	-1,37858	-1,37792
78	-1,37792	-1,37792	-1,37792	-1,37792	-1,36460	-1,35624	-1,35624	-1,35624	-1,35624	-1,35624
79	-1,32216	-1,32215	-1,32215	-1,31379	-1,31379	-1,31379	-1,31379	-1,31379	-1,31378	-1,30645
80	-1,29208	-1,29208	-1,29208	-1,29208	-1,29208	-1,27873	-1,27036	-1,27036	-1,27036	-1,27036
81	-1,27036	-1,23622	-1,22783	-1,22783	-1,22783	-1,22783	-1,22783	-1,21447	-1,20609	-1,20609
82	-1,20609	-1,20609	-1,20609	-1,15014	-1,14906	-1,14906	-1,14906	-1,14906	-1,14906	-1,14173
83	-1,14173	-1,14173	-1,14173	-1,14173	-1,14068	-1,14068	-1,08537	-1,08537	-1,08537	-1,08537
84	-1,08537	-1,07697	-1,07697	-1,06381	-1,06381	-1,06381	-1,06381	-1,06381	-1,05541	-1,05541
85	-1,02159	-1,02159	-1,02159	-1,02159	-1,02159	-1,01319	-1,01319	-1,00000	-1,00000	-1,00000
86	-1,00000	-1,00000	-0,99851	-0,99159	-0,99159	-0,99010	-0,99010	-0,99010	-0,99010	-0,99010
87	-0,97840	-0,97840	-0,97840	-0,97840	-0,97840	-0,96999	-0,96999	-0,93611	-0,93611	-0,93611
88	-0,93611	-0,93611	-0,93526	-0,92769	-0,92769	-0,92684	-0,92684	-0,92684	-0,92684	-0,92684
89	-0,91448	-0,91448	-0,91448	-0,91448	-0,91448	-0,91385	-0,90606	-0,90606	-0,90542	-0,90542
90	-0,90542	-0,90542	-0,90542	-0,87193	-0,86350	-0,86350	-0,86350	-0,86350	-0,86350	-0,85049

91	-0.85049	-0.85049	-0.85049	-0.85049	-0.85049	-0.85049	-0.85049	-0.84205	-0.84205	-0.84205
92	-0.84205	-0.84205	-0.84205	-0.84205	-0.84205	-0.82904	-0.82060	-0.82060	-0.82060	-0.82060
93	-0.82060	-0.78768	-0.78768	-0.78703	-0.78569	-0.77923	-0.77860	-0.77860	-0.77860	-0.77860
94	-0.77860	-0.76641	-0.76641	-0.76557	-0.75797	-0.75712	-0.75712	-0.75712	-0.75712	-0.75712
95	-0.72479	-0.72479	-0.72012	-0.71633	-0.70350	-0.70350	-0.70202	-0.69792	-0.69504	-0.69357
96	-0.69357	-0.69357	-0.69357	-0.69357	-0.68220	-0.68220	-0.67373	-0.65445	-0.64050	-0.64050
97	-0.63222	-0.63203	-0.61917	-0.61917	-0.61070	-0.60998	-0.60883	-0.60883	-0.60043	-0.58638
98	-0.56644	-0.55607	-0.55607	-0.54758	-0.54418	-0.54370	-0.54370	-0.53528	-0.52394	-0.52165
99	-0.52165	-0.51323	-0.50280	-0.47847	-0.47847	-0.47828	-0.47005	-0.46141	-0.45639	-0.45639
100	-0.44796	-0.44025	-0.43430	-0.43430	-0.42587	-0.41907	-0.39106	-0.39106	-0.38262	-0.37762
101	-0.36894	-0.36894	-0.36049	-0.35641	-0.31215	-0.30371	-0.30371	-0.30371	-0.30371	-0.30371
102	-0.30348	-0.30348	-0.29503	-0.29368	-0.24737	-0.23892	-0.23892	-0.23892	-0.23892	-0.23892
103	-0.22544	-0.21699	-0.21699	-0.21699	-0.21699	-0.21699	-0.18251	-0.17405	-0.17405	-0.17405
104	-0.17405	-0.17405	-0.16055	-0.15209	-0.15209	-0.15209	-0.15209	-0.15209	-0.15057	-0.15057
105	-0.15057	-0.15057	-0.15057	-0.14210	-0.14210	-0.13859	-0.13012	-0.13012	-0.13012	-0.13012
106	-0.13012	-0.09553	-0.08710	-0.08710	-0.08710	-0.08710	-0.08710	-0.08623	-0.08623	-0.08623
107	-0.08623	-0.08623	-0.07775	-0.07775	-0.07358	-0.06510	-0.06510	-0.06510	-0.06510	-0.06510
108	-0.06445	-0.06445	-0.06445	-0.06445	-0.06445	-0.05597	-0.05597	-0.02181	-0.02181	-0.02181
109	-0.02181	-0.02181	-0.01332	-0.01332	-0.00849	-0.00849	-0.00000	-0.00000	-0.00000	-0.00000
110	-0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
111	0.00000	0.00849	0.00849	0.02182	0.02182	0.02182	0.02182	0.02182	0.03031	0.03031
112	0.05539	0.06389	0.06389	0.06389	0.06389	0.06389	0.06453	0.06453	0.06453	0.06453
113	0.06453	0.07304	0.07304	0.07702	0.08552	0.08552	0.08552	0.08552	0.08552	0.08638
114	0.08638	0.08638	0.08638	0.08638	0.09489	0.09489	0.11935	0.12787	0.12787	0.12787
115	0.12787	0.12787	0.14101	0.14953	0.14953	0.14953	0.14953	0.14953	0.15102	0.15102
116	0.15102	0.15102	0.15102	0.15954	0.15954	0.16267	0.17119	0.17119	0.17119	0.17119
117	0.17119	0.20508	0.21361	0.21361	0.21361	0.21361	0.21361	0.22677	0.23530	0.23530
118	0.23530	0.23530	0.23530	0.23851	0.25912	0.25912	0.26764	0.29096	0.29950	0.29950
119	0.29950	0.29950	0.29950	0.30476	0.32263	0.32263	0.32719	0.33117	0.34413	0.34413
120	0.35267	0.37111	0.38622	0.38622	0.38702	0.39356	0.39477	0.40775	0.40775	0.41603
121	0.41630	0.42929	0.42929	0.43785	0.45007	0.46002	0.47142	0.47145	0.47145	0.48002
122	0.48252	0.49302	0.49302	0.50159	0.51321	0.53458	0.53905	0.53905	0.54755	0.54910
123	0.55597	0.55683	0.55683	0.56541	0.59783	0.60494	0.60494	0.61345	0.61924	0.62725
124	0.62725	0.63576	0.67092	0.67092	0.67944	0.68259	0.69325	0.69325	0.69480	0.70178
125	0.70332	0.70332	0.70332	0.70332	0.70332	0.71560	0.71560	0.72413	0.75934	0.75934
126	0.76023	0.76788	0.76877	0.76877	0.76877	0.76877	0.76877	0.78172	0.78172	0.78238
127	0.79026	0.79092	0.79092	0.79092	0.79092	0.79092	0.82575	0.83429	0.83429	0.83429
128	0.83429	0.83429	0.84793	0.84793	0.84793	0.84793	0.84793	0.84793	0.84793	0.84793
129	0.85648	0.85648	0.85648	0.85648	0.85648	0.85648	0.85648	0.85648	0.87012	0.87867
130	0.87867	0.87867	0.87867	0.87867	0.91291	0.91291	0.91291	0.91291	0.91291	0.91356
131	0.92147	0.92147	0.92212	0.92212	0.92212	0.92212	0.92212	0.93491	0.93491	0.93491
132	0.93491	0.93491	0.93578	0.94347	0.94347	0.94434	0.94434	0.94434	0.94434	0.94434
133	0.97797	0.97797	0.97797	0.97797	0.97797	0.98655	0.98655	1.00000	1.00000	1.00000
134	1.00000	1.00000	1.00152	1.00858	1.00858	1.01010	1.01010	1.01010	1.01010	1.01010
135	1.02204	1.02204	1.02204	1.02204	1.02504	1.03062	1.03062	1.06518	1.06518	1.06518
136	1.06518	1.06518	1.07377	1.07377	1.08724	1.08724	1.08724	1.08724	1.08724	1.09584
137	1.09584	1.11053	1.11912	1.11912	1.11912	1.11912	1.11912	1.15253	1.15253	1.15253
138	1.15253	1.15253	1.16114	1.16114	1.17513	1.18373	1.18373	1.18373	1.18373	1.18373
139	1.19700	1.20560	1.20560	1.20560	1.20560	1.20560	1.23981	1.24079	1.24079	1.24842
140	1.24842	1.24842	1.24842	1.24842	1.24940	1.26171	1.27032	1.27032	1.27032	1.27032
141	1.27032	1.28361	1.29223	1.29223	1.29223	1.29223	1.29223	1.30493	1.30493	1.31355
142	1.32650	1.32664	1.32664	1.33512	1.33512	1.33512	1.33512	1.33512	1.33527	1.34843
143	1.35706	1.35706	1.35706	1.35706	1.35706	1.36915	1.36915	1.37778	1.39089	1.39089
144	1.39618	1.39952	1.41263	1.41263	1.41333	1.42127	1.42197	1.42197	1.42197	1.42197
145	1.42197	1.45521	1.45521	1.46320	1.46386	1.47699	1.47699	1.48564	1.48589	1.53031
146	1.54142	1.54142	1.55009	1.55302	1.55460	1.55460	1.56318	1.57575	1.62025	1.62115
147	1.62115	1.62975	1.64301	1.64368	1.64368	1.65228	1.68779	1.68779	1.69640	1.70174
148	1.71035	1.71035	1.71035	1.71035	1.71035	1.71035	1.71035	1.71035	1.71897	1.73292
149	1.73292	1.74154	1.76783	1.77645	1.77645	1.77645	1.77645	1.77645	1.77711	1.77711
150	1.78574	1.79020	1.79883	1.79883	1.79883	1.79883	1.79883	1.79971	1.79971	1.80834
151	1.83400	1.84264	1.84264	1.84264	1.84264	1.84264	1.85641	1.86504	1.86504	1.86504
152	1.86504	1.86504	1.86659	1.86659	1.87823	1.87882	1.88746	1.88746	1.88746	1.88746
153	1.88746	1.92269	1.93134	1.93134	1.93134	1.93134	1.93134	1.94513	1.95379	1.95379
154	1.95379	1.95379	1.95379	1.97654	1.97654	1.97654	1.97654	1.97654	1.98518	1.98518
155	2.01154	2.02020	2.02020	2.02020	2.02020	2.02020	2.04224	2.04224	2.04224	2.04224
156	2.04224	2.05090	2.05090	2.06449	2.06449	2.06449	2.06449	2.06449	2.07315	2.07315
157	2.10055	2.10804	2.10804	2.10804	2.10804	2.10804	2.10922	2.10922	2.10922	2.10922
158	2.10922	2.11671	2.11671	2.13031	2.13031	2.13031	2.13031	2.13031	2.13899	2.13899
159	2.15259	2.15259	2.15259	2.15259	2.15259	2.16127	2.16127	2.16578	2.17446	2.17446
160	2.17446	2.17446	2.17446	2.16785	2.19622	2.19622	2.19622	2.19622	2.19622	2.19655
161	2.19655	2.19655	2.19655	2.19655	2.20490	2.20490	2.21853	2.21853	2.21853	2.21853
162	2.21853	2.22722	2.22722	2.23109	2.23979	2.23979	2.23979	2.23979	2.23979	2.25320
163	2.26190	2.26190	2.26190	2.26190	2.26190	2.27532	2.28402	2.28402	2.28402	2.28402
164	2.28402	2.28455	2.28455	2.28455	2.28455	2.28455	2.29325	2.29325	2.31863	2.32734
165	2.32734	2.32734	2.32734	2.32734	2.34075	2.34949	2.34949	2.34949	2.34949	2.34949
166	2.40631	2.41504	2.41504	2.41504	2.41504	2.41504	2.42038	2.46066	2.48808	2.51100
167	2.52502	2.54681	2.55586	2.57014	2.57014	2.57881	2.57881	2.58946	2.60177	2.61126
168	2.63310	2.63736	2.63736	2.64604	2.64672	2.66012	2.66012	2.66881	2.66971	2.67583
169	2.69708	2.70467	2.70467	2.71337	2.72746	2.72746	2.73616	2.73773	2.75025	2.75025
170	2.75896	2.76234	2.79480	2.79489	2.80359	2.81771	2.81771	2.82642	2.83991	2.84862
171	2.84862	2.84362	2.84862	2.84862	2.88526	2.88526	2.89398	2.90673	2.91545	2.91545
172	2.91545	2.91545	2.91545	2.92936	2.93808	2.93808	2.93808	2.93808	2.93808	2.97365
173	2.97503	2.97503	2.97503	2.97503	2.97503	2.98238	2.98238	2.98238	2.98238	2.98238
174	2.98376	2.98376	2.99630	3.00503	3.00503	3.00503	3.00503	3.00503	3.01896	3.02770
175	3.02770	3.02770	3.02770	3.02770	3.04138	3.04138	3.04138	3.04138	3.04138	3.05013
176	3.05013	3.06333	3.06384	3.06384	3.06384	3.06384	3.06384	3.07208	3.07208	3.07208
177	3.07208	3.07208	3.07259	3.07259	3.08402	3.09477	3.09477	3.09477	3.09477	3.09477
178	3.10782	3.10782	3.10782	3.10782	3.10782	3.11658	3.11658	3.13031	3.13031	3.13031
179	3.13031	3.13031	3.13907	3.13907	3.15281	3.15281	3.15281	3.15281	3.15281	3.15317
180	3.16157	3.16157	3.16193	3.16193	3.16193	3.16193	3.16193	3.19686	3.19686	3.19686
181	3.19686	3.19686	3.20563	3.20563	3.21939	3.21939	3.21939	3.21939	3.21939	3.22817
182	3.22817	3.28606	3.28606	3.28606	3.28606	3.28606	3.29485	3.29485	3.33207	3.33207
183	3.34086	3.39754	3.39754	3.40634	3.41970	3.41970	3.42850	3.44459	3.46308	3.46308
184	3.47169	3.48527	3.48527	3.49408	3.50746	3.50746	3.51296	3.51628	3.53611	3.55092
185	3.55092	3.55975	3.57315	3.57315	3.58142	3.58108	3.60460	3.62779	3.63891	3.63891
186	3.64775	3.67318	3.69640	3.71802	3.71802	3.72679	3.76511	3.78600	3.78600	3.79478
187	3.80901	3.80901	3.81779	3.84686	3.85406	3.85406	3.85565	3.85565	3.85565	3.85565

188	3.85565	3.86285	3.87710	3.87710	3.38590	3.90015	3.90015	3.90805	3.91434	3.92314
189	3.92314	3.92314	3.92314	3.92314	3.93718	3.94528	3.94528	3.94509	3.94599	3.94599
190	3.94599	3.94599	3.95409	3.96837	3.96837	3.97718	3.98191	3.99072	3.99072	3.99072
191	3.99072	3.99072	4.00478	4.01360	4.01360	4.01360	4.01360	4.01360	4.02766	4.03649
192	4.03649	4.03649	4.03649	4.03649	4.03667	4.03667	4.04549	4.07247	4.08130	4.08130
193	4.08130	4.08130	4.08130	4.09538	4.10422	4.10422	4.10422	4.10422	4.10422	4.16319
194	4.17203	4.17203	4.17203	4.17203	4.17303	4.20959	4.21844	4.21844	4.21844	4.21844
195	4.21844	4.27617	4.28503	4.28503	4.28503	4.28503	4.28503	4.29870	4.30757	4.30757
196	4.30757	4.30757	4.30757	4.34285	4.35170	4.35170	4.35170	4.35170	4.35170	4.36540
197	4.37427	4.37427	4.37427	4.37427	4.37427	4.38797	4.39685	4.39685	4.39685	4.39685
198	4.39685	4.43217	4.44106	4.44106	4.44106	4.44106	4.44106	4.45478	4.46367	4.46367
199	4.46367	4.46367	4.46367	4.52167	4.53057	4.53057	4.53057	4.53057	4.53057	4.60226
200	4.67140	4.69480	4.73357	4.73357	4.74062	4.74242	4.76406	4.78751	4.80221	4.80221
201	4.81108	4.82545	4.82545	4.83341	4.83432	4.85689	4.87094	4.87094	4.87982	4.89421
202	4.89421	4.90309	4.91748	4.91748	4.92437	4.92637	4.96305	4.96305	4.97195	4.98636
203	4.98636	4.99526	5.05533	5.05533	5.06424	5.10213	5.10213	5.10213	5.10213	5.10213
204	5.11105	5.11105	5.16986	5.16986	5.16986	5.16986	5.16986	5.17878	5.17878	5.19278
205	5.19278	5.19278	5.19278	5.19278	5.20171	5.20171	5.23767	5.23767	5.23767	5.23767
206	5.23767	5.24660	5.24660	5.26062	5.26062	5.26062	5.26062	5.26062	5.26956	5.26956
207	5.28359	5.28359	5.28359	5.28359	5.28359	5.29253	5.29253	5.32855	5.32855	5.32855
208	5.32855	5.32855	5.33750	5.33750	5.35155	5.35155	5.35155	5.35155	5.35155	5.36050
209	5.36050	5.41959	5.41959	5.41959	5.41959	5.41959	5.42856	5.42856	5.62646	5.69628
210	5.71991	5.76618	5.78985	5.81353	5.85988	5.88359	5.95374	5.99197	6.00094	6.00094
211	6.00094	6.00094	6.00094	6.06084	6.06983	6.06983	6.06983	6.06983	6.06983	6.08416
212	6.09315	6.09315	6.09315	6.09315	6.09315	6.12981	6.13881	6.13881	6.13881	6.13881
213	6.13881	6.15316	6.16216	6.16216	6.16216	6.16216	6.16216	6.17651	6.18552	6.18552
214	6.18552	6.18552	6.18552	6.22224	6.23125	6.23125	6.23125	6.23125	6.23125	6.24563
215	6.25464	6.25464	6.25464	6.25464	6.25464	6.31483	6.32386	6.32386	6.32386	6.32386
216	6.32366	6.89700	6.89700	6.90604	6.96706	6.96706	6.97611	6.99077	6.99077	6.99983
217	7.03721	7.03721	7.04627	7.06095	7.06095	7.07002	7.08471	7.08471	7.09378	7.13122
218	7.13122	7.14030	7.15501	7.15501	7.16409	7.22541	7.22541	7.23450	7.80833	7.87959
219	7.90371	7.95094	7.97510	7.99926	8.04457	8.07077	8.14238			

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FORD MOTOR CO. LTD.

GROUP SENSITIVITY ANALYSIS

OUTPUT IN ASCENDING ORDER

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1	-8.27671	-8.24022	-8.20370	-8.16106	-8.12447	-8.08786	-8.04511	-8.00844	-7.97173	-7.51426
2	-7.51426	-7.50657	-7.47716	-7.47716	-7.46947	-7.44003	-7.44003	-7.43233	-7.39667	-7.39667
3	-7.38897	-7.35948	-7.35948	-7.35177	-7.32225	-7.32225	-7.31453	-7.27879	-7.27879	-7.27106
4	-7.24150	-7.24150	-7.23376	-7.20418	-7.20418	-7.19644	-6.74677	-6.73903	-6.73903	-6.73903
5	-6.73903	-6.73903	-6.70905	-6.70130	-6.70130	-6.70130	-6.70130	-6.70130	-6.67130	-6.66355
6	-6.66355	-6.66355	-6.66355	-6.66355	-6.62722	-6.61946	-6.61946	-6.61946	-6.61946	-6.61946
7	-6.58940	-6.58164	-6.58164	-6.58164	-6.58164	-6.58164	-6.55156	-6.54379	-6.54379	-6.54379
8	-6.54379	-6.54379	-6.50736	-6.49959	-6.49959	-6.49959	-6.49959	-6.49959	-6.46945	-6.46167
9	-6.46167	-6.46167	-6.46167	-6.46167	-6.43151	-6.42372	-6.42372	-6.42372	-6.42372	-6.42372
10	-5.96643	-5.96643	-5.96643	-5.96643	-5.96443	-5.95864	-5.95864	-5.93653	-5.92807	-5.92807
11	-5.92807	-5.92807	-5.92807	-5.92028	-5.92028	-5.89911	-5.88969	-5.88969	-5.88969	-5.88969
12	-5.88969	-5.88189	-5.88189	-5.86166	-5.84487	-5.84487	-5.84487	-5.84487	-5.84487	-5.83706
13	-5.83706	-5.81792	-5.80642	-5.80642	-5.80442	-5.80642	-5.80642	-5.79860	-5.79860	-5.78041
14	-5.76793	-5.76793	-5.76793	-5.76793	-5.76793	-5.76011	-5.76011	-5.74286	-5.72300	-5.72300
15	-5.72300	-5.72300	-5.72300	-5.71517	-5.71517	-5.69902	-5.68444	-5.68444	-5.68444	-5.68444
16	-5.68444	-5.67661	-5.67661	-5.66141	-5.64586	-5.64586	-5.64586	-5.64586	-5.64586	-5.63802
17	-5.63802	-5.62377	-5.18876	-5.18092	-5.18092	-5.18092	-5.18092	-5.18092	-5.15463	-5.15463
18	-5.14977	-5.14674	-5.14192	-5.14192	-5.14192	-5.14192	-5.14192	-5.11658	-5.11658	-5.11075
19	-5.10869	-5.10289	-5.10289	-5.10289	-5.10289	-5.10289	-5.07850	-5.07850	-5.07060	-5.06518
20	-5.05732	-5.05732	-5.05732	-5.05732	-5.05732	-5.03404	-5.03404	-5.02613	-5.02609	-5.01822
21	-5.01822	-5.01822	-5.01822	-5.01822	-4.99589	-4.99589	-4.98798	-4.98697	-4.97909	-4.97909
22	-4.97909	-4.97909	-4.97909	-4.96270	-4.95772	-4.95772	-4.94980	-4.94128	-4.93340	-4.93340
23	-4.93340	-4.93340	-4.93340	-4.92495	-4.91315	-4.91315	-4.90522	-4.90209	-4.89420	-4.89420
24	-4.89420	-4.89420	-4.89420	-4.88711	-4.87490	-4.87490	-4.86697	-4.86286	-4.85497	-4.85497
25	-4.85497	-4.85497	-4.85497	-4.84292	-4.83663	-4.83663	-4.82869	-4.80502	-4.76708	-4.72279
26	-4.66479	-4.64676	-4.39812	-4.39812	-4.39023	-4.36755	-4.35961	-4.35961	-4.35961	-4.35961
27	-4.35961	-4.35848	-4.35848	-4.35058	-4.32887	-4.32092	-4.32092	-4.32092	-4.32092	-4.32092
28	-4.31861	-4.31381	-4.31090	-4.29016	-4.28221	-4.28221	-4.28221	-4.28221	-4.28221	-4.27248
29	-4.27248	-4.26456	-4.24495	-4.23699	-4.23699	-4.23699	-4.23699	-4.23699	-4.23273	-4.23273
30	-4.22461	-4.20617	-4.19821	-4.19821	-4.19821	-4.19821	-4.19821	-4.19295	-4.19295	-4.18502
31	-4.17276	-4.17276	-4.16736	-4.16479	-4.15939	-4.15939	-4.15939	-4.15939	-4.15939	-4.14650
32	-4.14650	-4.13856	-4.13432	-4.13432	-4.12634	-4.12204	-4.11406	-4.11406	-4.11406	-4.11406
33	-4.11406	-4.10664	-4.10664	-4.09870	-4.09584	-4.09584	-4.08786	-4.08316	-4.07518	-4.07518
34	-4.07518	-4.07518	-4.07518	-4.06676	-4.06676	-4.05881	-4.05092	-4.05092	-4.04425	-4.04293
35	-4.03626	-4.03626	-4.03626	-4.03626	-4.03626	-4.01238	-4.01238	-4.00439	-3.97381	-3.97381
36	-3.96581	-3.92878	-3.92878	-3.92077	-3.89014	-3.89014	-3.88213	-3.85147	-3.85147	-3.84345
37	-3.60230	-3.59635	-3.56730	-3.56730	-3.56730	-3.56730	-3.56730	-3.56199	-3.55931	-3.55931
38	-3.55799	-3.52797	-3.52797	-3.52797	-3.52797	-3.52797	-3.52165	-3.51997	-3.51997	-3.51961
39	-3.48861	-3.48861	-3.48861	-3.48861	-3.48861	-3.48060	-3.48060	-3.47479	-3.47455	-3.44264
40	-3.44264	-3.44264	-3.44264	-3.44264	-3.43434	-3.43463	-3.43463	-3.43413	-3.40321	-3.40321
41	-3.40321	-3.40321	-3.40321	-3.39786	-3.39519	-3.39519	-3.39369	-3.37753	-3.36951	-3.36951
42	-3.36951	-3.36951	-3.36951	-3.36374	-3.36374	-3.36374	-3.36374	-3.36374	-3.35572	-3.35572
43	-3.35293	-3.34646	-3.33845	-3.33043	-3.33043	-3.33043	-3.33043	-3.33043	-3.31766	-3.31766
44	-3.31766	-3.31766	-3.31766	-3.31430	-3.30963	-3.30963	-3.30594	-3.29934	-3.29131	-3.29131
45	-3.29131	-3.29131	-3.29131	-3.27812	-3.27812	-3.27812	-3.27812	-3.27812	-3.27580	-3.27009
46	-3.27009	-3.26538	-3.25367	-3.24563	-3.24563	-3.24563	-3.24563	-3.24563	-3.23856	-3.23856
47	-3.23856	-3.23856	-3.23856	-3.23051	-3.23051	-3.21448	-3.20644	-3.20644	-3.20644	-3.20644
48	-3.20644	-3.17527	-3.16722	-3.16722	-3.16722	-3.16722	-3.16722	-3.12948	-3.12142	-3.12142
49	-3.12142	-3.12142	-3.12142	-3.09020	-3.08213	-3.08213	-3.08213	-3.08213	-3.08213	-3.05088
50	-3.04281	-3.04281	-3.04281	-3.04281	-3.04281	-2.79499	-2.79499	-2.78601	-2.76979	-2.76175
51	-2.76175	-2.76175	-2.76175	-2.76175	-2.75600	-2.75600	-2.74791	-2.72981	-2.72176	-2.72176
52	-2.72176	-2.72176	-2.72176	-2.71697	-2.71697	-2.70888	-2.68979	-2.68174	-2.68174	-2.68174
53	-2.68174	-2.68174	-2.67140	-2.67140	-2.66330	-2.64306	-2.63500	-2.63500	-2.63500	-2.63500
54	-2.63500	-2.63231	-2.63231	-2.62420	-2.62257	-2.60297	-2.59490	-2.59490	-2.59490	-2.59490
55	-2.59490	-2.59319	-2.59319	-2.58507	-2.58383	-2.56900	-2.56900	-2.56900	-2.56900	-2.56900
56	-2.56285	-2.56093	-2.56093	-2.55478	-2.55478	-2.55478	-2.55478	-2.55478	-2.54750	-2.54750

57	-2.54506	-2.53938	-2,52926	-2,52926	-2,52926	-2.52926	-2,52926	-2.52118	-2,52118	-2.51600
58	-2.50831	-2.50831	-2,50792	-2,50792	-2,50792	-2.50792	-2,50792	-2.50018	-2.49979	-2.48949
59	-2.48949	-2.48949	-2,48949	-2,48949	-2,48140	-2.48140	-2,47581	-2.46909	-2.46909	-2.46772
60	-2.46772	-2.46772	-2,46772	-2,46772	-2,46095	-2.46095	-2,44305	-2.44305	-2.44305	-2.44305
61	-2.44305	-2,43558	-2,43496	-2,43496	-2,42748	-2.42748	-2,42748	-2.42748	-2.42748	-2.42208
62	-2.40321	-2;40321	-2,40321	-2,40321	-2,40321	-2.39511	-2,39511	-2.37669	-2.36333	-2.36333
63	-2.36333	-2;36333	-2,35333	-2,35525	-2,35523	-2.33776	-2,31677	-2.31677	-2.31677	-2.31677
64	-2.31677	-2;30866	-2,30866	-2,29879	-2,27683	-2.27683	-2,27683	-2.27683	-2,27683	-2.26871
65	-2.26871	-2;23685	-2.23685	-2,23685	-2,23685	-2.23685	-2,22873	-2.22873	-1,98833	-1.98020
66	-1.98020	-1,98020	-1,98020	-1,98020	-1,95899	-1,95899	-1,95089	-1.94869	-1,94055	-1.94055
67	-1.94055	-1,94055	-1,94055	-1,91833	-1,91833	-1,91023	-1,90901	-1.90087	-1.90087	-1.90087
68	-1.90087	-1,90087	-1,87764	-1,87764	-1,86954	-1,86268	-1,85453	-1.85453	-1,85453	-1.85453
69	-1,85453	-1,83013	-1,83013	-1,82294	-1,82502	-1,81478	-1,81478	-1.81478	-1,81478	-1.81478
70	-1.81312	-1,81312	-1,80496	-1,78937	-1,78937	-1.78316	-1,78125	-1.77499	-1,77499	-1.77499
71	-1.77499	-1;77499	-1,77373	-1.77373	-1,76556	-1.76324	-1,75511	-1.75511	-1.75511	-1.75511
72	-1.75511	-1,74857	-1,74857	-1.74044	-1,73671	-1.73431	-1,73431	-1.72854	-1.72854	-1.72854
73	-1.72854	-1;72854	-1,72614	-1.72284	-1,71471	-1.71471	-1,71671	-1.71471	-1.71471	-1.70094
74	-1.70094	-1,69667	-1,69280	-1.68868	-1,68868	-1.68868	-1,68868	-1.68868	-1.68829	-1.68829
75	-1.68241	-1,68010	-1,67627	-1.67627	-1,67627	-1.67427	-1,67627	-1.66007	-1.66007	-1.65699
76	-1.65192	-1;64880	-1,64880	-1.64880	-1,64880	-1.64880	-1,64880	-1.64880	-1.64880	-1.64061
77	-1.63519	-1,62705	-1,62705	-1.62705	-1,62705	-1.62705	-1,61917	-1.61917	-1.61101	-1.60967
78	-1.60928	-1.60928	-1,60108	-1.59469	-1,58654	-1.58654	-1,58654	-1.58654	-1.58654	-1.57051
79	-1.56313	-1.56313	-1,55493	-1.55415	-1,54599	-1.54599	-1,54599	-1.54599	-1.54599	-1.52479
80	-1.52355	-1;52355	-1,51533	-1.50682	-1,49865	-1.49865	-1,49865	-1.49865	-1.49865	-1.48556
81	-1.48393	-1,48393	-1,47571	-1.46621	-1,45803	-1.45803	-1,45803	-1.45803	-1,45803	-1.44630
82	-1.42556	-1.41738	-1,41738	-1.41738	-1,41738	-1.41738	-1,40046	-1.36114	-1,32178	-1.16817
83	-1.16817	-1.16817	-1,16817	-1.16817	-1,15999	-1.15999	-1,14285	-1.12786	-1.12786	-1.12786
84	-1.12786	-1.12786	-1,11967	-1.11967	-1,10152	-1.08752	-1,08752	-1.08752	-1.08752	-1.08752
85	-1.07932	-1;07932	-1,06015	-1.04041	-1,04041	-1.04041	-1,04041	-1.04041	-1,03220	-1.03220
86	-1.01164	-1.00000	-1,00000	-1.00000	-1,00000	-1.00000	-0,99832	-0.99178	-0,99178	-0.99010
87	-0.99010	-0.99010	-0,99010	-0.99010	-0,97040	-0.95955	-0,95955	-0.95955	-0.95955	-0.95955
88	-0.95827	-0.95133	-0,95133	-0.95005	-0,95005	-0.95005	-0,95005	-0.95005	-0,94403	-0.94403
89	-0.93586	-0.92892	-0,91820	-0.91232	-0,91232	-0.91232	-0,91232	-0.91232	-0.90997	-0.90997
90	-0.90997	-0.90997	-0,90997	-0.90409	-0,90409	-0.90296	-0,90296	-0.89477	-0,88049	-0.87180
91	-0.87180	-0,87180	-0,87180	-0.87180	-0,87140	-0.86357	-0,86357	-0.86316	-0,86316	-0.86316
92	-0.86316	-0.86316	-0,86185	-0.86185	-0,85366	-0.83893	-0,83125	-0.83125	-0,83125	-0.83125
93	-0.83125	-0.83125	-0,83125	-0.83125	-0,82301	-0.82301	-0,82301	-0.82301	-0.82301	-0,82301
94	-0.82301	-0.82301	-0,81385	-0.81385	-0,80565	-0.79734	-0,79147	-0.79147	-0,79107	-0,78322
95	-0.78282	-0;78282	-0,78282	-0.78282	-0,78282	-0.77266	-0,77266	-0.76446	-0,75166	-0,75166
96	-0.74416	-0.74340	-0,73590	-0.73590	-0,73590	-0.73590	-0,73590	-0.73145	-0,73145	-0.72323
97	-0.70517	-0.70517	-0,70391	-0.69690	-0,69564	-0.69564	-0,69564	-0.69564	-0,69564	-0,68331
98	-0,68331	-0.67509	-0,66529	-0.66529	-0,66362	-0.65701	-0,65535	-0.65535	-0.65535	-0.65535
99	-0.65535	-0.64202	-0,64202	-0,63379	-0,62837	-0.62537	-0,61709	-0.60070	-0,60070	-0.59246
100	-0.57876	-0.57876	-0,57048	-0,53878	-0,53878	-0.53049	-0,49876	-0.49876	-0,49046	-0.35083
101	-0.34258	-0.34258	-0,34258	-0.34258	-0.34258	-0.30985	-0,30160	-0.30160	-0.30160	-0.30160
102	-0.30160	-0.28239	-0,26883	-0.26058	-0.26058	-0.26058	-0,26058	-0.26058	-0.24272	-0.22094
103	-0.21268	-0.21268	-0,21268	-0.21268	-0,21268	-0.20302	-0,17986	-0.17159	-0.17159	-0.17159
104	-0.17159	-0;17159	-0,16987	-0.16987	-0,16087	-0.16987	-0,16987	-0.16160	-0.16160	-0.15666
105	-0.13874	-0.13046	-0,13046	-0.13046	-0,13046	-0.13046	-0,12916	-0.12916	-0.12916	-0.12916
106	-0.12916	-0.12088	-0,12088	-0.11945	-0,11688	-0.09072	-0,08841	-0.08841	-0,08841	-0,08841
107	-0.08841	-0.08243	-0,08243	-0.08243	-0,08243	-0.08243	-0,08012	-0,08012	-0,07769	-0,07708
108	-0.04953	-0.04123	-0,04123	-0,04123	-0,04123	-0,04123	-0,04082	-0.04082	-0,04082	-0.04082
109	-0.04082	-0,03590	-0,03253	-0,03253	-0,03060	-0.00830	-0,00830	-0.00000	-0,00000	-0,00000
110	-0.00000	0.00000	0,00000	0,00000	0,00000	0.00000	0,00000	0.00000	0,00000	0.00000
111	0.00000	0.00000	0,00830	0,00830	0,00927	0.01291	0,03215	0.04045	0,04045	0.04045
112	0.04045	0.04045	0,04086	0,04086	0,04086	0.04086	0,04086	0.04916	0,04916	0.04917
113	0.05479	0.07262	0,08093	0,08093	0,08093	0.08093	0,08093	0.08856	0.08856	0.08856
114	0.08856	0.08856	0,09669	0,09688	0,09688	0.11989	0,12821	0.12821	0,12821	0,12821
115	0.12821	0.12949	0,12949	0.12949	0,12949	0.12949	0,13781	0.13781	0,14563	0.16044
116	0.16876	0.16876	0,16876	0.16876	0,16876	0.17045	0,17045	0.17045	0,17045	0.17045
117	0.17878	0.17878	0,18761	0,20104	0,20935	0.20935	0,20935	0.20935	0,20935	0.22963
118	0.24840	0.25674	0,25674	0,25674	0,25674	0.25674	0,28905	0.29740	0,29740	0.29740
119	0.29740	0.29740	0,32974	0,33809	0,33809	0.33809	0,33809	0.33809	0,48015	0.48015
120	0.48845	0.52182	0,52182	0,53012	0,54651	0.54651	0,55487	0.56352	0,56352	0.57183
121	0.58685	0.58685	0,59521	0,61221	0,61221	0.62053	0,62721	0.62721	0,63559	0.65399
122	0.65399	0,65573	0,66231	0,66406	0,66406	0.66406	0,66406	0.66406	0,67435	0.67435
123	0,68273	0,69138	0,69580	0,69580	0,69712	0.70413	0,70546	0.70546	0,70546	0.70546
124	0.70546	0,71479	0,71479	0,72317	0,73144	0.73855	0,74462	0.74462	0,74689	0.74689
125	0.74689	0,74689	0,74689	0,75296	0,75526	0.75526	0,76365	0.77153	0,78651	0.78651
126	0.78693	0,79485	0,79527	0,79527	0,79527	0.79527	0,79527	0.80251	0,80251	0.81091
127	0.81835	0,82843	0,82843	0,82843	0,82843	0.82843	0,82843	0.82843	0,82843	0.83678
128	0.83678	0.83678	0,83678	0,83678	0,83678	0.83678	0,83678	0.84305	0,84305	0.85146
129	0.85851	0,86955	0,86955	0,86955	0,86955	0.86955	0,86996	0.87791	0,87791	0.87832
130	0.87832	0;87832	0,87832	0,87832	0,88362	0.88362	0,89204	0.89870	0,91071	0.91071
131	0.91071	0.91071	0.91071	0,91846	0,91908	0.91908	0,92683	0.92683	0,92683	0.92683
132	0,92683	0.94563	0,95877	0,95877	0,95877	0.95877	0,95877	0.96007	0,96714	0.96714
133	0.96845	0.96845	0,96845	0,96845	0,96845	0.98589	1,00000	1.00000	1,00000	1.00000
134	1,00000	1,00172	1,00838	1,00838	1,01010	1.01010	1,01010	1.01010	1,01010	1.02618
135	1.04126	1,04126	1,04126	1,04126	1,04126	1.04965	1,04965	1.08945	1,08945	1.08945
136	1.08945	1,08945	1,09785	1,09785	1,13079	1.13079	1,13079	1.13079	1,13079	1.13919
137	1.13919	1,17216	1,17216	1,17216	1,17216	1.17216	1,18057	1.18057	1,31659	1.35895
138	1.38090	1,38932	1,38932	1,38932	1,38932	1.38932	1,40135	1.42191	1.43033	1.43033
139	1.43033	1,43033	1,43033	1,45086	1,46295	1.47137	1,47137	1.47137	1.47137	1.47137
140	1,49333	1,49510	1,49510	1,50340	1,51087	1.51930	1,51930	1.51930	1,51930	1.51930
141	1.52838	1,52838	1,53584	1,53682	1,53719	1.53719	1,54558	1.55198	1.56042	1.56042
142	1.56042	1,56042	1,56042	1,56911	1,56911	1.57756	1,57931	1.57931	1,58548	1.58771
143	1.59312	1,60157	1,60157	1,60157	1,60157	1.60157	1,60987	1.60987	1,61833	1.62807
144	1.62850	1,62850	1,63690	1,64117	1,64963	1.64963	1,64963	1.64963	1,64963	1.65747
145	1.65747	1.66229	1.66593	1.67070	1,67070	1.67070	1,67070	1.67070	1.67070	1.67070
146	1.67070	1,67911	1,68239	1,69085	1,69085	1.69085	1,69085	1.69085	1,69830	1.69830
147	1.70410	1.70677	1,71251	1,71251	1,71251	1.71251	1,71251	1.71293	1.71293	1.72134
148	1.72364	1.73211	1,73211	1.73211	1,73211	1.73211	1,73916	1.73916	1.74594	1.74764
149	1.75436	1.75436	1,75436	1.75436	1,75436	1.76224	1,76224	1.77067	1.78688	1.78688
150	1.79460	1.79536	1,80323	1.80323	1.80323	1.80323	1,80323	1.80455	1.80455	1.81298
151	1.82781	1.82781	1,83630	1,83671	1,84515	1.84515	1,84515	1.84515	1.84515	1.84600
152	1,84690	1,85533	1,86878	1,86878	1,87728	1.87866	1,88711	1.88711	1,88711	1.88711
153	1.86711	1,92765	1,93610	1,93610	1,93610	1,93610	1,93610	1.96968	1,97813	1.97813

154	1.97813	1.97813	1.97813	2.01174	2.02020	2.02020	2.02020	2.02020	2.02020	2.22925
155	2.22925	2.22925	2.22925	2.22925	2.23772	2.23772	2.27095	2.27095	2.27095	2.27095
156	2.27095	2.27942	2.27942	2.31268	2.31268	2.31268	2.31268	2.31268	2.32116	2.32116
157	2.33999	2.36141	2.36141	2.36141	2.36141	2.36141	2.36990	2.36990	2.37092	2.37941
158	2.37941	2.37941	2.37941	2.37941	2.38278	2.40321	2.40321	2.40321	2.40321	2.40321
159	2.41171	2.41171	2.41233	2.42083	2.42083	2.42083	2.42083	2.42083	2.42561	2.44505
160	2.44505	2.44505	2.44505	2.44505	2.45355	2.45355	2.45377	2.46227	2.46227	2.46227
161	2.46227	2.46227	2.47561	2.49390	2.49390	2.49390	2.49390	2.49390	2.50215	2.50241
162	2.50241	2.51006	2.51006	2.51067	2.51067	2.51067	2.51067	2.51067	2.51852	2.51852
163	2.53581	2.53581	2.53581	2.53581	2.53581	2.54367	2.54433	2.54433	2.55219	2.55219
164	2.55219	2.55219	2.55219	2.55256	2.55256	2.56103	2.56146	2.57776	2.57776	2.57776
165	2.57776	2.57776	2.58521	2.58628	2.58628	2.59375	2.59375	2.59375	2.59375	2.59375
166	2.59511	2.59511	2.60358	2.61160	2.63373	2.64227	2.64227	2.64227	2.64227	2.64227
167	2.64478	2.64478	2.65327	2.65462	2.67535	2.68389	2.68389	2.68389	2.68389	2.68389
168	2.68740	2.68740	2.69590	2.69767	2.71700	2.72555	2.72555	2.72555	2.72555	2.72555
169	2.73006	2.73006	2.73856	2.77987	2.77987	2.78838	2.82260	2.82260	2.83111	2.86537
170	2.86537	2.87389	3.03157	3.07256	3.07470	3.08322	3.08322	3.08322	3.08322	3.08322
171	3.11358	3.11709	3.12562	3.12562	3.12562	3.12562	3.12562	3.15951	3.16148	3.16805
172	3.16805	3.16805	3.16805	3.16805	3.20257	3.20905	3.21759	3.21759	3.21759	3.21759
173	3.21759	3.22755	3.22755	3.22755	3.22755	3.22755	3.23611	3.23611	3.24370	3.25135
174	3.26010	3.26010	3.26010	3.26010	3.26010	3.26966	3.26966	3.26966	3.26966	3.26966
175	3.27822	3.27822	3.29172	3.29408	3.30264	3.30264	3.30264	3.30264	3.30264	3.31179
176	3.31179	3.31179	3.31179	3.31179	3.32036	3.32036	3.33292	3.34375	3.35232	3.35232
177	3.35232	3.35232	3.35232	3.36100	3.36100	3.36100	3.36100	3.36100	3.36339	3.36957
178	3.36957	3.37415	3.38636	3.39493	3.39493	3.39493	3.39493	3.39493	3.40321	3.40321
179	3.40321	3.40321	3.40321	3.40661	3.41179	3.41179	3.42900	3.43758	3.43758	3.43758
180	3.43758	3.43758	3.44545	3.44545	3.44545	3.44545	3.44545	3.44986	3.45404	3.45404
181	3.49479	3.49479	3.49479	3.49479	3.49479	3.50037	3.50338	3.50338	3.53711	3.53711
182	3.53711	3.53711	3.53711	3.54370	3.54571	3.54571	3.57946	3.57946	3.57946	3.57946
183	3.57946	3.58707	3.58807	3.58807	3.63772	3.68117	3.72465	3.88802	3.88802	3.89666
184	3.92969	3.92969	3.93424	3.93424	3.93834	3.94282	3.97140	3.97140	3.97734	3.97734
185	3.98005	3.98593	4.02010	4.02010	4.02048	4.02048	4.02876	4.02907	4.06188	4.06188
186	4.07055	4.07084	4.07084	4.07945	4.08126	4.08986	4.08986	4.08986	4.08986	4.08986
187	4.10370	4.10370	4.11237	4.11406	4.11406	4.12267	4.12406	4.13267	4.13267	4.13267
188	4.13267	4.13267	4.15252	4.15252	4.15730	4.15730	4.16120	4.16592	4.16689	4.17552
189	4.17552	4.17552	4.17552	4.17552	4.19441	4.19441	4.20310	4.20780	4.20780	4.21643
190	4.21692	4.22555	4.22555	4.22555	4.22555	4.22555	4.23633	4.23633	4.24502	4.25113
191	4.25113	4.25976	4.25983	4.26847	4.26847	4.26847	4.26847	4.26847	4.29449	4.29449
192	4.30278	4.30313	4.31142	4.31142	4.31142	4.31142	4.31142	4.35293	4.36158	4.36158
193	4.36158	4.36158	4.36158	4.39596	4.40462	4.40462	4.40462	4.40462	4.40462	4.43902
194	4.44769	4.44769	4.44769	4.44769	4.44769	4.75014	4.75883	4.75883	4.75883	4.75883
195	4.75883	4.79250	4.79943	4.80120	4.80120	4.80120	4.80120	4.80120	4.83491	4.84325
196	4.84362	4.84362	4.84362	4.84362	4.84362	4.85442	4.88711	4.89314	4.89314	4.89314
197	4.89314	4.89314	4.92690	4.93562	4.93562	4.93562	4.93562	4.93562	4.93832	4.94919
198	4.94919	4.95786	4.96941	4.97814	4.97814	4.97814	4.97814	4.97814	4.98225	4.99271
199	4.99271	5.00139	5.01905	5.02622	5.02779	5.02779	5.02779	5.02779	5.02779	5.03627
200	5.03627	5.04495	5.06164	5.07038	5.07038	5.07038	5.07038	5.07038	5.07757	5.08713
201	5.08713	5.09582	5.10426	5.11301	5.11301	5.11301	5.11301	5.11301	5.12162	5.13076
202	5.13076	5.13946	5.16571	5.17443	5.17443	5.18313	5.22543	5.22543	5.23414	5.26917
203	5.26917	5.27789	5.31296	5.31296	5.32168	5.62668	5.62668	5.62668	5.62668	5.62668
204	5.63543	5.63543	5.66976	5.66976	5.66976	5.66976	5.66976	5.67852	5.67852	5.71288
205	5.71288	5.71288	5.71288	5.71288	5.72164	5.72164	5.76322	5.76322	5.76322	5.76322
206	5.76322	5.77200	5.77200	5.80642	5.80642	5.80642	5.80642	5.80642	5.81520	5.81520
207	5.82263	5.84965	5.84965	5.84965	5.84965	5.84965	5.85843	5.85843	5.86708	5.90012
208	5.90012	5.90012	5.90012	5.90012	5.90892	5.90892	5.91136	5.94343	5.94343	5.94343
209	5.94343	5.94343	5.95223	5.95223	5.96107	5.98677	5.98677	5.98677	5.98677	5.98677
210	5.99558	5.99558	6.00744	6.03184	6.10369	6.14817	6.19269	6.50022	6.50903	6.50903
211	6.50903	6.50903	6.50903	6.54402	6.55283	6.55283	6.55283	6.55283	6.55283	6.58785
212	6.59667	6.59667	6.59667	6.59667	6.59667	6.63904	6.64787	6.64787	6.64787	6.64787
213	6.64787	6.68295	6.69179	6.69179	6.69179	6.69179	6.69179	6.72689	6.73574	6.73574
214	6.73574	6.73574	6.73574	6.77821	6.78707	6.78707	6.78707	6.78707	6.78707	6.82224
215	6.83110	6.83110	6.83110	6.83110	6.83110	6.86630	6.87517	6.87517	6.87517	6.87517
216	6.87517	7.38833	7.38833	7.39720	7.43286	7.43286	7.44174	7.47743	7.47743	7.48631
217	7.52947	7.52947	7.53836	7.57412	7.57412	7.58302	7.61881	7.61881	7.62771	7.67098
218	7.67098	7.67990	7.71575	7.71575	7.72467	7.76055	7.76055	7.76948	8.28223	8.32755
219	8.37286	8.42578	8.47117	8.51660	8.56066	8.61517	8.66073			

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VAUXHALL MOTOR CO. LTD

GROUP SENSITIVITY ANALYSIS

OUTPUT IN ASCENDING ORDER

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1	-10.22184	-10.17813	-10.14012	-10.13447	-10.09437	-10.05824	-10.05259	-10.01442	-9.97055	-9.45170
2	-9.45170	-9.44393	-9.40728	-9.40726	-9.39950	-9.36856	-9.36856	-9.36282	-9.36282	-9.36078
3	-9.35504	-9.32406	-9.32406	-9.31627	-9.28527	-9.28527	-9.27952	-9.27952	-9.27747	-9.27172
4	-9.24069	-9.24069	-9.23289	-9.19607	-9.19607	-9.18825	-8.67604	-8.66822	-8.66822	-8.66822
5	-8.66822	-8.66822	-8.63086	-8.62303	-8.62303	-8.62303	-8.62303	-8.62303	-8.59148	-8.58564
6	-8.58364	-8.58364	-8.58364	-8.58364	-8.58364	-8.57780	-8.57780	-8.57780	-8.57780	-8.57780
7	-8.54621	-8.53837	-8.53837	-8.53837	-8.53837	-8.53837	-8.50675	-8.50090	-8.49890	-8.49890
8	-8.49890	-8.49890	-8.49890	-8.49305	-8.49305	-8.49305	-8.49305	-8.49305	-8.46140	-8.45354
9	-8.45354	-8.45354	-8.45354	-8.45354	-8.41601	-8.40814	-8.40814	-8.40814	-8.40814	-8.40814
10	-7.88699	-7.88699	-7.88699	-7.88699	-7.88609	-7.87911	-7.87911	-7.84102	-7.84102	-7.84102
11	-7.84102	-7.84102	-7.83314	-7.83314	-7.80095	-7.80095	-7.80095	-7.80095	-7.80095	-7.79501
12	-7.79501	-7.79501	-7.79501	-7.79501	-7.79306	-7.79306	-7.78712	-7.78712	-7.75490	-7.75490
13	-7.75490	-7.75490	-7.75490	-7.74700	-7.74700	-7.71476	-7.71476	-7.71476	-7.71476	-7.71476
14	-7.70881	-7.70881	-7.70881	-7.70881	-7.70881	-7.70685	-7.70685	-7.70090	-7.70090	-7.66862
15	-7.66862	-7.66862	-7.66862	-7.66862	-7.66070	-7.66070	-7.62244	-7.62244	-7.62244	-7.62244
16	-7.62244	-7.61451	-7.61451	-7.10021	-7.09228	-7.09228	-7.09228	-7.09228	-7.09228	-7.05346
17	-7.04552	-7.04552	-7.04552	-7.04552	-7.04552	-7.01270	-7.00666	-7.00475	-7.00475	-7.00475
18	-7.00475	-7.00475	-6.99871	-6.99871	-6.99871	-6.99871	-6.99871	-6.96586	-6.95790	-6.95790
19	-6.95790	-6.95790	-6.95790	-6.93472	-6.92502	-6.91897	-6.91706	-6.91706	-6.91706	-6.91706
20	-6.91706	-6.91100	-6.91100	-6.91100	-6.91100	-6.91100	-6.88945	-6.87809	-6.87012	-6.87012
21	-6.87012	-6.87012	-6.87012	-6.85000	-6.84415	-6.83111	-6.82313	-6.82313	-6.32313	-6.82313

22	-6,82313	-6,80465	-6,76512	-6,75926	-6,71969	-6.67422	-6,29988	-6.29988	-6.29189	-6.25232
23	-6,25232	-6.24432	-6,21085	-6.21085	-6,20471	-6.20471	-6,20284	-6.19670	-6.16320	-6.16320
24	-6,15518	-6.13637	-6,13637	-6.12832	-6,12166	-6.12166	-6,11550	-6.11550	-6.11363	-6.10747
25	-6,09033	-6,09033	-6,08227	-6,07391	-6,07391	-6,06588	-6,05019	-6,05019	-6,04424	-6,04424
26	-6,04212	-6,03617	-6,02612	-6,02612	-6,01808	-6,00406	-6,00406	-5,99509	-5,96385	-5,96385
27	-5,96146	-5,95789	-5,95789	-5,95577	-5,94981	-5,91764	-5,91764	-5,91572	-5,90955	-5,87585
28	-5,87138	-5,87138	-5,86994	-5,86326	-5,83003	-5,79009	-5,78417	-5,74419	-5,69824	-5,49325
29	-5,44547	-5,40328	-5,39703	-5,35481	-5,33232	-5,32421	-5,32421	-5,32421	-5,32421	-5,32421
30	-5,31254	-5,30628	-5,28548	-5,27737	-5,27737	-5.27737	-5.27737	-5.27737	-5.26397	-5.26466
31	-5,23860	-5,23653	-5,23653	-5,23653	-5,23653	-5.23653	-5,23048	-5.23048	-5.23048	-5.23048
32	-5,23048	-5,21535	-5,19773	-5,18960	-5,18960	-5.18960	-5,18960	-5.18960	-5.15683	-5.15476
33	-5,15476	-5,15077	-5,14869	-5,14869	-5,14869	-5.14869	-5,14869	-5.14663	-5.14262	-5.14262
34	-5,14262	-5,14262	-5,14262	-5,10982	-5,10826	-5.10826	-5,10167	-5.10167	-5.10167	-5.10167
35	-5,10167	-5.10010	-5,06763	-5,06760	-5,06277	-5.06167	-5,06167	-5.05953	-5.05461	-5.05461
36	-5,05461	-5.05461	-5,05461	-5,05352	-5,02107	-5.02107	-5,01291	-4.98044	-4,98044	-4.97442
37	-4,97442	-4,97227	-4,96625	-4,93375	-4,93375	-4.92557	-4,88701	-4.88701	-4.87882	-4.51437
38	-4,51437	-4,51437	-4,51437	-4,51437	-4,50621	-4.50621	-4,46673	-4.46673	-4.46673	-4.46673
39	-4,46673	-4,45855	-4,45855	-4,42519	-4,42519	-4.42519	-4,42519	-4.42519	-4.41903	-4.41903
40	-4,41903	-4,41903	-4,41903	-4,41700	-4,41700	-4.41085	-4,41085	-4.37745	-4.37745	-4.37745
41	-4,37745	-4,37745	-4,36926	-4,36920	-4,34230	-4.33584	-4,33584	-4.33584	-4.33584	-4.33584
42	-4,33411	-4,33411	-4,33411	-4,33411	-4,33411	-4.32967	-4,32967	-4.32967	-4.32967	-4.32967
43	-4,32764	-4,32764	-4,32147	-4,32147	-4,29498	-4.28801	-4,28801	-4.28801	-4,28801	-4.28801
44	-4,28678	-4,28678	-4,28678	-4,28678	-4,28678	-4.27980	-4,27980	-4.25372	-4.24761	-4.24551
45	-4,24551	-4,24551	-4,24551	-4,24551	-4,24014	-4,24014	-4,24014	-4.24014	-4.24014	-4.23940
46	-4,23940	-4,23940	-4,23940	-4,23940	-4,23192	-4.23192	-4,20631	-4.19809	-4.19809	-4.19809
47	-4,19809	-4,19809	-4,16498	-4,13885	-4,15675	-4.15675	-4,15675	-4.15675	-4,15675	-4.15063
48	-4,15063	-4,15063	-4,15063	-4,15063	-4,11748	-4.10925	-4,10925	-4.10925	-4,10925	-4.10925
49	-4,06993	-4,06169	-4,06169	-4,06169	-4,06169	-4,06169	-3,69879	-3.69056	-3,69056	-3.69056
50	-3,69056	-3,69056	-3,65033	-3,64759	-3,64509	-3.64209	-3,64209	-3.64209	-3,64209	-3.60807
51	-3,60181	-3,60073	-3,59983	-3,59983	-3,59983	-3.59983	-3,59983	-3.59357	-3,59357	-3.59357
52	-3,59357	-3,59357	-3,55988	-3,55952	-3,55382	-3.55127	-3,55127	-3.55127	-3,55127	-3.55127
53	-3,51719	-3,51581	-3,51581	-3,51581	-3,51581	-3.51581	-3,51293	-3.51091	-3,50893	-3.50893
54	-3,50893	-3,50893	-3,50893	-3,50755	-3,50755	-3.50265	-3,50265	-3.50265	-3,50265	-3.50265
55	-3,47201	-3,46854	-3,46766	-3,46766	-3,46766	-3,46766	-3,46766	-3,46594	-3,46027	-3.46027
56	-3,46027	-3,46027	-3,46027	-3,45940	-3,45940	-3,42569	-3,42569	-3,42569	-3,42569	-3.42569
57	-3,42497	-3,41984	-3,41947	-3,41947	-3,41947	-3,41947	-3,41947	-3.41742	-3.41742	-3.41157
58	-3,41157	-3,41157	-3,41157	-3,41157	-3,41120	-3,41120	-3,37790	-3.37745	-3.37745	-3.37745
59	-3,37745	-3,37745	-3,36917	-3,36917	-3,33540	-3.33540	-3,33540	-3.33540	-3,33540	-3.32917
60	-3,32917	-3,32917	-3,32917	-3,32917	-3,32712	-3.32712	-3,32088	-3.32088	-3,28707	-3.28707
61	-3,28707	-3,28707	-3,28707	-3,27878	-3,27878	-3,23870	-3,23870	-3,23870	-3,23870	-3,23870
62	-3,23040	-3,23040	-2,86915	-2,86915	-2,86087	-2.82105	-2,82105	-2.81985	-2,81985	-2.81271
63	-2,81156	-2,77687	-2,77687	-2,77338	-2,77338	-2,77050	-2,77050	-2,76857	-2,76503	-2,76219
64	-2,73182	-2,73182	-2,72747	-2,72747	-2,72566	-2,72566	-2,72347	-2,71916	-2,71731	-2,69169
65	-2,68441	-2,68441	-2,68407	-2,68407	-2,68338	-2,68338	-2,68338	-2,68338	-2,68338	-2,67802
66	-2,67802	-2,67609	-2,67570	-2,67433	-2,66670	-2,64272	-2,64243	-2,64243	-2,63626	-2,63626
67	-2,63491	-2,63491	-2,63440	-2,63440	-2,63440	-2,63440	-2,63440	-2,63407	-2,62789	-2,62700
68	-2,62659	-2,60003	-2,59459	-2,59459	-2,59370	-2,59170	-2,59170	-2,59170	-2,59170	-2,59170
69	-2,58621	-2,58573	-2,58537	-2,58537	-2,58537	-2,58537	-2,58537	-2,58537	-2,58537	-2,57962
70	-2,57704	-2,55096	-2,54670	-2,54670	-2,54263	-2,54263	-2,54263	-2,54263	-2,54263	-2,53831
71	-2,53831	-2,50819	-2,50185	-2,49985	-2,49085	-2,49985	-2,49985	-2,49985	-2,49697	-2,49350
72	-2,49350	-2,49350	-2,49350	-2,49350	-2,49085	-2,45903	-2,45068	-2,45068	-2,45068	-2,45068
73	-2,45068	-2,44547	-2,40963	-2,40191	-2,40147	-2,40147	-2,40147	-2,40147	-2,40147	-2,03361
74	-1,98859	-1,98346	-1,98020	-1,98020	-1,98020	-1,98020	-1,98020	-1,94011	-1,93973	-1,93325
75	-1,93170	-1,93170	-1,93170	-1,93170	-1,93170	-1,89783	-1,89157	-1,88948	-1,88942	-1,88942
76	-1,88942	-1,88942	-1,88942	-1,88316	-1,88316	-1,88316	-1,88316	-1,88316	-1,85338	-1,85338
77	-1,84926	-1,84567	-1,84501	-1,84084	-1,84084	-1,84084	-1,84084	-1,84084	-1,83944	-1,83944
78	-1,83917	-1,83102	-1,80691	-1,80356	-1,80356	-1,80063	-1,79848	-1,79848	-1,79848	-1,79848
79	-1,79848	-1,79532	-1,79516	-1,79220	-1,79220	-1,79220	-1,79220	-1,79220	-1,79129	-1,79129
80	-1,78286	-1,76013	-1,76013	-1,75824	-1,75369	-1,75369	-1,75174	-1,74980	-1,74980	-1,74980
81	-1,74980	-1,74980	-1,74931	-1,74931	-1,74830	-1,74492	-1,74309	-1,74309	-1,74088	-1,73465
82	-1,71021	-1,71021	-1,70952	-1,70182	-1,70108	-1,70108	-1,70108	-1,70108	-1,70108	-1,70108
83	-1,70108	-1,70108	-1,69263	-1,66670	-1,66670	-1,66025	-1,66025	-1,65902	-1,65902	-1,65830
84	-1,65327	-1,65279	-1,65279	-1,65185	-1,65057	-1,64436	-1,61669	-1,61669	-1,61159	-1,61070
85	-1,61070	-1,60826	-1,60541	-1,60224	-1,56663	-1,56663	-1,56370	-1,56232	-1,56232	-1,55821
86	-1,55385	-1,52194	-1,51576	-1,47396	-1,42593	-1,14176	-1,14176	-1,14176	-1,14176	-1,14176
87	-1,13330	-1,13330	-1,09243	-1,09243	-1,09243	-1,09243	-1,09243	-1,08396	-1,08396	-1,04942
88	-1,04942	-1,04942	-1,04942	-1,04942	-1,04305	-1,04305	-1,04305	-1,04305	-1,04305	-1,04095
89	-1,04095	-1,03457	-1,03457	-1,00910	-1,00000	-1,00000	-1,00000	-1,00000	-1,00000	-0,99858
90	-0,99152	-0,99132	-0,99010	-0,99010	-0,99010	-0,99010	-0,99010	-0,95842	-0,95691	-0,95691
91	-0,95691	-0,95691	-0,95691	-0,95053	-0,95053	-0,95053	-0,95053	-0,95053	-0,94960	-0,94843
92	-0,94843	-0,94204	-0,94204	-0,94111	-0,94111	-0,94111	-0,94111	-0,94111	-0,91426	-0,90769
93	-0,90740	-0,90740	-0,90740	-0,90740	-0,90740	-0,90690	-0,90057	-0,89890	-0,89890	-0,89841
94	-0,89841	-0,89841	-0,89841	-0,89841	-0,89208	-0,89208	-0,89208	-0,89208	-0,89208	-0,86346
95	-0,85783	-0,85783	-0,85783	-0,85783	-0,85783	-0,85783	-0,85783	-0,85783	-0,84933	-0,84933
96	-0,84933	-0,84933	-0,84933	-0,84933	-0,84933	-0,84933	-0,81919	-0,81506	-0,81263	-0,80920
97	-0,80920	-0,80872	-0,80654	-0,80654	-0,80654	-0,80654	-0,80654	-0,80069	-0,80020	-0,80020
98	-0,80020	-0,80020	-0,80020	-0,76832	-0,76681	-0,76681	-0,76590	-0,76052	-0,76052	-0,75829
99	-0,75738	-0,75738	-0,75738	-0,75738	-0,75738	-0,75200	-0,71809	-0,71809	-0,71739	-0,71649
100	-0,70956	-0,70816	-0,70816	-0,70816	-0,70815	-0,70816	-0,67561	-0,67561	-0,66932	-0,66932
101	-0,66708	-0,66078	-0,62680	-0,62680	-0,61826	-0,57794	-0,57794	-0,56939	-0,29737	-0,28885
102	-0,28885	-0,28885	-0,28885	-0,28885	-0,24719	-0,23867	-0,23867	-0,23867	-0,23867	-0,23867
103	-0,20345	-0,19696	-0,19492	-0,19492	-0,19492	-0,19492	-0,19492	-0,18843	-0,18843	-0,18843
104	-0,18843	-0,18843	-0,15318	-0,14463	-0,14463	-0,14463	-0,14463	-0,14463	-0,14319	-0,14319
105	-0,14319	-0,14319	-0,14319	-0,13465	-0,13465	-0,10935	-0,10285	-0,10080	-0,10080	-0,10080
106	-0,10080	-0,10080	-0,09430	-0,09430	-0,09430	-0,09430	-0,09430	-0,09336	-0,09336	-0,09336
107	-0,09336	-0,09336	-0,08481	-0,08481	-0,05898	-0,05043	-0,05043	-0,05043	-0,05043	-0,05043
108	-0,04992	-0,04992	-0,04992	-0,04992	-0,04992	-0,04348	-0,04348	-0,04348	-0,04348	-0,04348
109	-0,04136	-0,04136	-0,03492	-0,03492	-0,00857	-0,00857	-0,00000	-0,00000	-0,00000	-0,00000
110	-0,00000	-0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	0,00000
111	0,00000	0,00857	0,00857	0,04090	0,04352	0,04352	0,04352	0,04352	0,04352	0,04948
112	0,04948	0,04948	0,04948	0,04940	0,04997	0,04997	0,04997	0,04997	0,04997	0,05210
113	0,05210	0,05855	0,05855	0,08403	0,09042	0,09261	0,09261	0,09261	0,09261	0,09261
114	0,09354	0,09354	0,09354	0,09354	0,09354	0,09900	0,09900	0,09900	0,09900	0,09900
115	0,10212	0,10212	0,13359	0,14218	0,14218	0,14218	0,14218	0,14218	0,14360	0,14360
116	0,14360	0,14360	0,14360	0,15219	0,15219	0,17679	0,18320	0,18539	0,18539	0,18539
117	0,18539	0,18539	0,19180	0,19180	0,19180	0,19180	0,19180	0,22644	0,23505	0,23505
118	0,23505	0,23505	0,23505	0,27613	0,28476	0,28476	0,28476	0,28476	0,28476	0,56157
119	0,56157	0,57015	0,61262	0,61262	0,61279	0,62120	0,65712	0,65712	0,66173	0,66371

120	0,66371	0.66571	0,67231	0.70436	0,70826	0.70826	0,70973	0.71071	0,71686	0.71833
121	0,71833	0,71833	0,71833	0.71833	0,75285	0.75285	0,75341	0.75945	0,75945	0.76041
122	0,76146	0,76807	0,76902	0.76902	0,76902	0.76902	0,76902	0.79614	0,80248	0.80409
123	0,80409	0,80460	0,81115	0.81270	0,81322	0.81322	0,81322	0.81322	0,81322	0.81977
124	0,81977	0,81977	0,81977	0.81977	0,84525	0,85538	0,85538	0.85538	0,85538	0.85538
125	0,85538	0.85538	0,85538	0.86401	0,86401	0.86401	0,86401	0.86401	0,86401	0.86401
126	0,86401	0.89441	0,89965	0.90570	0,90570	0.90570	0,90570	0.90570	0,90621	0.90828
127	0,90828	0,90828	0,90828	0.90828	0,91434	0.91434	0,91484	0.91484	0,91484	0.91484
128	0,91484	0,94958	0,94958	0.94958	0,94958	0.94958	0,95052	0.95608	0,95608	0.95608
129	0,95608	0,95608	0,95822	0.95822	0,95917	0.95917	0,95917	0.95917	0,95917	0.96473
130	0,96473	1,00000	1,00000	1.00000	1,00000	1.00000	1,00145	1.00865	1,00865	1.01010
131	1,01010	1.01010	1,01010	1.01010	1,04396	1.04396	1,04396	1.04306	1,04396	1.05047
132	1,05047	1,05047	1,05047	1.05047	1,05262	1.05262	1,05913	1.05913	1,09447	1.09447
133	1,09447	1,09447	1,09447	1.10314	1,10314	1.14504	1,14504	1.14504	1,14504	1.14504
134	1,15372	1,15372	1,42662	1.47589	1,47589	1.47855	1,48459	1.52382	1,52566	1.52566
135	1,53053	1,53438	1,56905	1.56905	1,57549	1.57549	1,57585	1.57734	1,57734	1.57778
136	1.58421	1,58601	1,58605	1.61892	1,61892	1.62121	1,62765	1.62793	1,62890	1.62890
137	1,63546	1,63758	1,66240	1.66240	1,66884	1.66884	1,67113	1.67333	1,67386	1.67386
138	1,67758	1,67853	1,68052	1.68052	1,68254	1.68491	1,68920	1.71235	1,71235	1.71683
139	1,72110	1.72551	1,72551	1.72551	1,72551	1.72551	1,72551	1.72551	1,72551	1.72802
140	1,73420	1,76236	1,76236	1.76804	1,77055	1.77055	1,77112	1.77117	1,77671	1.77671
141	1,77671	1,77671	1,77671	1.77723	1,77723	1.77757	1,77925	1.78592	1,81264	1.81926
142	1,82076	1,82135	1,82135	1.82135	1,82135	1.82135	1,82231	1.82231	1,82797	1.82797
143	1,82797	1,82797	1,82797	1.83101	1,86393	1.87039	1,87265	1.87265	1,87265	1.87265
144	1,87265	1,87412	1,87412	1.88283	1,90864	1.91527	1,91736	1.91736	1,91736	1.91736
145	1,91736	1,92399	1,92399	1.92399	1,92399	1.92399	1,96003	1.96876	1,96876	1.96876
146	1,96876	1,96876	2,01146	2.02020	2,02020	2.02020	2,02020	2.02020	2,34514	2.35391
147	2.35391	2,35391	2,35391	2.35391	2,39578	2.40455	2,40455	2.40455	2,40455	2.40455
148	2.43992	2.44646	2,44870	2.44870	2,44870	2.44870	2,44870	2.45113	2,45524	2.45524
149	2.45524	2,45524	2,45524	2.45749	2,45749	2.46628	2,49064	2.49944	2,49944	2.49944
150	2.49944	2.49944	2,50359	2.50775	2,50775	2.51655	2,53487	2.54142	2,54367	2.54367
151	2,54367	2.54367	2,54367	2.54931	2,55022	2.55022	2,55022	2.55022	2,55022	2.55156
152	2,55156	2,55609	2,55806	2.55806	2,56037	2.56686	2,58569	2.59312	2,59312	2.59450
153	2.59450	2.59450	2,59450	2.59450	2,60187	2.60187	2,60191	2.60191	2,61073	2.63656
154	2,64519	2.64519	2,64538	2.64538	2,64538	2.64538	2,64538	2.64580	2,64580	2.64768
155	2.65231	2.65231	2,65395	2.65447	2,65463	2.66113	2,69059	2.69059	2,69625	2.69625
156	2,69732	2,69732	2,69936	2.70034	2,70506	2.70609	2,74277	2.74277	2,74674	2.74674
157	2,75155	2,75305	2,75558	2.78826	2,78826	2.79500	2,79500	2.79704	2,80378	2.84053
158	2,84053	2,84932	2,89286	2.89286	2,90166	3.22942	3,22942	3.22942	3,22942	3.22942
159	3,23825	3,23825	3,28094	3.28094	3,28094	3.28094	3,28094	3.28978	3,28978	3.32584
160	3.32584	3.32584	3.32584	3.32584	3,33250	3.33250	3,33250	3.33250	3,33250	3.33469
161	3.33469	3.33516	3,34135	3.34135	3,34401	3.34401	3,34401	3.34401	3,34401	3.37745
162	3,37745	3,37745	3,37745	3.37745	3,38428	3.38631	3,38631	3.39514	3,39514	3.39514
163	3,39514	3,39514	3,42244	3.42244	3,42244	3.42244	3,42244	3.42911	3,42911	3.42911
164	3.42911	3.42911	3,43085	3.43131	3,43131	3.43745	3,43798	3.43798	3,43972	3.43972
165	3,43972	3,43972	3,43972	3.44632	3,44632	3.44632	3,44632	3.44632	3,47415	3.47415
166	3,47415	3.47415	3,47415	3.47565	3.48507	3,48302	3,48302	3.49094	3,49094	3.49094
167	3,49094	3,49094	3,52590	3.52590	3,52590	3.52590	3,52590	3.52672	3,52862	3.53333
168	3,53478	3,53478	3,53560	3.53560	3,53560	3.53560	3,53560	3.54222	3,54222	3.54222
169	3,54222	3,54222	3,57481	3.57803	3,58165	3.58692	3,58692	3.58692	3,58692	3.58692
170	3,62789	3,62939	3,63829	3.63829	3,63829	3.63829	3,63829	3.67446	3,68102	3.72734
171	3,78058	4.11115	4,12006	4.12006	4.12006	4.12006	4,12006	4.16355	4,17245	4.17245
172	4.17245	4.17245	4,17245	4.20922	4,21599	4.21813	4,21813	4.21813	4,21813	4.21813
173	4,22491	4,22491	4,22491	4.22491	4,22491	4.22799	4,22799	4.22799	4,22799	4.22799
174	4,23691	4,23691	4,26172	4.27064	4,27064	4.27064	4,27064	4.27064	4,28000	4.28000
175	4.28000	4,28000	4,28000	4.28893	4,28893	4.30748	4,31427	4.31641	4,31641	4.31641
176	4.31641	4.31641	4,32319	4.32319	4,32319	4.32319	4,32319	4.32534	4,32534	4.32534
177	4.32534	4.32534	4,33206	4.33206	4,33206	4.33206	4,33206	4.33428	4,33428	4.34100
178	4.34100	4,36008	4,36901	4.36901	4,36901	4.36901	4,36901	4.37745	4,37745	4.37745
179	4,37745	4.37745	4,38639	4.38639	4.41272	4.42167	4,42167	4.42167	4,42167	4.42167
180	4.42288	4,42288	4,42288	4.42288	4,42288	4.42961	4,42961	4.42961	4,42961	4.42961
181	4.43183	4,43183	4,43856	4.43856	4,47508	4.47508	4,47508	4.47508	4,47508	4.48404
182	4,48404	4.52734	4,52734	4.52734	4,52734	4.52734	4,53631	4.53631	4,87318	4.92418
183	4,96805	4,97524	5,00807	5.00807	5,01703	5.01974	5,06137	5.06137	5,06429	5.07034
184	5,07089	5.10784	5,10786	5.11475	5,11473	5.11548	5,11681	5.11825	5,12370	5.12723
185	5,12723	5,12723	5,12723	5.12723	5,16124	5.16124	5,16672	5.17023	5,17115	5.18014
186	5,18014	5,18014	5,18014	5.18014	5,20780	5.20780	5,21470	5.21470	5,21679	5.21727
187	5,22369	5.22411	5,22627	5.22627	5,22627	5.22627	5,22627	5.23310	5,23310	5.23310
188	5,23310	5,23310	5,26131	5.26131	5,27027	5.27031	5,27928	5.27928	5,27928	5.27928
189	5,27928	5.31487	5,31487	5.31648	5,32333	5.32388	5,32549	5.32549	5,32549	5.32549
190	5,32549	5.33234	5,33234	5.33234	5,33234	5.33234	5,36958	5.37860	5,37860	5.37860
191	5,37860	5,37860	5,42274	5.43177	5,43177	3.43177	5,43177	5.43177	5,77282	5.77282
192	5,78189	5,82470	5,82470	5.83378	5,86993	5.86993	5,87663	5.87663	5,87902	5.88573
193	5,91137	5,92191	5,92191	5.93101	5,96560	5.96722	5,96722	5.97394	5,97394	5.97633
194	5,98305	6,01287	6,01930	6.01930	6,01987	6.02384	6,02384	6.02841	6,03289	6.06720
195	6,07142	6,07142	6,07766	6.07766	6,08055	6.08671	6,11456	6.12158	6,12458	6.12458
196	6,13153	6.13153	6,13364	6.14059	6,16899	6.17850	6,17850	6.18757	6,22348	6.22551
197	6.22551	6.23247	6,23247	6.23458	6,24155	6.27953	6,27953	6.28862	6,33361	6.33361
198	6,34270	6.67888	6,68802	6.68806	6,68802	6.68802	6,68802	6.73166	6,74081	6.74081
199	6,74081	6,74081	6,74081	6.77767	6,78449	6.78682	6,78682	6.78682	6,78682	6.78682
200	6.79365	6.79365	6,79365	6.79365	6,79365	6.83054	6,83971	6.83971	6.83971	6.83971
201	6,83971	6.87664	6,88347	6.88581	6,88581	6.88581	6,88581	6.88581	6.89264	6.89264
202	6.89264	6.89264	6,89264	6.92961	6,93588	6.93879	6,93879	6.93879	6.93879	6.93879
203	6.98264	6.99063	6,99183	6.99183	6,99183	6.99183	6,99183	7.03836	7.04544	7.09321
204	7,14104	7.14312	7,19599	7.25101	7,60061	7.60061	7,60061	7.60061	7,60061	7.60981
205	7,60981	7.65430	7,65430	7.65430	7,65430	7.65430	7,66351	7.66351	7,70111	7.70111
206	7.70111	7,70111	7,70111	7.70805	7,70805	7.70805	7,70805	7.70805	7,71033	7.71033
207	7,71727	7,71727	7,75490	7.75490	7,75490	7.75490	7,75490	7.76413	7,76413	7.80180
208	7,80180	7,80180	7,80180	7.80180	7,80875	7.80875	7,80875	7.80875	7,80875	7.81106
209.	7,81106	7,81799	7,81799	7.85569	7,85569	7.85569	7,85569	7.85569	7,86494	7.86494
210	7,90964	7,90964	7,90964	7.90964	7,90964	7.91890	7,91890	8.51967	8,52894	8.52894
211	8,52894	8,52894	8,52894	8.57428	8,58356	8.58356	8,58356	8.58356	8,58356	8.62190
212	8,62895	8,63118	8,63118	8.63118	8,63118	8.63118	8,63824	8.63824	8,63824	8.63824
213	8,63824	8,67661	8,68591	8.68591	8,68591	8.68591	8,68591	8.72432	8,73139	8.73362
214	8,73362	8.73362	8,73362	8.73362	8,74069	8.74069	8,74069	8.74069	8,74069	8.77914
215	8,78845	8,78845	8,78845	8.78845	8,78845	8.83401	8,84334	8.84334	8,84334	8.84334
216	8,84334	9,45457	9,45457	9.46390	9,51013	9.51013	9,51947	9.55856	9,55856	9.56574

217	9.56574	9.56792	9.57510	9.61423	9.61423	9.62359	9.66276	9.66276	9.66995	9.66995
218	9.67213	9.67932	9.71853	9.71853	9.72791	9.77436	9.77436	9.78375	10.39612	10.45264
219	10.50191	10.50922	10.55854	10.60791	10.61523	10.66465	10.72144			

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CHRYSLER MOTOR CO, LTD.

GROUP SENSITIVITY ANALYSIS

OUTPUT IN ASCENDING ORDER

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1	-11.34678	-11.27176	-11.24400	-11.19660	-11.16879	-11.14097	-11.09346	-11.06559	-10.99009	-10.64109
2	-10.64109	-10.63398	-10.56486	-10.56486	-10.55774	-10.53666	-10.53666	-10.52953	-10.48850	-10.48850
3	-10.48137	-10.46025	-10.46025	-10.45311	-10.43198	-10.43198	-10.42483	-10.38371	-10.38371	-10.37656
4	-10.35540	-10.35540	-10.34824	-10.27868	-10.27868	-10.27151	-9.93122	-9.92407	-9.92407	-9.92407
5	-9.92407	-9.92407	-9.35378	-9.84661	-9.84661	-9.84661	-9.84661	-9.84661	-9.82513	-9.81795
6	-9.81795	-9.81795	-9.81795	-9.81795	-9.77420	-9.76902	-9.76902	-9.76902	-9.76902	-9.76902
7	-9.74750	-9.74031	-9.74031	-9.74031	-9.74031	-9.74031	-9.71878	-9.71159	-9.71159	-9.71159
8	-9.71159	-9.71159	-9.66974	-9.66254	-9.66254	-9.66254	-9.66254	-9.66254	-9.64097	-9.63377
9	-9.63377	-9.63377	-9.63377	-9.63377	-9.56302	-9.55581	-9.55581	-9.55581	-9.55581	-9.55581
10	-9.20999	-9.20999	-9.20999	-9.20999	-9.20999	-9.20279	-9.20279	-9.13130	-9.13130	-9.13130
11	-9.13130	-9.13130	-9.12409	-9.12409	-9.10219	-9.10219	-9.10219	-9.10219	-9.10219	-9.09497
12	-9.09497	-9.05248	-9.05248	-9.05248	-9.05248	-9.05248	-9.04525	-9.04525	-9.02331	-9.02331
13	-9.02331	-9.02331	-9.02331	-9.01608	-9.01608	-8.99413	-8.99413	-8.99413	-8.99413	-8.99413
14	-8.98689	-8.96689	-8.94430	-8.94430	-8.94430	-8.94430	-8.94430	-8.93706	-8.93706	-8.91506
15	-8.91506	-8.91506	-8.91506	-8.91506	-8.90782	-8.90782	-8.83586	-8.83586	-8.83586	-8.83586
16	-8.83586	-8.82860	-8.82860	-8.49174	-8.48450	-8.48450	-8.48450	-8.48450	-8.48450	-8.41180
17	-8.40455	-8.40455	-8.40455	-8.40455	-8.40455	-8.38222	-8.37497	-8.37497	-8.37497	-8.37497
18	-8.37497	-8.33172	-8.32446	-8.32446	-8.32446	-8.32446	-8.32446	-8.30209	-8.29482	-8.29482
19	-8.29482	-8.29482	-8.29482	-8.27244	-8.26517	-8.26517	-8.26517	-8.26517	-8.26517	-8.22182
20	-8.21456	-8.21456	-8.21454	-8.21454	-8.21454	-8.19212	-8.18483	-8.18483	-8.18483	-8.18483
21	-8.18483	-8.11165	-8.10435	-8.10435	-8.10435	-8.10435	-8.10435	-7.76204	-7.76204	-7.75476
22	-7.68082	-7.68082	-7.67352	-7.65077	-7.65077	-7.64347	-7.59945	-7.59945	-7.59215	-7.56935
23	-7.56935	-7.56204	-7.53922	-7.53922	-7.53191	-7.48779	-7.48779	-7.48046	-7.45761	-7.45761
24	-7.45028	-7.43758	-7.37585	-7.37585	-7.36851	-7.35925	-7.33026	-7.28078	-7.25174	-7.22269
25	-7.17309	-7.14399	-7.06516	-7.02806	-6.94556	-6.91502	-6.86289	-6.83230	-6.80170	-6.74944
26	-6.71877	-6.70077	-6.70077	-6.69334	-6.63571	-6.62118	-6.62118	-6.61374	-6.59173	-6.59173
27	-6.58429	-6.54146	-6.54146	-6.53400	-6.51196	-6.51196	-6.50450	-6.48244	-6.48244	-6.47498
28	-6.46312	-6.43205	-6.43205	-6.42458	-6.40248	-6.40248	-6.39501	-6.38306	-6.35467	-6.32238
29	-6.32238	-6.31489	-6.30467	-6.27535	-6.24597	-6.19585	-6.16644	-6.08678	-5.95960	-5.95213
30	-5.95213	-5.95213	-5.95213	-5.95213	-5.87875	-5.87126	-5.87126	-5.87126	-5.87126	-5.87126
31	-5.84883	-5.84134	-5.84134	-5.84134	-5.84134	-5.84134	-5.79775	-5.79025	-5.79025	-5.79025
32	-5.79025	-5.79025	-5.76778	-5.76028	-5.76028	-5.76028	-5.76028	-5.76028	-5.73779	-5.73028
33	-5.73028	-5.73028	-5.73028	-5.73028	-5.71855	-5.71855	-5.71105	-5.68659	-5.67907	-5.67907
34	-5.67907	-5.67907	-5.67907	-5.65655	-5.64903	-5.64903	-5.64903	-5.64903	-5.64903	-5.63813
35	-5.63813	-5.63061	-5.60837	-5.60837	-5.60085	-5.57517	-5.56764	-5.56764	-5.56764	-5.56764
36	-5.56764	-5.55756	-5.55756	-5.55005	-5.52775	-5.52775	-5.52022	-5.49793	-5.49793	-5.49039
37	-5.44700	-5.44700	-5.43945	-5.41714	-5.41712	-5.40957	-5.33618	-5.33618	-5.32861	-5.20657
38	-5.20657	-5.20657	-5.20657	-5.20657	-5.19905	-5.19905	-5.12441	-5.12441	-5.12441	-5.12441
39	-5.12441	-5.11688	-5.11688	-5.09401	-5.09401	-5.09401	-5.09401	-5.09401	-5.08648	-5.08648
40	-5.04211	-5.04211	-5.04211	-5.04211	-5.04211	-5.03457	-5.03457	-5.01166	-5.01166	-5.01166
41	-5.01166	-5.01166	-5.00411	-5.00411	-4.98118	-4.98118	-4.98118	-4.98118	-4.98118	-4.97363
42	-4.97363	-4.96758	-4.96203	-4.96203	-4.96203	-4.96203	-4.95203	-4.92916	-4.92916	-4.92916
43	-4.92916	-4.92916	-4.92160	-4.92160	-4.89863	-4.89863	-4.89863	-4.89863	-4.89863	-4.89107
44	-4.89107	-4.88737	-4.88031	-4.88031	-4.88031	-4.88031	-4.88031	-4.85764	-4.85007	-4.85007
45	-4.85007	-4.85007	-4.85007	-4.81594	-4.81594	-4.81594	-4.81594	-4.81594	-4.80836	-4.80836
46	-4.80602	-4.79845	-4.79845	-4.79845	-4.79845	-4.79845	-4.77574	-4.76816	-4.76816	-4.76816
47	-4.76816	-4.76816	-4.74543	-4.73785	-4.73785	-4.73785	-4.73785	-4.73785	-4.69369	-4.68610
48	-4.68610	-4.68610	-4.68610	-4.68610	-4.66334	-4.65574	-4.65574	-4.65574	-4.65574	-4.65574
49	-4.58110	-4.57349	-4.57349	-4.57349	-4.57349	-4.57349	-4.45665	-4.44909	-4.44909	-4.44909
50	-4.44909	-4.44909	-4.37318	-4.36561	-4.36561	-4.36561	-4.36561	-4.36561	-4.34230	-4.33472
51	-4.33472	-4.33472	-4.33472	-4.33472	-4.28957	-4.28199	-4.28199	-4.28199	-4.28199	-4.28199
52	-4.25863	-4.25104	-4.25104	-4.25104	-4.25104	-4.25104	-4.22768	-4.22008	-4.22008	-4.22008
53	-4.22008	-4.22008	-4.20862	-4.20862	-4.20862	-4.20862	-4.20862	-4.20103	-4.20103	-4.17482
54	-4.16722	-4.16722	-4.16722	-4.16722	-4.16722	-4.14381	-4.13620	-4.13620	-4.13620	-4.13620
55	-4.13620	-4.12560	-4.12560	-4.12560	-4.12560	-4.12560	-4.11799	-4.11799	-4.09488	-4.09488
56	-4.09468	-4.09488	-4.09488	-4.08726	-4.08726	-4.05980	-4.05218	-4.05218	-4.05218	-4.05218
57	-4.05218	-4.04243	-4.04243	-4.04243	-4.04243	-4.04243	-4.03481	-4.03481	-4.01166	-4.01166
58	-4.01166	-4.01166	-4.01166	-4.00403	-4.00403	-3.98086	-3.98086	-3.98086	-3.98086	-3.98086
59	-3.97323	-3.97323	-3.92829	-3.92829	-3.92829	-3.92829	-3.92829	-3.92065	-3.92065	-3.89744
60	-3.89744	-3.89744	-3.89744	-3.89744	-3.88080	-3.88980	-3.81388	-3.81388	-3.81388	-3.81388
61	-3.81388	-3.80622	-3.80622	-3.69477	-3.69477	-3.68716	-3.60997	-3.60907	-3.60235	-3.57859
62	-3.57859	-3.57097	-3.52838	-3.52501	-3.52501	-3.51738	-3.49358	-3.49358	-3.48595	-3.46213
63	-3.46213	-3.45449	-3.45081	-3.44674	-3.44317	-3.44317	-3.44317	-3.44317	-3.44317	-3.41653
64	-3.40842	-3.40842	-3.40077	-3.37691	-3.37691	-3.36926	-3.36646	-3.36495	-3.35881	-3.35881
65	-3.35801	-3.35881	-3.35881	-3.33523	-3.33473	-3.32760	-3.32760	-3.32760	-3.32760	-3.32760
66	-3.30442	-3.29155	-3.29155	-3.28380	-3.28197	-3.27430	-3.27430	-3.27430	-3.27430	-3.27430
67	-3.25272	-3.25071	-3.24304	-3.24304	-3.24304	-3.24304	-3.24306	-3.22239	-3.21942	-3.21175
68	-3.21175	-3.21175	-3.21175	-3.21175	-3.16601	-3.15833	-3.15833	-3.15833	-3.15833	-3.15833
69	-3.14023	-3.13468	-3.12699	-3.12699	-3.12699	-3.12699	-3.12699	-3.04978	-3.04208	-3.04208
70	-3.04208	-3.04208	-3.04208	-2.92844	-2.84226	-2.81040	-2.76045	-2.76045	-2.75597	-2.75271
71	-2.72404	-2.69238	-2.68090	-2.68090	-2.67750	-2.67750	-2.67322	-2.66975	-2.64681	-2.64681
72	-2.63905	-2.63751	-2.60550	-2.59521	-2.59521	-2.59441	-2.59441	-2.58751	-2.58464	-2.56367
73	-2.56307	-2.56350	-2.56350	-2.55589	-2.55580	-2.55392	-2.53290	-2.53290	-2.52513	-2.51377
74	-2.50936	-2.50936	-2.50165	-2.48036	-2.48033	-2.47760	-2.47760	-2.47259	-2.47145	-2.46788
75	-2.44956	-2.44956	-2.44581	-2.44581	-2.44177	-2.44094	-2.43809	-2.39154	-2.39154	-2.33884
76	-2.38382	-2.36603	-2.36608	-2.35970	-2.35570	-2.35828	-2.35828	-2.35107	-2.32769	-2.27548
77	-2.27344	-2.27344	-2.26560	-2.24484	-2.16135	-1.98798	-1.98020	-1.98020	-1.98020	-1.98020
78	-1.98020	-1.90651	-1.90371	-1.89591	-1.89591	-1.89591	-1.89591	-1.89591	-1.87253	-1.86472
79	-1.86472	-1.86472	-1.86472	-1.86472	-1.81945	-1.81929	-1.81148	-1.81148	-1.81148	-1.81148
80	-1.81148	-1.78806	-1.78723	-1.78024	-1.78024	-1.78024	-1.78024	-1.78024	-1.77823	-1.77523
81	-1.77042	-1.75680	-1.74898	-1.74898	-1.74898	-1.74898	-1.74898	-1.73223	-1.70344	-1.69905
82	-1.69561	-1.69561	-1.69561	-1.69561	-1.69561	-1.69445	-1.69445	-1.68661	-1.67213	-1.66766
83	-1.66429	-1.66429	-1.66429	-1.66429	-1.66429	-1.66345	-1.66345	-1.65561	-1.61252	-1.61052
84	-1.61052	-1.60267	-1.58731	-1.58017	-1.57046	-1.57946	-1.57946	-1.57946	-1.57946	-1.57946
85	-1.57946	-1.57946	-1.57101	-1.54839	-1.54839	-1.54053	-1.49617	-1.49533	-1.49533	-1.49252

86	-1.48747	-1.46535	-1.46421	-1.46421	-1.45634	-1.41273	-1.38186	-1.37988	-1.37988	-1.37200
87	-1.35097	-1.29823	-1.26729	-1.20315	-1.20315	-1.20315	-1.20315	-1.20315	-1.19531	-1.19531
88	-1.18347	-1.11752	-1.11752	-1.11752	-1.11752	-1.11752	-1.10967	-1.10967	-1.08583	-1.08583
89	-1.08583	-1.08583	-1.08583	-1.07798	-1.07798	-1.03174	-1.03174	-1.03174	-1.03174	-1.03174
90	-1.02388	-1.02388	-1.00000	-1.00000	-1.00000	-1.00000	-1.00000	-0.99796	-0.99214	-0.99214
91	-0.99010	-0.99010	-0.99010	-0.99010	-0.99010	-0.96824	-0.96824	-0.96824	-0.96824	-0.96824
92	-0.96037	-0.96037	-0.91402	-0.91402	-0.91402	-0.91402	-0.91402	-0.91284	-0.90614	-0.90614
93	-0.90496	-0.90496	-0.90496	-0.90496	-0.90496	-0.88220	-0.88220	-0.88220	-0.88220	-0.88220
94	-0.88134	-0.87432	-0.87432	-0.87346	-0.87346	-0.87346	-0.87346	-0.87346	-0.82757	-0.81968
95	-0.81968	-0.81968	-0.81968	-0.81968	-0.79602	-0.79602	-0.79602	-0.79602	-0.79602	-0.79602
96	-0.79602	-0.79602	-0.78812	-0.78812	-0.78812	-0.78812	-0.78812	-0.78812	-0.78812	-0.78812
97	-0.76445	-0.75654	-0.75654	-0.75654	-0.75654	-0.75654	-0.71139	-0.71139	-0.71054	-0.70348
98	-0.70263	-0.70263	-0.70263	-0.70263	-0.70263	-0.68008	-0.68008	-0.67892	-0.67216	-0.67100
99	-0.67100	-0.67100	-0.67100	-0.67100	-0.62662	-0.62662	-0.61870	-0.59526	-0.59526	-0.59324
100	-0.58733	-0.58531	-0.58531	-0.58531	-0.58531	-0.58531	-0.56387	-0.56387	-0.55594	-0.51029
101	-0.51029	-0.50234	-0.47885	-0.47885	-0.47090	-0.42155	-0.41368	-0.41368	-0.41368	-0.41368
102	-0.41368	-0.39368	-0.39368	-0.38572	-0.33456	-0.32667	-0.32667	-0.32667	-0.32667	-0.32667
103	-0.30238	-0.29448	-0.29448	-0.29448	-0.29448	-0.29448	-0.24742	-0.23951	-0.23951	-0.23951
104	-0.23951	-0.23951	-0.21518	-0.20727	-0.20727	-0.20727	-0.20727	-0.20727	-0.20520	-0.20520
105	-0.20520	-0.20520	-0.20520	-0.19729	-0.19729	-0.18291	-0.17500	-0.17500	-0.17500	-0.17500
106	-0.17500	-0.12783	-0.11990	-0.11990	-0.11990	-0.11990	-0.11990	-0.11870	-0.11870	-0.11870
107	-0.11870	-0.11870	-0.11078	-0.11078	-0.09551	-0.08758	-0.08758	-0.08758	-0.08758	-0.08758
108	-0.08670	-0.08670	-0.08670	-0.08670	-0.08670	-0.07877	-0.07877	-0.03206	-0.03206	-0.03206
109	-0.03206	-0.03206	-0.02412	-0.02412	-0.00794	-0.00794	-0.00000	-0.00000	-0.00000	-0.00000
110	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
111	0.00000	0.00794	0.00794	0.03208	0.03208	0.03208	0.03208	0.03208	0.04003	0.04003
112	0.07803	0.08599	0.08599	0.08599	0.08599	0.08599	0.08685	0.08685	0.08685	0.08685
113	0.08685	0.09481	0.09481	0.10984	0.11781	0.11781	0.11781	0.11781	0.11781	0.11809
114	0.11899	0.11899	0.11899	0.11899	0.12695	0.12695	0.16416	0.17213	0.17213	0.17213
115	0.17213	0.17213	0.19602	0.20400	0.20400	0.20400	0.20400	0.20400	0.20604	0.20604
116	0.20604	0.20604	0.20604	0.21402	0.21402	0.22791	0.23589	0.23589	0.23589	0.23589
117	0.23589	0.28235	0.29034	0.29034	0.29034	0.29034	0.29034	0.31429	0.32229	0.32229
118	0.32229	0.32229	0.32229	0.37250	0.37250	0.38043	0.40082	0.40883	0.40883	0.40883
119	0.40883	0.40883	0.46089	0.46089	0.46883	0.49359	0.49359	0.50153	0.54943	0.54943
120	0.55738	0.58219	0.58219	0.58429	0.59015	0.59225	0.59225	0.59225	0.59225	0.59225
121	0.61497	0.61497	0.62293	0.67094	0.67094	0.67216	0.67891	0.68013	0.68013	0.68013
122	0.68013	0.68013	0.70378	0.70378	0.70467	0.71176	0.71265	0.71265	0.71265	0.71265
123	0.71265	0.76018	0.76817	0.76817	0.76817	0.76817	0.76817	0.79275	0.79275	0.79275
124	0.79275	0.79275	0.79275	0.79275	0.79275	0.80074	0.80074	0.80074	0.80074	0.80074
125	0.80074	0.80074	0.80074	0.82534	0.83334	0.83334	0.83334	0.83334	0.83334	0.88011
126	0.88011	0.88011	0.88011	0.88011	0.88098	0.88811	0.88811	0.88899	0.88899	0.88899
127	0.88899	0.88899	0.91243	0.91243	0.91243	0.91243	0.91243	0.91363	0.92044	0.92044
128	0.92164	0.92164	0.92164	0.92164	0.92164	0.96762	0.96762	0.96762	0.96762	0.96762
129	0.97564	0.97564	1.00000	1.00000	1.00000	1.00000	1.00000	1.00208	1.00802	1.00802
130	1.01010	1.01010	1.01010	1.01010	1.01010	1.03240	1.03240	1.03240	1.03240	1.03240
131	1.04043	1.04043	1.08772	1.08772	1.08772	1.08772	1.08772	1.09576	1.09576	1.12018
132	1.12018	1.12018	1.12018	1.12018	1.12822	1.12822	1.17119	1.20810	1.20810	1.20810
133	1.20810	1.20810	1.21616	1.21616	1.26099	1.29422	1.35095	1.35528	1.38423	1.38637
134	1.38637	1.39437	1.41754	1.44106	1.47279	1.47441	1.47564	1.47564	1.48346	1.50777
135	1.50868	1.50868	1.51670	1.52698	1.55877	1.56508	1.56508	1.57311	1.59013	1.59058
136	1.59817	1.59817	1.59817	1.59817	1.59817	1.59817	1.59817	1.59817	1.60621	1.63128
137	1.63128	1.63933	1.64489	1.67676	1.67888	1.68693	1.68693	1.68693	1.68693	1.68693
138	1.68782	1.68782	1.69587	1.71172	1.71677	1.71977	1.71977	1.71977	1.71977	1.72099
139	1.72099	1.72905	1.76308	1.76778	1.77585	1.77585	1.77585	1.77585	1.77585	1.80068
140	1.80875	1.80875	1.80875	1.80875	1.80875	1.81086	1.81086	1.81893	1.83359	1.84167
141	1.84167	1.84167	1.84167	1.84167	1.88079	1.89788	1.89788	1.89788	1.89788	1.89788
142	1.92277	1.93086	1.93086	1.93086	1.93086	1.93086	2.01210	2.02020	2.02020	2.02020
143	2.02020	2.02020	2.16208	2.16208	2.17022	2.19313	2.24923	2.24923	2.25738	2.28148
144	2.28148	2.28383	2.28963	2.31739	2.32074	2.33653	2.33653	2.34469	2.36883	2.36883
145	2.37609	2.37700	2.40023	2.40023	2.40115	2.40115	2.40832	2.40832	2.40932	2.41634
146	2.44196	2.46638	2.45633	2.45633	2.46451	2.48871	2.48871	2.49040	2.49040	2.49690
147	2.49850	2.49740	2.50309	2.52376	2.52376	2.53187	2.53311	2.53519	2.56730	2.57642
148	2.57642	2.58073	2.58073	2.58662	2.58884	2.61415	2.61415	2.62214	2.62227	2.62441
149	2.64760	2.64760	2.65431	2.65572	2.70470	2.70470	2.71283	2.73820	2.73820	2.74146
150	2.74636	2.82897	2.82897	2.83712	2.97366	2.98184	2.98184	2.98184	2.98184	2.98184
151	3.06220	3.07039	3.07039	3.07039	3.07039	3.07039	3.09496	3.10316	3.10316	3.10316
152	3.10316	3.10316	3.14430	3.14430	3.15089	3.15251	3.15910	3.15910	3.15910	3.15910
153	3.15910	3.18379	3.19192	3.19192	3.19192	3.19192	3.19192	3.21506	3.21656	3.22476
154	3.22476	3.22476	3.22476	3.22476	3.23229	3.23229	3.24051	3.26484	3.26484	3.27261
155	3.27307	3.28084	3.28084	3.28084	3.28084	3.28084	3.30550	3.30667	3.31373	3.31373
156	3.31373	3.31373	3.31373	3.32043	3.32043	3.32867	3.34056	3.35304	3.35304	3.36128
157	3.38567	3.38567	3.39392	3.39461	3.39844	3.40286	3.40286	3.40286	3.40286	3.40286
158	3.43240	3.44138	3.44138	3.44964	3.46438	3.47407	3.47407	3.48233	3.52440	3.55844
159	3.56202	3.56262	3.57090	3.65066	3.79823	3.79823	3.79823	3.79823	3.79823	3.80645
160	3.80645	3.88819	3.88819	3.88819	3.88819	3.88819	3.89643	3.89643	3.92148	3.92148
161	3.92148	3.92148	3.92148	3.92973	3.92973	3.96368	3.97194	3.97194	3.97194	3.97194
162	3.97194	3.97831	3.97831	3.97831	3.97831	3.97831	3.98657	3.98657	4.01166	4.01166
163	4.01166	4.01166	4.01166	4.01992	4.01992	4.04502	4.04502	4.04502	4.04502	4.04502
164	4.05307	4.05329	4.05329	4.06134	4.06134	4.06134	4.06134	4.06134	4.08616	4.09442
165	4.09442	4.09442	4.09442	4.09442	4.10199	4.10199	4.10199	4.10199	4.10199	4.11027
166	4.11027	4.13541	4.13541	4.13541	4.13541	4.13541	4.14261	4.14370	4.14370	4.15090
167	4.15090	4.15090	4.15090	4.15090	4.17574	4.18404	4.18404	4.18404	4.18404	4.18404
168	4.20890	4.21720	4.21720	4.21720	4.21720	4.21720	4.22596	4.22596	4.22596	4.22596
169	4.22596	4.23426	4.23426	4.26550	4.27381	4.27381	4.27381	4.27381	4.27381	4.29871
170	4.30702	4.30702	4.30702	4.30702	4.30702	4.38863	4.39701	4.39701	4.39701	4.39701
171	4.39701	4.61938	4.62766	4.62766	4.62766	4.62766	4.62766	4.71078	4.71907	4.71907
172	4.71907	4.71907	4.71907	4.74459	4.75289	4.75289	4.75289	4.75289	4.75289	4.79617
173	4.79617	4.79617	4.79617	4.79617	4.80233	4.80448	4.80448	4.81064	4.81064	4.81064
174	4.81064	4.81064	4.83621	4.84452	4.84452	4.84452	4.84452	4.84452	4.87010	4.87842
175	4.87842	4.87842	4.87842	4.87842	4.88700	4.88700	4.88700	4.88700	4.88700	4.89533
176	4.89533	4.92061	4.92061	4.92061	4.92061	4.92061	4.92798	4.92894	4.92894	4.93631
177	4.93631	4.93631	4.93631	4.93631	4.96194	4.97027	4.97027	4.97027	4.97027	4.97027
178	4.97799	4.97799	4.97799	4.97799	4.97799	4.98633	4.98633	5.01166	5.01166	5.01166
179	5.01156	5.01166	5.02000	5.02000	5.04534	5.04534	5.04534	5.04534	5.04534	5.05369
180	5.05369	5.05393	5.06228	5.06228	5.06228	5.06228	5.06228	5.10286	5.10286	5.10286
181	5.10286	5.10286	5.11122	5.11122	5.13660	5.13660	5.13660	5.13660	5.13660	5.14497
182	5.14497	5.22802	5.22802	5.22802	5.22802	5.22802	5.23640	5.23640	5.45364	5.45364

183	5.46196	5.54650	5,54650	5.55484	5,58086	5.58086	5,58920	5.62523	5.63358	5.63358
184	5,63358	5,63358	5.63358	5.63952	5.63052	5.64787	5,67394	5.67394	5,68230	5.70838
185	5.70838	5,71675	5,71750	5.72587	5,72587	5.72587	5.72587	5.72587	5.75164	5.76002
186	5,76002	5,76002	5,76002	5,76002	5,76718	5.76718	5,77556	5.80169	5,80169	5.80993
187	5,81007	5,81832	5,81832	5.81832	5,81832	5.81832	5,84413	5.85253	5,85253	5.85253
188	5.85253	5,85253	5,87836	5,88676	5,88676	5.88676	5,88676	5.88676	5,89516	5.89516
189	5,90355	5,93679	5,94520	5,94520	5.94520	5.94520	5,94520	5.97107	5.97949	5.97949
190	5,97949	5,97949	5,97949	6,06393	6,07238	6.07238	6,07238	6.07238	6,07238	6.23804
191	6,29276	6,32885	6,36212	6,38710	6,41801	6.42201	6,45224	6.46750	6,46750	6.47591
192	6,48101	6.48558	6,51658	6.54251	6.55158	6.56125	6,56125	6.56967	6.57591	6.59594
193	6,59594	6,60437	6,61132	6.64638	6.65517	6.65517	6,66360	6.66639	6,68992	6.68992
194	6.69836	6.72469	6.72469	6.73314	6.74135	6.78406	6.78406	6.79252	6.81890	6.81890
195	6.82736	6,91327	6,91327	6.92174	7,08462	7.08462	7,09314	7.17597	7.17597	7.18451
196	7.20977	7,20977	7,21831	7,26747	7.26747	7.27603	7.30133	7.30133	7.30989	7.31469
197	7.33521	7,33521	7,34377	7,39305	7.39305	7.40162	7.40996	7.42698	7.42698	7.43556
198	7.44519	7.50536	7.51892	7.51892	7.52751	7.54067	7.57600	7.63632	7.67171	7.76760
199	7.93530	7.94387	7,94387	7.94387	7.94387	7.94387	8,02810	8.03669	8,03669	8.03669
200	8,03669	8,03669	8,06244	8.07104	8,07104	8.07104	8,07104	8.07104	8,12107	8.12967
201	8.12967	8,12967	8,12967	8.12967	8,15547	8.16408	8,16408	8.16408	8.16408	3.16408
202	8,18989	8,19850	8,19850	8.19850	8,19850	8.19850	8,24865	8.25728	8,25728	8.25728
203	8,25728	8,25728	8,28313	8,29176	8,29176	8.29176	8,29176	8.29176	8,37654	8.38518
204	8.38518	8.38518	8,38518	8.38518	8,79960	8.79960	8,79960	8.79960	8.79960	3.80822
205	8.80822	8,89390	8,89390	8.89390	8,89390	8.89390	8,90254	8.90254	8,92879	8.92879
206	8,92879	8,92879	8,92879	8.93743	8,93743	8.98836	8,98836	8.98836	8,98836	8.98836
207	8,99701	8,99701	9,02331	9.02331	9,02331	9.02331	9,02331	9.03197	9,03197	9.05828
208	9,05828	9,05828	9,05828	9.05828	9,06695	9.06695	9,11800	9.11800	9,11800	9.11800
209	9,11800	9,12667	9,12667	9.15303	9,15303	9.15303	9,15303	9.15303	9.16171	9.16171
210	9.24795	9,24795	9,24795	9.24795	9,24795	9.25664	9,25664	9.66032	9.66900	9.66900
211	9,66900	9.66900	9,66900	9.75612	9,76481	9.76481	9,76481	9.76481	9.76481	9.79156
212	9.80026	9.80026	9,80026	9.80026	9,80026	9.85208	9,86079	9.86079	9.86079	9.86079
213	9.86079	9.88759	9,89630	9.89630	9,89630	9.89630	9,89630	9.92312	9,93184	9.93184
214	9.93184	9,93184	9,93184	9.98379	9,99252	9.99252	9,99252	9.99252	9,99252	10.01938
215	10,02811	10,02811	10,02811	10,02811	10,02811	10.11581	10,12456	10.12456	10,12456	10.12456
216	10.12456	10.53477	10,53477	10.54350	10.63211	10.63211	10,64085	10.66812	10,66812	10.67687
217	10,72961	10,72961	10,73837	10,76569	10,76569	10,77445	10,80179	10.80179	10,81056	10,86343
218	10,86343	10,87221	10.89959	10,89959	10.90838	10.99757	10.99757	11.00637	11,41433	11.51322
219	11,54981	11.61228	11.64896	11.68561	11.74824	11.78499	11,88453			

APPENDIX C

C1: A SAMPLE OF RANGE DETERMINISTIC APPRAISAL OF BRITISH LEYLAND WITH RESPECTIVE VALUES OF COMPONENT VARIABLES (1977 DATA).

C2: A SAMPLE OF RANGE DETERMINISTIC APPRAISAL OF BRITISH LEYLAND IN ASCENDING ORDER.

C3: OUTPUT OF TARGET DETERMINISTIC APPRAISAL WITH THEIR RESPECTIVE VALUES IN COMPONENT VARIABLES.

C4: OUTPUT OF TARGET DETERMINISTIC APPRAISAL IN ASCENDING ORDER.

C1 OUTPUT OF RANGE DETERMINISTIC APPRAISAL

```
KK=    SERIAL NUMBER
I  = % CHANGE IN A              A = PRICE PER UNIT OF OUTPUT
J  = % CHANGE IN C              C = TOTAL NO, OF OUTPUT
K  = % CHANGE IN B              B = MATERIAL COST PER UNIT OF OUTPUT
L  = % CHANGE IN D              D = AVERAGE REMUNERATION PER MAN PER YEAR
M  = % CHANGE IN E              E = TOTAL NO, OF EMPLOYEES
N  = % CHANGE IN H              H = CAPITAL INTEREST CHARGES PER UNIT OF OUTPUT
II = % CHANGE IN G              G = FACILITIES COST PER UNIT OF OUTPUT
X  = % CHANGE IN PRODUCTIVITY
```

KK= 1	I= 4	J=-1	K= 1	L= 6	M=-2	N=-1	II= 1	X(I,J,K,L,M,N,II)=	5,93348
KK= 2	I= 4	J=-1	K= 1	L= 6	M=-2	N=-1	II= 2	X(I,J,K,L,M,N,II)=	5,84581
KK= 3	I= 4	J=-1	K= 1	L= 6	M=-2	N=-1	II= 3	X(I,J,K,L,M,N,II)=	5,75830
KK= 4	I= 4	J=-1	K= 1	L= 6	M=-2	N=-1	II= 4	X(I,J,K,L,M,N,II)=	5,67093
KK= 5	I= 4	J=-1	K= 1	L= 6	M=-2	N= 0	II= 1	X(I,J,K,L,M,N,II)=	5,86796
KK= 6	I= 4	J=-1	K= 1	L= 6	M=-2	N= 0	II= 2	X(I,J,K,L,M,N,II)=	5,78040
KK= 7	I= 4	J=-1	K= 1	L= 6	M=-2	N= 0	II= 3	X(I,J,K,L,M,N,II)=	5,69300
KK= 8	I= 4	J=-1	K= 1	L= 6	M=-2	N= 0	II= 4	X(I,J,K,L,M,N,II)=	5.60573
KK= 9	I= 4	J=-1	K= 1	L= 6	M=-2	N= 1	II= 1	X(I,J,K,L,M,N,II)=	5.80252
KK= 10	I= 4	J=-1	K= 1	L= 6	M=-2	N= 1	II= 2	X(I,J,K,L,M,N,II)=	5,71508
KK= 11	I= 4	J=-1	K= 1	L= 6	M=-2	N= 1	II= 3	X(I,J,K,L,M,N,II)=	5,62778
KK= 12	I= 4	J=-1	K= 1	L= 6	M=-2	N= 1	II= 4	X(I,J,K,L,M,N,II)=	5,54062
KK= 13	I= 4	J=-1	K= 1	L= 6	M=-2	N= 2	II= 1	X(I,J,K,L,M,N,II)=	5,73716
KK= 14	I= 4	J=-1	K= 1	L= 6	M=-2	N= 2	II= 2	X(I,J,K,L,M,N,II)=	5,64983
KK= 15	I= 4	J=-1	K= 1	L= 6	M=-2	N= 2	II= 3	X(I,J,K,L,M,N,II)=	5,56263
KK= 16	I= 4	J=-1	K= 1	L= 6	M=-2	N= 2	II= 4	X(I,J,K,L,M,N,II)=	5,47559
KK= 17	I= 4	J=-1	K= 1	L= 6	M=-2	N= 3	II= 1	X(I,J,K,L,M,N,II)=	5,67189
KK= 18	I= 4	J=-1	K= 1	L= 6	M=-2	N= 3	II= 2	X(I,J,K,L,M,N,II)=	5,58466
KK= 19	I= 4	J=-1	K= 1	L= 6	M=-2	N= 3	II= 3	X(I,J,K,L,M,N,II)=	5,49757
KK= 20	I= 4	J=-1	K= 1	L= 6	M=-2	N= 3	II= 4	X(I,J,K,L,M,N,II)=	5,41063
KK= 21	I= 4	J=-1	K= 1	L= 6	M=-2	N= 4	II= 1	X(I,J,K,L,M,N,II)=	5,60669
KK= 22	I= 4	J=-1	K= 1	L= 6	M=-2	N= 4	II= 2	X(I,J,K,L,M,N,II)=	5,51957
KK= 23	I= 4	J=-1	K= 1	L= 6	M=-2	N= 4	II= 3	X(I,J,K,L,M,N,II)=	5,43259
KK= 24	I= 4	J=-1	K= 1	L= 6	M=-2	N= 4	II= 4	X(I,J,K,L,M,N,II)=	5,34576
KK= 25	I= 4	J=-1	K= 1	L= 6	M=-1	N=-1	II= 1	X(I,J,K,L,M,N,II)=	5,01716
KK= 26	I= 4	J=-1	K= 1	L= 6	M=-1	N=-1	II= 2	X(I,J,K,L,M,N,II)=	4,93101
KK= 27	I= 4	J=-1	K= 1	L= 6	M=-1	N=-1	II= 3	X(I,J,K,L,M,N,II)=	4,84500
KK= 28	I= 4	J=-1	K= 1	L= 6	M=-1	N=-1	II= 4	X(I,J,K,L,M,N,II)=	4,75913
KK= 29	I= 4	J=-1	K= 1	L= 6	M=-1	N= 0	II= 1	X(I,J,K,L,M,N,II)=	4,95277
KK= 30	I= 4	J=-1	K= 1	L= 6	M=-1	N= 0	II= 2	X(I,J,K,L,M,N,II)=	4,86673
KK= 31	I= 4	J=-1	K= 1	L= 6	M=-1	N= 0	II= 3	X(I,J,K,L,M,N,II)=	4,78082
KK= 32	I= 4	J=-1	K= 1	L= 6	M=-1	N= 0	II= 4	X(I,J,K,L,M,N,II)=	4,69506
KK= 33	I= 4	J=-1	K= 1	L= 6	M=-1	N= 1	II= 1	X(I,J,K,L,M,N,II)=	4,88846
KK= 34	I= 4	J=-1	K= 1	L= 6	M=-1	N= 1	II= 2	X(I,J,K,L,M,N,II)=	4,80252
KK= 35	I= 4	J=-1	K= 1	L= 6	M=-1	N= 1	II= 3	X(I,J,K,L,M,N,II)=	4,71672
KK= 36	I= 4	J=-1	K= 1	L= 6	M=-1	N= 1	II= 4	X(I,J,K,L,M,N,II)=	4,63106
KK= 37	I= 4	J=-1	K= 1	L= 6	M=-1	N= 2	II= 1	X(I,J,K,L,M,N,II)=	4,82423
KK= 38	I= 4	J=-1	K= 1	L= 6	M=-1	N= 2	II= 2	X(I,J,K,L,M,N,II)=	4,73839
KK= 39	I= 4	J=-1	K= 1	L= 6	M=-1	N= 2	II= 3	X(I,J,K,L,M,N,II)=	4,65270
KK= 40	I= 4	J=-1	K= 1	L= 6	M=-1	N= 2	II= 4	X(I,J,K,L,M,N,II)=	4,56714
KK= 41	I= 4	J=-1	K= 1	L= 6	M=-1	N= 3	II= 1	X(I,J,K,L,M,N,II)=	4,76008
KK= 42	I= 4	J=-1	K= 1	L= 6	M=-1	N= 3	II= 2	X(I,J,K,L,M,N,II)=	4,67435
KK= 43	I= 4	J=-1	K= 1	L= 6	M=-1	N= 3	II= 3	X(I,J,K,L,M,N,II)=	4,58876
KK= 44	I= 4	J=-1	K= 1	L= 6	M=-1	N= 3	II= 4	X(I,J,K,L,M,N,II)=	4,50330
KK= 45	I= 4	J=-1	K= 1	L= 6	M=-1	N= 4	II= 1	X(I,J,K,L,M,N,II)=	4,69600
KK= 46	I= 4	J=-1	K= 1	L= 6	M=-1	N= 4	II= 2	X(I,J,K,L,M,N,II)=	4,61037
KK= 47	I= 4	J=-1	K= 1	L= 6	M=-1	N= 4	II= 3	X(I,J,K,L,M,N,II)=	4,52489
KK= 48	I= 4	J=-1	K= 1	L= 6	M=-1	N= 4	II= 4	X(I,J,K,L,M,N,II)=	4,43954
KK= 49	I= 4	J=-1	K= 1	L= 6	M= 0	N=-1	II= 1	X(I,J,K,L,M,N,II)=	4,11657
KK= 50	I= 4	J=-1	K= 1	L= 6	M= 0	N=-1	II= 2	X(I,J,K,L,M,N,II)=	4,03189
KK= 51	I= 4	J=-1	K= 1	L= 6	M= 0	N=-1	II= 3	X(I,J,K,L,M,N,II)=	3,94735
KK= 52	I= 4	J=-1	K= 1	L= 6	M= 0	N=-1	II= 4	X(I,J,K,L,M,N,II)=	3,86294
KK= 53	I= 4	J=-1	K= 1	L= 6	M= 0	N= 0	II= 1	X(I,J,K,L,M,N,II)=	4,05328
KK= 54	I= 4	J=-1	K= 1	L= 6	M= 0	N= 0	II= 2	X(I,J,K,L,M,N,II)=	3,96870
KK= 55	I= 4	J=-1	K= 1	L= 6	M= 0	N= 0	II= 3	X(I,J,K,L,M,N,II)=	3,88426
KK= 56	I= 4	J=-1	K= 1	L= 6	M= 0	N= 0	II= 4	X(I,J,K,L,M,N,II)=	3,79996
KK= 57	I= 4	J=-1	K= 1	L= 6	M= 0	N= 1	II= 1	X(I,J,K,L,M,N,II)=	3,99006
KK= 58	I= 4	J=-1	K= 1	L= 6	M= 0	N= 1	II= 2	X(I,J,K,L,M,N,II)=	3,90559
KK= 59	I= 4	J=-1	K= 1	L= 6	M= 0	N= 1	II= 3	X(I,J,K,L,M,N,II)=	3,82125
KK= 60	I= 4	J=-1	K= 1	L= 6	M= 0	N= 1	II= 4	X(I,J,K,L,M,N,II)=	3,73705
KK= 61	I= 4	J=-1	K= 1	L= 6	M= 0	N= 2	II= 1	X(I,J,K,L,M,N,II)=	3,92693
KK= 62	I= 4	J=-1	K= 1	L= 6	M= 0	N= 2	II= 2	X(I,J,K,L,M,N,II)=	3,84255
KK= 63	I= 4	J=-1	K= 1	L= 6	M= 0	N= 2	II= 3	X(I,J,K,L,M,N,II)=	3,75832
KK= 64	I= 4	J=-1	K= 1	L= 6	M= 0	N= 2	II= 4	X(I,J,K,L,M,N,II)=	3,67422
KK= 65	I= 4	J=-1	K= 1	L= 6	M= 0	N= 3	II= 1	X(I,J,K,L,M,N,II)=	3,86387
KK= 66	I= 4	J=-1	K= 1	L= 6	M= 0	N= 3	II= 2	X(I,J,K,L,M,N,II)=	3,77960
KK= 67	I= 4	J=-1	K= 1	L= 6	M= 0	N= 3	II= 3	X(I,J,K,L,M,N,II)=	3,69546
KK= 68	I= 4	J=-1	K= 1	L= 6	M= 0	N= 3	II= 4	X(I,J,K,L,M,N,II)=	3,61146
KK= 69	I= 4	J=-1	K= 1	L= 6	M= 0	N= 4	II= 1	X(I,J,K,L,M,N,II)=	3,80088
KK= 70	I= 4	J=-1	K= 1	L= 6	M= 0	N= 4	II= 2	X(I,J,K,L,M,N,II)=	3,71671
KK= 71	I= 4	J=-1	K= 1	L= 6	M= 0	N= 4	II= 3	X(I,J,K,L,M,N,II)=	3,63268
KK= 72	I= 4	J=-1	K= 1	L= 6	M= 0	N= 4	II= 4	X(I,J,K,L,M,N,II)=	3,54879
KK= 73	I= 4	J=-1	K= 1	L= 6	M= 1	N=-1	II= 1	X(I,J,K,L,M,N,II)=	3,23129
KK= 74	I= 4	J=-1	K= 1	L= 6	M= 1	N=-1	II= 2	X(I,J,K,L,M,N,II)=	3,14804
KK= 75	I= 4	J=-1	K= 1	L= 6	M= 1	N=-1	II= 3	X(I,J,K,L,M,N,II)=	3,06493
KK= 76	I= 4	J=-1	K= 1	L= 6	M= 1	N=-1	II= 4	X(I,J,K,L,M,N,II)=	2,98195
KK= 77	I= 4	J=-1	K= 1	L= 6	M= 1	N= 0	II= 1	X(I,J,K,L,M,N,II)=	3,16907
KK= 78	I= 4	J=-1	K= 1	L= 6	M= 1	N= 0	II= 2	X(I,J,K,L,M,N,II)=	3,08592

KK= 79	I= 4	J=-1	K= 1	L= 6	M= 1	N= 0	II= 3	X(I,J,K,L,M,N,II)=	3,00291
KK= 80	I= 4	J=-1	K= 1	L= 6	M= 1	N= 0	II= 4	X(I,J,K,L,M,N,II)=	2,92003
KK= 81	I= 4	J=-1	K= 1	L= 6	M= 1	N= 1	II= 1	X(I,J,K,L,M,N,II)=	3,10692
KK= 82	I= 4	J=-1	K= 1	L= 6	M= 1	N= 1	II= 2	X(I,J,K,L,M,N,II)=	3,02388
KK= 83	I= 4	J=-1	K= 1	L= 6	M= 1	N= 1	II= 3	X(I,J,K,L,M,N,II)=	2,94096
KK= 84	I= 4	J=-1	K= 1	L= 6	M= 1	N= 1	II= 4	X(I,J,K,L,M,N,II)=	2,85818
KK= 85	I= 4	J=-1	K= 1	L= 6	M= 1	N= 2	II= 1	X(I,J,K,L,M,N,II)=	3,04485
KK= 86	I= 4	J=-1	K= 1	L= 6	M= 1	N= 2	II= 2	X(I,J,K,L,M,N,II)=	2,96191
KK= 87	I= 4	J=-1	K= 1	L= 6	M= 1	N= 2	II= 3	X(I,J,K,L,M,N,II)=	2,87909
KK= 88	I= 4	J=-1	K= 1	L= 6	M= 1	N= 2	II= 4	X(I,J,K,L,M,N,II)=	2,79641
KK= 89	I= 4	J=-1	K= 1	L= 6	M= 1	N= 3	II= 1	X(I,J,K,L,M,N,II)=	2,98286
KK= 90	I= 4	J=-1	K= 1	L= 6	M= 1	N= 3	II= 2	X(I,J,K,L,M,N,II)=	2,90001
KK= 91	I= 4	J=-1	K= 1	L= 6	M= 1	N= 3	II= 3	X(I,J,K,L,M,N,II)=	2,81730
KK= 92	I= 4	J=-1	K= 1	L= 6	M= 1	N= 3	II= 4	X(I,J,K,L,M,N,II)=	2,73472
KK= 93	I= 4	J=-1	K= 1	L= 6	M= 1	N= 4	II= 1	X(I,J,K,L,M,N,II)=	2,92094
KK= 94	I= 4	J=-1	K= 1	L= 6	M= 1	N= 4	II= 2	X(I,J,K,L,M,N,II)=	2,83819
KK= 95	I= 4	J=-1	K= 1	L= 6	M= 1	N= 4	II= 3	X(I,J,K,L,M,N,II)=	2,75558
KK= 96	I= 4	J=-1	K= 1	L= 6	M= 1	N= 4	II= 4	X(I,J,K,L,M,N,II)=	2,67309
KK= 97	I= 4	J=-1	K= 1	L= 6	M= 2	N=-1	II= 1	X(I,J,K,L,M,N,II)=	2,36094
KK= 98	I= 4	J=-1	K= 1	L= 6	M= 2	N=-1	II= 2	X(I,J,K,L,M,N,II)=	2,27909
KK= 99	I= 4	J=-1	K= 1	L= 6	M= 2	N=-1	II= 3	X(I,J,K,L,M,N,II)=	2,19737
KK= 100	I= 4	J=-1	K= 1	L= 6	M= 2	N=-1	II= 4	X(I,J,K,L,M,N,II)=	2,11578
KK= 101	I= 4	J=-1	K= 1	L= 6	M= 2	N= 0	II= 1	X(I,J,K,L,M,N,II)=	2,29976
KK= 102	I= 4	J=-1	K= 1	L= 6	M= 2	N= 0	II= 2	X(I,J,K,L,M,N,II)=	2,21801
KK= 103	I= 4	J=-1	K= 1	L= 6	M= 2	N= 0	II= 3	X(I,J,K,L,M,N,II)=	2,13639
KK= 104	I= 4	J=-1	K= 1	L= 6	M= 2	N= 0	II= 4	X(I,J,K,L,M,N,II)=	2,05490
KK= 105	I= 4	J=-1	K= 1	L= 6	M= 2	N= 1	II= 1	X(I,J,K,L,M,N,II)=	2,23866
KK= 106	I= 4	J=-1	K= 1	L= 6	M= 2	N= 1	II= 2	X(I,J,K,L,M,N,II)=	2,15700
KK= 107	I= 4	J=-1	K= 1	L= 6	M= 2	N= 1	II= 3	X(I,J,K,L,M,N,II)=	2,07548
KK= 108	I= 4	J=-1	K= 1	L= 6	M= 2	N= 1	II= 4	X(I,J,K,L,M,N,II)=	1,99409
KK= 109	I= 4	J=-1	K= 1	L= 6	M= 2	N= 2	II= 1	X(I,J,K,L,M,N,II)=	2,17763
KK= 110	I= 4	J=-1	K= 1	L= 6	M= 2	N= 2	II= 2	X(I,J,K,L,M,N,II)=	2,09607
KK= 111	I= 4	J=-1	K= 1	L= 6	M= 2	N= 2	II= 3	X(I,J,K,L,M,N,II)=	2,01465
KK= 112	I= 4	J=-1	K= 1	L= 6	M= 2	N= 2	II= 4	X(I,J,K,L,M,N,II)=	1,93335
KK= 113	I= 4	J=-1	K= 1	L= 6	M= 2	N= 3	II= 1	X(I,J,K,L,M,N,II)=	2,11667
KK= 114	I= 4	J=-1	K= 1	L= 6	M= 2	N= 3	II= 2	X(I,J,K,L,M,N,II)=	2,03521
KK= 115	I= 4	J=-1	K= 1	L= 6	M= 2	N= 3	II= 3	X(I,J,K,L,M,N,II)=	1,95388
KK= 116	I= 4	J=-1	K= 1	L= 6	M= 2	N= 3	II= 4	X(I,J,K,L,M,N,II)=	1,87268
KK= 117	I= 4	J=-1	K= 1	L= 6	M= 2	N= 4	II= 1	X(I,J,K,L,M,N,II)=	2,05579
KK= 118	I= 4	J=-1	K= 1	L= 6	M= 2	N= 4	II= 2	X(I,J,K,L,M,N,II)=	1,97443
KK= 119	I= 4	J=-1	K= 1	L= 6	M= 2	N= 4	II= 3	X(I,J,K,L,M,N,II)=	1,89319
KK= 120	I= 4	J=-1	K= 1	L= 6	M= 2	N= 4	II= 4	X(I,J,K,L,M,N,II)=	1,81209
KK= 121	I= 4	J=-1	K= 1	L= 7	M=-2	N=-1	II= 1	X(I,J,K,L,M,N,II)=	5,08577
KK= 122	I= 4	J=-1	K= 1	L= 7	M=-2	N=-1	II= 2	X(I,J,K,L,M,N,II)=	4,99950
KK= 123	I= 4	J=-1	K= 1	L= 7	M=-2	N=-1	II= 3	X(I,J,K,L,M,N,II)=	4,91338
KK= 124	I= 4	J=-1	K= 1	L= 7	M=-2	N=-1	II= 4	X(I,J,K,L,M,N,II)=	4,82740
KK= 125	I= 4	J=-1	K= 1	L= 7	M=-2	N= 0	II= 1	X(I,J,K,L,M,N,II)=	5,02129
KK= 126	I= 4	J=-1	K= 1	L= 7	M=-2	N= 0	II= 2	X(I,J,K,L,M,N,II)=	4,93513
KK= 127	I= 4	J=-1	K= 1	L= 7	M=-2	N= 0	II= 3	X(I,J,K,L,M,N,II)=	4,84912
KK= 128	I= 4	J=-1	K= 1	L= 7	M=-2	N= 0	II= 4	X(I,J,K,L,M,N,II)=	4,76324
KK= 129	I= 4	J=-1	K= 1	L= 7	M=-2	N= 1	II= 1	X(I,J,K,L,M,N,II)=	4,95690
KK= 130	I= 4	J=-1	K= 1	L= 7	M=-2	N= 1	II= 2	X(I,J,K,L,M,N,II)=	4,87084
KK= 131	I= 4	J=-1	K= 1	L= 7	M=-2	N= 1	II= 3	X(I,J,K,L,M,N,II)=	4,78493
KK= 132	I= 4	J=-1	K= 1	L= 7	M=-2	N= 1	II= 4	X(I,J,K,L,M,N,II)=	4,69916
KK= 133	I= 4	J=-1	K= 1	L= 7	M=-2	N= 2	II= 1	X(I,J,K,L,M,N,II)=	4,89258
KK= 134	I= 4	J=-1	K= 1	L= 7	M=-2	N= 2	II= 2	X(I,J,K,L,M,N,II)=	4,80663
KK= 135	I= 4	J=-1	K= 1	L= 7	M=-2	N= 2	II= 3	X(I,J,K,L,M,N,II)=	4,72083
KK= 136	I= 4	J=-1	K= 1	L= 7	M=-2	N= 2	II= 4	X(I,J,K,L,M,N,II)=	4,63516
KK= 137	I= 4	J=-1	K= 1	L= 7	M=-2	N= 3	II= 1	X(I,J,K,L,M,N,II)=	4,82834
KK= 138	I= 4	J=-1	K= 1	L= 7	M=-2	N= 3	II= 2	X(I,J,K,L,M,N,II)=	4,74250
KK= 139	I= 4	J=-1	K= 1	L= 7	M=-2	N= 3	II= 3	X(I,J,K,L,M,N,II)=	4,65680
KK= 140	I= 4	J=-1	K= 1	L= 7	M=-2	N= 3	II= 4	X(I,J,K,L,M,N,II)=	4,57124
KK= 141	I= 4	J=-1	K= 1	L= 7	M=-2	N= 4	II= 1	X(I,J,K,L,M,N,II)=	4,76418
KK= 142	I= 4	J=-1	K= 1	L= 7	M=-2	N= 4	II= 2	X(I,J,K,L,M,N,II)=	4,67845
KK= 143	I= 4	J=-1	K= 1	L= 7	M=-2	N= 4	II= 3	X(I,J,K,L,M,N,II)=	4,59285
KK= 144	I= 4	J=-1	K= 1	L= 7	M=-2	N= 4	II= 4	X(I,J,K,L,M,N,II)=	4,50739
KK= 145	I= 4	J=-1	K= 1	L= 7	M=-1	N=-1	II= 1	X(I,J,K,L,M,N,II)=	4,17557
KK= 146	I= 4	J=-1	K= 1	L= 7	M=-1	N=-1	II= 2	X(I,J,K,L,M,N,II)=	4,09079
KK= 147	I= 4	J=-1	K= 1	L= 7	M=-1	N=-1	II= 3	X(I,J,K,L,M,N,II)=	4,00615
KK= 148	I= 4	J=-1	K= 1	L= 7	M=-1	N=-1	II= 4	X(I,J,K,L,M,N,II)=	3,92165
KK= 149	I= 4	J=-1	K= 1	L= 7	M=-1	N= 0	II= 1	X(I,J,K,L,M,N,II)=	4,11220
KK= 150	I= 4	J=-1	K= 1	L= 7	M=-1	N= 0	II= 2	X(I,J,K,L,M,N,II)=	4,02753
KK= 151	I= 4	J=-1	K= 1	L= 7	M=-1	N= 0	II= 3	X(I,J,K,L,M,N,II)=	3,94299
KK= 152	I= 4	J=-1	K= 1	L= 7	M=-1	N= 0	II= 4	X(I,J,K,L,M,N,II)=	3,85859
KK= 153	I= 4	J=-1	K= 1	L= 7	M=-1	N= 1	II= 1	X(I,J,K,L,M,N,II)=	4,04892
KK= 154	I= 4	J=-1	K= 1	L= 7	M=-1	N= 1	II= 2	X(I,J,K,L,M,N,II)=	3,96435
KK= 155	I= 4	J=-1	K= 1	L= 7	M=-1	N= 1	II= 3	X(I,J,K,L,M,N,II)=	3,87991
KK= 156	I= 4	J=-1	K= 1	L= 7	M=-1	N= 1	II= 4	X(I,J,K,L,M,N,II)=	3,79562
KK= 157	I= 4	J=-1	K= 1	L= 7	M=-1	N= 2	II= 1	X(I,J,K,L,M,N,II)=	3,98571
KK= 158	I= 4	J=-1	K= 1	L= 7	M=-1	N= 2	II= 2	X(I,J,K,L,M,N,II)=	3,90124
KK= 159	I= 4	J=-1	K= 1	L= 7	M=-1	N= 2	II= 3	X(I,J,K,L,M,N,II)=	3,81691
KK= 160	I= 4	J=-1	K= 1	L= 7	M=-1	N= 2	II= 4	X(I,J,K,L,M,N,II)=	3,73271
KK= 161	I= 4	J=-1	K= 1	L= 7	M=-1	N= 3	II= 1	X(I,J,K,L,M,N,II)=	3,92258
KK= 162	I= 4	J=-1	K= 1	L= 7	M=-1	N= 3	II= 2	X(I,J,K,L,M,N,II)=	3,83821
KK= 163	I= 4	J=-1	K= 1	L= 7	M=-1	N= 3	II= 3	X(I,J,K,L,M,N,II)=	3,75398
KK= 164	I= 4	J=-1	K= 1	L= 7	M=-1	N= 3	II= 4	X(I,J,K,L,M,N,II)=	3,66989
KK= 165	I= 4	J=-1	K= 1	L= 7	M=-1	N= 4	II= 1	X(I,J,K,L,M,N,II)=	3,85952
KK= 166	I= 4	J=-1	K= 1	L= 7	M=-1	N= 4	II= 2	X(I,J,K,L,M,N,II)=	3,77526
KK= 167	I= 4	J=-1	K= 1	L= 7	M=-1	N= 4	II= 3	X(I,J,K,L,M,N,II)=	3,69113
KK= 168	I= 4	J=-1	K= 1	L= 7	M=-1	N= 4	II= 4	X(I,J,K,L,M,N,II)=	3,60714
KK= 169	I= 4	J=-1	K= 1	L= 7	M= 0	N=-1	II= 1	X(I,J,K,L,M,N,II)=	3,28100
KK= 170	I= 4	J=-1	K= 1	L= 7	M= 0	N=-1	II= 2	X(I,J,K,L,M,N,II)=	3,19767
KK= 171	I= 4	J=-1	K= 1	L= 7	M= 0	N=-1	II= 3	X(I,J,K,L,M,N,II)=	3,11448
KK= 172	I= 4	J=-1	K= 1	L= 7	M= 0	N=-1	II= 4	X(I,J,K,L,M,N,II)=	3,03142
KK= 173	I= 4	J=-1	K= 1	L= 7	M= 0	N= 0	II= 1	X(I,J,K,L,M,N,II)=	3,21872
KK= 174	I= 4	J=-1	K= 1	L= 7	M= 0	N= 0	II= 2	X(I,J,K,L,M,N,II)=	3,13549

KK=	175	I= 4	J=-1	K= 1	L= 7	M= 0	N= 0	II= 3	X(I,J,K,L,M,N,II)= 3,05240
KK=	176	I= 4	J=-1	K= 1	L= 7	M= 0	N= 0	II= 4	X(I,J,K,L,M,N,II)= 2,96944
KK=	177	I= 4	J=-1	K= 1	L= 7	M= 0	N= 1	II= 1	X(I,J,K,L,M,N,II)= 3,15651
KK=	178	I= 4	J=-1	K= 1	L= 7	M= 0	N= 1	II= 2	X(I,J,K,L,M,N,II)= 3,07339
KK=	179	I= 4	J=-1	K= 1	L= 7	M= 0	N= 1	II= 3	X(I,J,K,L,M,N,II)= 2,99039
KK=	180	I= 4	J=-1	K= 1	L= 7	M= 0	N= 1	II= 4	X(I,J,K,L,M,N,II)= 2,90753
KK=	181	I= 4	J=-1	K= 1	L= 7	M= 0	N= 2	II= 1	X(I,J,K,L,M,N,II)= 3,09438
KK=	182	I= 4	J=-1	K= 1	L= 7	M= 0	N= 2	II= 2	X(I,J,K,L,M,N,II)= 3,01136
KK=	183	I= 4	J=-1	K= 1	L= 7	M= 0	N= 2	II= 3	X(I,J,K,L,M,N,II)= 2,92846
KK=	184	I= 4	J=-1	K= 1	L= 7	M= 0	N= 2	II= 4	X(I,J,K,L,M,N,II)= 2,84570
KK=	185	I= 4	J=-1	K= 1	L= 7	M= 0	N= 3	II= 1	X(I,J,K,L,M,N,II)= 3,03233
KK=	186	I= 4	J=-1	K= 1	L= 7	M= 0	N= 3	II= 2	X(I,J,K,L,M,N,II)= 2,94940
KK=	187	I= 4	J=-1	K= 1	L= 7	M= 0	N= 3	II= 3	X(I,J,K,L,M,N,II)= 2,86661
KK=	188	I= 4	J=-1	K= 1	L= 7	M= 0	N= 3	II= 4	X(I,J,K,L,M,N,II)= 2,78395
KK=	189	I= 4	J=-1	K= 1	L= 7	M= 0	N= 4	II= 1	X(I,J,K,L,M,N,II)= 2,97035
KK=	190	I= 4	J=-1	K= 1	L= 7	M= 0	N= 4	II= 2	X(I,J,K,L,M,N,II)= 2,88752
KK=	191	I= 4	J=-1	K= 1	L= 7	M= 0	N= 4	II= 3	X(I,J,K,L,M,N,II)= 2,80483
KK=	192	I= 4	J=-1	K= 1	L= 7	M= 0	N= 4	II= 4	X(I,J,K,L,M,N,II)= 2,72227
KK=	193	I= 4	J=-1	K= 1	L= 7	M= 1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 2,40166
KK=	194	I= 4	J=-1	K= 1	L= 7	M= 1	N=-1	II= 2	X(I,J,K,L,M,N,II)= 2,31975
KK=	195	I= 4	J=-1	K= 1	L= 7	M= 1	N=-1	II= 3	X(I,J,K,L,M,N,II)= 2,23796
KK=	196	I= 4	J=-1	K= 1	L= 7	M= 1	N=-1	II= 4	X(I,J,K,L,M,N,II)= 2,15631
KK=	197	I= 4	J=-1	K= 1	L= 7	M= 1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 2,34044
KK=	198	I= 4	J=-1	K= 1	L= 7	M= 1	N= 0	II= 2	X(I,J,K,L,M,N,II)= 2,25862
KK=	199	I= 4	J=-1	K= 1	L= 7	M= 1	N= 0	II= 3	X(I,J,K,L,M,N,II)= 2,17693
KK=	200	I= 4	J=-1	K= 1	L= 7	M= 1	N= 0	II= 4	X(I,J,K,L,M,N,II)= 2,09538
KK=	201	I= 4	J=-1	K= 1	L= 7	M= 1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 2,27929
KK=	202	I= 4	J=-1	K= 1	L= 7	M= 1	N= 1	II= 2	X(I,J,K,L,M,N,II)= 2,19757
KK=	203	I= 4	J=-1	K= 1	L= 7	M= 1	N= 1	II= 3	X(I,J,K,L,M,N,II)= 2,11598
KK=	204	I= 4	J=-1	K= 1	L= 7	M= 1	N= 1	II= 4	X(I,J,K,L,M,N,II)= 2,03452
KK=	205	I= 4	J=-1	K= 1	L= 7	M= 1	N= 2	II= 1	X(I,J,K,L,M,N,II)= 2,21821
KK=	206	I= 4	J=-1	K= 1	L= 7	M= 1	N= 2	II= 2	X(I,J,K,L,M,N,II)= 2,13659
KK=	207	I= 4	J=-1	K= 1	L= 7	M= 1	N= 2	II= 3	X(I,J,K,L,M,N,II)= 2,05509
KK=	208	I= 4	J=-1	K= 1	L= 7	M= 1	N= 2	II= 4	X(I,J,K,L,M,N,II)= 1,97373
KK=	209	I= 4	J=-1	K= 1	L= 7	M= 1	N= 3	II= 1	X(I,J,K,L,M,N,II)= 2,15720
KK=	210	I= 4	J=-1	K= 1	L= 7	M= 1	N= 3	II= 2	X(I,J,K,L,M,N,II)= 2,07568
KK=	211	I= 4	J=-1	K= 1	L= 7	M= 1	N= 3	II= 3	X(I,J,K,L,M,N,II)= 1,99428
KK=	212	I= 4	J=-1	K= 1	L= 7	M= 1	N= 3	II= 4	X(I,J,K,L,M,N,II)= 1,91302
KK=	213	I= 4	J=-1	K= 1	L= 7	M= 1	N= 4	II= 1	X(I,J,K,L,M,N,II)= 2,09627
KK=	214	I= 4	J=-1	K= 1	L= 7	M= 1	N= 4	II= 2	X(I,J,K,L,M,N,II)= 2,01484
KK=	215	I= 4	J=-1	K= 1	L= 7	M= 1	N= 4	II= 3	X(I,J,K,L,M,N,II)= 1,93355
KK=	216	I= 4	J=-1	K= 1	L= 7	M= 1	N= 4	II= 4	X(I,J,K,L,M,N,II)= 1,85238
KK=	217	I= 4	J=-1	K= 1	L= 7	M= 2	N=-1	II= 1	X(I,J,K,L,M,N,II)= 1,53717
KK=	218	I= 4	J=-1	K= 1	L= 7	M= 2	N=-1	II= 2	X(I,J,K,L,M,N,II)= 1,45663
KK=	219	I= 4	J=-1	K= 1	L= 7	M= 2	N=-1	II= 3	X(I,J,K,L,M,N,II)= 1,37622
KK=	220	I= 4	J=-1	K= 1	L= 7	M= 2	N=-1	II= 4	X(I,J,K,L,M,N,II)= 1,29594
KK=	221	I= 4	J=-1	K= 1	L= 7	M= 2	N= 0	II= 1	X(I,J,K,L,M,N,II)= 1,47698
KK=	222	I= 4	J=-1	K= 1	L= 7	M= 2	N= 0	II= 2	X(I,J,K,L,M,N,II)= 1,39653
KK=	223	I= 4	J=-1	K= 1	L= 7	M= 2	N= 0	II= 3	X(I,J,K,L,M,N,II)= 1,31622
KK=	224	I= 4	J=-1	K= 1	L= 7	M= 2	N= 0	II= 4	X(I,J,K,L,M,N,II)= 1,23603
KK=	225	I= 4	J=-1	K= 1	L= 7	M= 2	N= 1	II= 1	X(I,J,K,L,M,N,II)= 1,41685
KK=	226	I= 4	J=-1	K= 1	L= 7	M= 2	N= 1	II= 2	X(I,J,K,L,M,N,II)= 1,33651
KK=	227	I= 4	J=-1	K= 1	L= 7	M= 2	N= 1	II= 3	X(I,J,K,L,M,N,II)= 1,25628
KK=	228	I= 4	J=-1	K= 1	L= 7	M= 2	N= 1	II= 4	X(I,J,K,L,M,N,II)= 1,17619
KK=	229	I= 4	J=-1	K= 1	L= 7	M= 2	N= 2	II= 1	X(I,J,K,L,M,N,II)= 1,35680
KK=	230	I= 4	J=-1	K= 1	L= 7	M= 2	N= 2	II= 2	X(I,J,K,L,M,N,II)= 1,27655
KK=	231	I= 4	J=-1	K= 1	L= 7	M= 2	N= 2	II= 3	X(I,J,K,L,M,N,II)= 1,19642
KK=	232	I= 4	J=-1	K= 1	L= 7	M= 2	N= 2	II= 4	X(I,J,K,L,M,N,II)= 1,11642
KK=	233	I= 4	J=-1	K= 1	L= 7	M= 2	N= 3	II= 1	X(I,J,K,L,M,N,II)= 1,29682
KK=	234	I= 4	J=-1	K= 1	L= 7	M= 2	N= 3	II= 2	X(I,J,K,L,M,N,II)= 1,21666
KK=	235	I= 4	J=-1	K= 1	L= 7	M= 2	N= 3	II= 3	X(I,J,K,L,M,N,II)= 1,13663
KK=	236	I= 4	J=-1	K= 1	L= 7	M= 2	N= 3	II= 4	X(I,J,K,L,M,N,II)= 1,05673
KK=	237	I= 4	J=-1	K= 1	L= 7	M= 2	N= 4	II= 1	X(I,J,K,L,M,N,II)= 1,23691
KK=	238	I= 4	J=-1	K= 1	L= 7	M= 2	N= 4	II= 2	X(I,J,K,L,M,N,II)= 1,15685
KK=	239	I= 4	J=-1	K= 1	L= 7	M= 2	N= 4	II= 3	X(I,J,K,L,M,N,II)= 1,07691
KK=	240	I= 4	J=-1	K= 1	L= 7	M= 2	N= 4	II= 4	X(I,J,K,L,M,N,II)= ,99710
KK=	241	I= 4	J=-1	K= 1	L= 8	M=-2	N=-1	II= 1	X(I,J,K,L,M,N,II)= 4,25152
KK=	242	I= 4	J=-1	K= 1	L= 8	M=-2	N=-1	II= 2	X(I,J,K,L,M,N,II)= 4,16662
KK=	243	I= 4	J=-1	K= 1	L= 8	M=-2	N=-1	II= 3	X(I,J,K,L,M,N,II)= 4,08185
KK=	244	I= 4	J=-1	K= 1	L= 8	M=-2	N=-1	II= 4	X(I,J,K,L,M,N,II)= 3,99723
KK=	245	I= 4	J=-1	K= 1	L= 8	M=-2	N= 0	II= 1	X(I,J,K,L,M,N,II)= 4,18806
KK=	246	I= 4	J=-1	K= 1	L= 8	M=-2	N= 0	II= 2	X(I,J,K,L,M,N,II)= 4,10326
KK=	247	I= 4	J=-1	K= 1	L= 8	M=-2	N= 0	II= 3	X(I,J,K,L,M,N,II)= 4,01861
KK=	248	I= 4	J=-1	K= 1	L= 8	M=-2	N= 0	II= 4	X(I,J,K,L,M,N,II)= 3,93408
KK=	249	I= 4	J=-1	K= 1	L= 8	M=-2	N= 1	II= 1	X(I,J,K,L,M,N,II)= 4,12468
KK=	250	I= 4	J=-1	K= 1	L= 8	M=-2	N= 1	II= 2	X(I,J,K,L,M,N,II)= 4,03999
KK=	251	I= 4	J=-1	K= 1	L= 8	M=-2	N= 1	II= 3	X(I,J,K,L,M,N,II)= 3,95543
KK=	252	I= 4	J=-1	K= 1	L= 8	M=-2	N= 1	II= 4	X(I,J,K,L,M,N,II)= 3,87101
KK=	253	I= 4	J=-1	K= 1	L= 8	M=-2	N= 2	II= 1	X(I,J,K,L,M,N,II)= 4,06138
KK=	254	I= 4	J=-1	K= 1	L= 8	M=-2	N= 2	II= 2	X(I,J,K,L,M,N,II)= 3,97679
KK=	255	I= 4	J=-1	K= 1	L= 8	M=-2	N= 2	II= 3	X(I,J,K,L,M,N,II)= 3,89234
KK=	256	I= 4	J=-1	K= 1	L= 8	M=-2	N= 2	II= 4	X(I,J,K,L,M,N,II)= 3,80802
KK=	257	I= 4	J=-1	K= 1	L= 8	M=-2	N= 3	II= 1	X(I,J,K,L,M,N,II)= 3,99816
KK=	258	I= 4	J=-1	K= 1	L= 8	M=-2	N= 3	II= 2	X(I,J,K,L,M,N,II)= 3,91367
KK=	259	I= 4	J=-1	K= 1	L= 8	M=-2	N= 3	II= 3	X(I,J,K,L,M,N,II)= 3,82932
KK=	260	I= 4	J=-1	K= 1	L= 8	M=-2	N= 3	II= 4	X(I,J,K,L,M,N,II)= 3,74510
KK=	261	I= 4	J=-1	K= 1	L= 8	M=-2	N= 4	II= 1	X(I,J,K,L,M,N,II)= 3,93501
KK=	262	I= 4	J=-1	K= 1	L= 8	M=-2	N= 4	II= 2	X(I,J,K,L,M,N,II)= 3,85063
KK=	263	I= 4	J=-1	K= 1	L= 8	M=-2	N= 4	II= 3	X(I,J,K,L,M,N,II)= 3,76638
KK=	264	I= 4	J=-1	K= 1	L= 8	M=-2	N= 4	II= 4	X(I,J,K,L,M,N,II)= 3,68226
KK=	265	I= 4	J=-1	K= 1	L= 8	M=-1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 3,34735
KK=	266	I= 4	J=-1	K= 1	L= 8	M=-1	N=-1	II= 2	X(I,J,K,L,M,N,II)= 3,26391
KK=	267	I= 4	J=-1	K= 1	L= 8	M=-1	N=-1	II= 3	X(I,J,K,L,M,N,II)= 3,18061
KK=	268	I= 4	J=-1	K= 1	L= 8	M=-1	N=-1	II= 4	X(I,J,K,L,M,N,II)= 3,09745
KK=	269	I= 4	J=-1	K= 1	L= 8	M=-1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 3,28499
KK=	270	I= 4	J=-1	K= 1	L= 8	M=-1	N= 0	II= 2	X(I,J,K,L,M,N,II)= 3,20166

KK= 271	I= 4	J=-1	K= 1	L= 8	M=-1	N= 0	II= 3	X(I,J,K,L,M,N,II)=	3,11846
KK= 272	I= 4	J=-1	K= 1	L= 8	M=-1	N= 0	II= 4	X(I,J,K,L,M,N,II)=	3,03539
KK= 273	I= 4	J=-1	K= 1	L= 8	M=-1	N= 1	II= 1	X(I,J,K,L,M,N,II)=	3,22271
KK= 274	I= 4	J=-1	K= 1	L= 8	M=-1	N= 1	II= 2	X(I,J,K,L,M,N,II)=	3,13947
KK= 275	I= 4	J=-1	K= 1	L= 8	M=-1	N= 1	II= 3	X(I,J,K,L,M,N,II)=	3,05637
KK= 276	I= 4	J=-1	K= 1	L= 8	M=-1	N= 1	II= 4	X(I,J,K,L,M,N,II)=	2,97341
KK= 277	I= 4	J=-1	K= 1	L= 8	M=-1	N= 2	II= 1	X(I,J,K,L,M,N,II)=	3,16050
KK= 278	I= 4	J=-1	K= 1	L= 8	M=-1	N= 2	II= 2	X(I,J,K,L,M,N,II)=	3,07736
KK= 279	I= 4	J=-1	K= 1	L= 8	M=-1	N= 2	II= 3	X(I,J,K,L,M,N,II)=	2,99436
KK= 280	I= 4	J=-1	K= 1	L= 8	M=-1	N= 2	II= 4	X(I,J,K,L,M,N,II)=	2,91150
KK= 281	I= 4	J=-1	K= 1	L= 8	M=-1	N= 3	II= 1	X(I,J,K,L,M,N,II)=	3,09836
KK= 282	I= 4	J=-1	K= 1	L= 8	M=-1	N= 3	II= 2	X(I,J,K,L,M,N,II)=	3,01533
KK= 283	I= 4	J=-1	K= 1	L= 8	M=-1	N= 3	II= 3	X(I,J,K,L,M,N,II)=	2,93243
KK= 284	I= 4	J=-1	K= 1	L= 8	M=-1	N= 3	II= 4	X(I,J,K,L,M,N,II)=	2,84966
KK= 285	I= 4	J=-1	K= 1	L= 8	M=-1	N= 4	II= 1	X(I,J,K,L,M,N,II)=	3,03630
KK= 286	I= 4	J=-1	K= 1	L= 8	M=-1	N= 4	II= 2	X(I,J,K,L,M,N,II)=	2,95337
KK= 287	I= 4	J=-1	K= 1	L= 8	M=-1	N= 4	II= 3	X(I,J,K,L,M,N,II)=	2,87057
KK= 288	I= 4	J=-1	K= 1	L= 8	M=-1	N= 4	II= 4	X(I,J,K,L,M,N,II)=	2,78790
KK= 289	I= 4	J=-1	K= 1	L= 8	M= 0	N=-1	II= 1	X(I,J,K,L,M,N,II)=	2,45873
KK= 290	I= 4	J=-1	K= 1	L= 8	M= 0	N=-1	II= 2	X(I,J,K,L,M,N,II)=	2,37672
KK= 291	I= 4	J=-1	K= 1	L= 8	M= 0	N=-1	II= 3	X(I,J,K,L,M,N,II)=	2,29485
KK= 292	I= 4	J=-1	K= 1	L= 8	M= 0	N=-1	II= 4	X(I,J,K,L,M,N,II)=	2,21310
KK= 293	I= 4	J=-1	K= 1	L= 8	M= 0	N= 0	II= 1	X(I,J,K,L,M,N,II)=	2,39744
KK= 294	I= 4	J=-1	K= 1	L= 8	M= 0	N= 0	II= 2	X(I,J,K,L,M,N,II)=	2,31553
KK= 295	I= 4	J=-1	K= 1	L= 8	M= 0	N= 0	II= 3	X(I,J,K,L,M,N,II)=	2,23375
KK= 296	I= 4	J=-1	K= 1	L= 8	M= 0	N= 0	II= 4	X(I,J,K,L,M,N,II)=	2,15210
KK= 297	I= 4	J=-1	K= 1	L= 8	M= 0	N= 1	II= 1	X(I,J,K,L,M,N,II)=	2,33622
KK= 298	I= 4	J=-1	K= 1	L= 8	M= 0	N= 1	II= 2	X(I,J,K,L,M,N,II)=	2,25441
KK= 299	I= 4	J=-1	K= 1	L= 8	M= 0	N= 1	II= 3	X(I,J,K,L,M,N,II)=	2,17273
KK= 300	I= 4	J=-1	K= 1	L= 8	M= 0	N= 1	II= 4	X(I,J,K,L,M,N,II)=	2,09118
KK= 301	I= 4	J=-1	K= 1	L= 8	M= 0	N= 2	II= 1	X(I,J,K,L,M,N,II)=	2,27507
KK= 302	I= 4	J=-1	K= 1	L= 8	M= 0	N= 2	II= 2	X(I,J,K,L,M,N,II)=	2,19336
KK= 303	I= 4	J=-1	K= 1	L= 8	M= 0	N= 2	II= 3	X(I,J,K,L,M,N,II)=	2,11178
KK= 304	I= 4	J=-1	K= 1	L= 8	M= 0	N= 2	II= 4	X(I,J,K,L,M,N,II)=	2,03032
KK= 305	I= 4	J=-1	K= 1	L= 8	M= 0	N= 3	II= 1	X(I,J,K,L,M,N,II)=	2,21400
KK= 306	I= 4	J=-1	K= 1	L= 8	M= 0	N= 3	II= 2	X(I,J,K,L,M,N,II)=	2,13238
KK= 307	I= 4	J=-1	K= 1	L= 8	M= 0	N= 3	II= 3	X(I,J,K,L,M,N,II)=	2,05090
KK= 308	I= 4	J=-1	K= 1	L= 8	M= 0	N= 3	II= 4	X(I,J,K,L,M,N,II)=	1,96954
KK= 309	I= 4	J=-1	K= 1	L= 8	M= 0	N= 4	II= 1	X(I,J,K,L,M,N,II)=	2,15300
KK= 310	I= 4	J=-1	K= 1	L= 8	M= 0	N= 4	II= 2	X(I,J,K,L,M,N,II)=	2,07148
KK= 311	I= 4	J=-1	K= 1	L= 8	M= 0	N= 4	II= 3	X(I,J,K,L,M,N,II)=	1,99009
KK= 312	I= 4	J=-1	K= 1	L= 8	M= 0	N= 4	II= 4	X(I,J,K,L,M,N,II)=	1,90884
KK= 313	I= 4	J=-1	K= 1	L= 8	M= 1	N=-1	II= 1	X(I,J,K,L,M,N,II)=	1,58526
KK= 314	I= 4	J=-1	K= 1	L= 8	M= 1	N=-1	II= 2	X(I,J,K,L,M,N,II)=	1,50465
KK= 315	I= 4	J=-1	K= 1	L= 8	M= 1	N=-1	II= 3	X(I,J,K,L,M,N,II)=	1,42416
KK= 316	I= 4	J=-1	K= 1	L= 8	M= 1	N=-1	II= 4	X(I,J,K,L,M,N,II)=	1,34380
KK= 317	I= 4	J=-1	K= 1	L= 8	M= 1	N= 0	II= 1	X(I,J,K,L,M,N,II)=	1,52501
KK= 318	I= 4	J=-1	K= 1	L= 8	M= 1	N= 0	II= 2	X(I,J,K,L,M,N,II)=	1,44449
KK= 319	I= 4	J=-1	K= 1	L= 8	M= 1	N= 0	II= 3	X(I,J,K,L,M,N,II)=	1,36410
KK= 320	I= 4	J=-1	K= 1	L= 8	M= 1	N= 0	II= 4	X(I,J,K,L,M,N,II)=	1,28383
KK= 321	I= 4	J=-1	K= 1	L= 8	M= 1	N= 1	II= 1	X(I,J,K,L,M,N,II)=	1,46483
KK= 322	I= 4	J=-1	K= 1	L= 8	M= 1	N= 1	II= 2	X(I,J,K,L,M,N,II)=	1,38441
KK= 323	I= 4	J=-1	K= 1	L= 8	M= 1	N= 1	II= 3	X(I,J,K,L,M,N,II)=	1,30411
KK= 324	I= 4	J=-1	K= 1	L= 8	M= 1	N= 1	II= 4	X(I,J,K,L,M,N,II)=	1,22394
KK= 325	I= 4	J=-1	K= 1	L= 8	M= 1	N= 2	II= 1	X(I,J,K,L,M,N,II)=	1,40472
KK= 326	I= 4	J=-1	K= 1	L= 8	M= 1	N= 2	II= 2	X(I,J,K,L,M,N,II)=	1,32439
KK= 327	I= 4	J=-1	K= 1	L= 8	M= 1	N= 2	II= 3	X(I,J,K,L,M,N,II)=	1,24419
KK= 328	I= 4	J=-1	K= 1	L= 8	M= 1	N= 2	II= 4	X(I,J,K,L,M,N,II)=	1,16411
KK= 329	I= 4	J=-1	K= 1	L= 8	M= 1	N= 3	II= 1	X(I,J,K,L,M,N,II)=	1,34468
KK= 330	I= 4	J=-1	K= 1	L= 8	M= 1	N= 3	II= 2	X(I,J,K,L,M,N,II)=	1,26445
KK= 331	I= 4	J=-1	K= 1	L= 8	M= 1	N= 3	II= 3	X(I,J,K,L,M,N,II)=	1,18434
KK= 332	I= 4	J=-1	K= 1	L= 8	M= 1	N= 3	II= 4	X(I,J,K,L,M,N,II)=	1,10436
KK= 333	I= 4	J=-1	K= 1	L= 8	M= 1	N= 4	II= 1	X(I,J,K,L,M,N,II)=	1,28472
KK= 334	I= 4	J=-1	K= 1	L= 8	M= 1	N= 4	II= 2	X(I,J,K,L,M,N,II)=	1,20458
KK= 335	I= 4	J=-1	K= 1	L= 8	M= 1	N= 4	II= 3	X(I,J,K,L,M,N,II)=	1,12456
KK= 336	I= 4	J=-1	K= 1	L= 8	M= 1	N= 4	II= 4	X(I,J,K,L,M,N,II)=	1,04468
KK= 337	I= 4	J=-1	K= 1	L= 8	M= 2	N=-1	II= 1	X(I,J,K,L,M,N,II)=	,72656
KK= 338	I= 4	J=-1	K= 1	L= 8	M= 2	N=-1	II= 2	X(I,J,K,L,M,N,II)=	,64730
KK= 339	I= 4	J=-1	K= 1	L= 8	M= 2	N=-1	II= 3	X(I,J,K,L,M,N,II)=	,56817
KK= 340	I= 4	J=-1	K= 1	L= 8	M= 2	N=-1	II= 4	X(I,J,K,L,M,N,II)=	,48916
KK= 341	I= 4	J=-1	K= 1	L= 8	M= 2	N= 0	II= 1	X(I,J,K,L,M,N,II)=	,66732
KK= 342	I= 4	J=-1	K= 1	L= 8	M= 2	N= 0	II= 2	X(I,J,K,L,M,N,II)=	,58816
KK= 343	I= 4	J=-1	K= 1	L= 8	M= 2	N= 0	II= 3	X(I,J,K,L,M,N,II)=	,50912
KK= 344	I= 4	J=-1	K= 1	L= 8	M= 2	N= 0	II= 4	X(I,J,K,L,M,N,II)=	,43020
KK= 345	I= 4	J=-1	K= 1	L= 8	M= 2	N= 1	II= 1	X(I,J,K,L,M,N,II)=	,60815
KK= 346	I= 4	J=-1	K= 1	L= 8	M= 2	N= 1	II= 2	X(I,J,K,L,M,N,II)=	,52908
KK= 347	I= 4	J=-1	K= 1	L= 8	M= 2	N= 1	II= 3	X(I,J,K,L,M,N,II)=	,45013
KK= 348	I= 4	J=-1	K= 1	L= 8	M= 2	N= 1	II= 4	X(I,J,K,L,M,N,II)=	,37131
KK= 349	I= 4	J=-1	K= 1	L= 8	M= 2	N= 2	II= 1	X(I,J,K,L,M,N,II)=	,54906
KK= 350	I= 4	J=-1	K= 1	L= 8	M= 2	N= 2	II= 2	X(I,J,K,L,M,N,II)=	,47008
KK= 351	I= 4	J=-1	K= 1	L= 8	M= 2	N= 2	II= 3	X(I,J,K,L,M,N,II)=	,39122
KK= 352	I= 4	J=-1	K= 1	L= 8	M= 2	N= 2	II= 4	X(I,J,K,L,M,N,II)=	,31249
KK= 353	I= 4	J=-1	K= 1	L= 8	M= 2	N= 3	II= 1	X(I,J,K,L,M,N,II)=	,49003
KK= 354	I= 4	J=-1	K= 1	L= 8	M= 2	N= 3	II= 2	X(I,J,K,L,M,N,II)=	,41114
KK= 355	I= 4	J=-1	K= 1	L= 8	M= 2	N= 3	II= 3	X(I,J,K,L,M,N,II)=	,33238
KK= 356	I= 4	J=-1	K= 1	L= 8	M= 2	N= 3	II= 4	X(I,J,K,L,M,N,II)=	,25374
KK= 357	I= 4	J=-1	K= 1	L= 8	M= 2	N= 4	II= 1	X(I,J,K,L,M,N,II)=	,43107
KK= 358	I= 4	J=-1	K= 1	L= 8	M= 2	N= 4	II= 2	X(I,J,K,L,M,N,II)=	,35227
KK= 359	I= 4	J=-1	K= 1	L= 8	M= 2	N= 4	II= 3	X(I,J,K,L,M,N,II)=	,27360
KK= 360	I= 4	J=-1	K= 1	L= 8	M= 2	N= 4	II= 4	X(I,J,K,L,M,N,II)=	,19505
KK= 361	I= 4	J=-1	K= 1	L= 9	M=-2	N=-1	II= 1	X(I,J,K,L,M,N,II)=	3,43041
KK= 362	I= 4	J=-1	K= 1	L= 9	M=-2	N=-1	II= 2	X(I,J,K,L,M,N,II)=	3,34684
KK= 363	I= 4	J=-1	K= 1	L= 9	M=-2	N=-1	II= 3	X(I,J,K,L,M,N,II)=	3,26341
KK= 364	I= 4	J=-1	K= 1	L= 9	M=-2	N=-1	II= 4	X(I,J,K,L,M,N,II)=	3,18011
KK= 365	I= 4	J=-1	K= 1	L= 9	M=-2	N= 0	II= 1	X(I,J,K,L,M,N,II)=	3,36795
KK= 366	I= 4	J=-1	K= 1	L= 9	M=-2	N= 0	II= 2	X(I,J,K,L,M,N,II)=	3,28448

KK=	367	I= 4	J=-1	K= 1	L= 9	M=-2	N= 0	II= 3	X(I,J,K,L,M,N,II)= 3,20115
KK=	368	I= 4	J=-1	K= 1	L= 9	M=-2	N= 0	II= 4	X(I,J,K,L,M,N,II)= 3,11795
KK=	369	I= 4	J=-1	K= 1	L= 9	M=-2	N= 1	II= 1	X(I,J,K,L,M,N,II)= 3,30556
KK=	370	I= 4	J=-1	K= 1	L= 9	M=-2	N= 1	II= 2	X(I,J,K,L,M,N,II)= 3,22220
KK=	371	I= 4	J=-1	K= 1	L= 9	M=-2	N= 1	II= 3	X(I,J,K,L,M,N,II)= 3,13896
KK=	372	I= 4	J=-1	K= 1	L= 9	M=-2	N= 1	II= 4	X(I,J,K,L,M,N,II)= 3,05587
KK=	373	I= 4	J=-1	K= 1	L= 9	M=-2	N= 2	II= 1	X(I,J,K,L,M,N,II)= 3,24326
KK=	374	I= 4	J=-1	K= 1	L= 9	M=-2	N= 2	II= 2	X(I,J,K,L,M,N,II)= 3,15999
KK=	375	I= 4	J=-1	K= 1	L= 9	M=-2	N= 2	II= 3	X(I,J,K,L,M,N,II)= 3,07686
KK=	376	I= 4	J=-1	K= 1	L= 9	M=-2	N= 2	II= 4	X(I,J,K,L,M,N,II)= 2,99386
KK=	377	I= 4	J=-1	K= 1	L= 9	M=-2	N= 3	II= 1	X(I,J,K,L,M,N,II)= 3,18102
KK=	378	I= 4	J=-1	K= 1	L= 9	M=-2	N= 3	II= 2	X(I,J,K,L,M,N,II)= 3,09785
KK=	379	I= 4	J=-1	K= 1	L= 9	M=-2	N= 3	II= 3	X(I,J,K,L,M,N,II)= 3,01482
KK=	380	I= 4	J=-1	K= 1	L= 9	M=-2	N= 3	II= 4	X(I,J,K,L,M,N,II)= 2,93192
KK=	381	I= 4	J=-1	K= 1	L= 9	M=-2	N= 4	II= 1	X(I,J,K,L,M,N,II)= 3,11886
KK=	382	I= 4	J=-1	K= 1	L= 9	M=-2	N= 4	II= 2	X(I,J,K,L,M,N,II)= 3,03580
KK=	383	I= 4	J=-1	K= 1	L= 9	M=-2	N= 4	II= 3	X(I,J,K,L,M,N,II)= 2,95286
KK=	384	I= 4	J=-1	K= 1	L= 9	M=-2	N= 4	II= 4	X(I,J,K,L,M,N,II)= 2,87006
KK=	385	I= 4	J=-1	K= 1	L= 9	M=-1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 2,53220
KK=	386	I= 4	J=-1	K= 1	L= 9	M=-1	N=-1	II= 2	X(I,J,K,L,M,N,II)= 2,45007
KK=	387	I= 4	J=-1	K= 1	L= 9	M=-1	N=-1	II= 3	X(I,J,K,L,M,N,II)= 2,36808
KK=	388	I= 4	J=-1	K= 1	L= 9	M=-1	N=-1	II= 4	X(I,J,K,L,M,N,II)= 2,28622
KK=	389	I= 4	J=-1	K= 1	L= 9	M=-1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 2,47082
KK=	390	I= 4	J=-1	K= 1	L= 9	M=-1	N= 0	II= 2	X(I,J,K,L,M,N,II)= 2,38879
KK=	391	I= 4	J=-1	K= 1	L= 9	M=-1	N= 0	II= 3	X(I,J,K,L,M,N,II)= 2,30690
KK=	392	I= 4	J=-1	K= 1	L= 9	M=-1	N= 0	II= 4	X(I,J,K,L,M,N,II)= 2,22513
KK=	393	I= 4	J=-1	K= 1	L= 9	M=-1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 2,40951
KK=	394	I= 4	J=-1	K= 1	L= 9	M=-1	N= 1	II= 2	X(I,J,K,L,M,N,II)= 2,32758
KK=	395	I= 4	J=-1	K= 1	L= 9	M=-1	N= 1	II= 3	X(I,J,K,L,M,N,II)= 2,24579
KK=	396	I= 4	J=-1	K= 1	L= 9	M=-1	N= 1	II= 4	X(I,J,K,L,M,N,II)= 2,16412
KK=	397	I= 4	J=-1	K= 1	L= 9	M=-1	N= 2	II= 1	X(I,J,K,L,M,N,II)= 2,34828
KK=	398	I= 4	J=-1	K= 1	L= 9	M=-1	N= 2	II= 2	X(I,J,K,L,M,N,II)= 2,26645
KK=	399	I= 4	J=-1	K= 1	L= 9	M=-1	N= 2	II= 3	X(I,J,K,L,M,N,II)= 2,18475
KK=	400	I= 4	J=-1	K= 1	L= 9	M=-1	N= 2	II= 4	X(I,J,K,L,M,N,II)= 2,10318
KK=	401	I= 4	J=-1	K= 1	L= 9	M=-1	N= 3	II= 1	X(I,J,K,L,M,N,II)= 2,28712
KK=	402	I= 4	J=-1	K= 1	L= 9	M=-1	N= 3	II= 2	X(I,J,K,L,M,N,II)= 2,20538
KK=	403	I= 4	J=-1	K= 1	L= 9	M=-1	N= 3	II= 3	X(I,J,K,L,M,N,II)= 2,12378
KK=	404	I= 4	J=-1	K= 1	L= 9	M=-1	N= 3	II= 4	X(I,J,K,L,M,N,II)= 2,04231
KK=	405	I= 4	J=-1	K= 1	L= 9	M=-1	N= 4	II= 1	X(I,J,K,L,M,N,II)= 2,22603
KK=	406	I= 4	J=-1	K= 1	L= 9	M=-1	N= 4	II= 2	X(I,J,K,L,M,N,II)= 2,14440
KK=	407	I= 4	J=-1	K= 1	L= 9	M=-1	N= 4	II= 3	X(I,J,K,L,M,N,II)= 2,06289
KK=	408	I= 4	J=-1	K= 1	L= 9	M=-1	N= 4	II= 4	X(I,J,K,L,M,N,II)= 1,98152
KK=	409	I= 4	J=-1	K= 1	L= 9	M= 0	N=-1	II= 1	X(I,J,K,L,M,N,II)= 1,64945
KK=	410	I= 4	J=-1	K= 1	L= 9	M= 0	N=-1	II= 2	X(I,J,K,L,M,N,II)= 1,56873
KK=	411	I= 4	J=-1	K= 1	L= 9	M= 0	N=-1	II= 3	X(I,J,K,L,M,N,II)= 1,48815
KK=	412	I= 4	J=-1	K= 1	L= 9	M= 0	N=-1	II= 4	X(I,J,K,L,M,N,II)= 1,40769
KK=	413	I= 4	J=-1	K= 1	L= 9	M= 0	N= 0	II= 1	X(I,J,K,L,M,N,II)= 1,58912
KK=	414	I= 4	J=-1	K= 1	L= 9	M= 0	N= 0	II= 2	X(I,J,K,L,M,N,II)= 1,50850
KK=	415	I= 4	J=-1	K= 1	L= 9	M= 0	N= 0	II= 3	X(I,J,K,L,M,N,II)= 1,42801
KK=	416	I= 4	J=-1	K= 1	L= 9	M= 0	N= 0	II= 4	X(I,J,K,L,M,N,II)= 1,34764
KK=	417	I= 4	J=-1	K= 1	L= 9	M= 0	N= 1	II= 1	X(I,J,K,L,M,N,II)= 1,52887
KK=	418	I= 4	J=-1	K= 1	L= 9	M= 0	N= 1	II= 2	X(I,J,K,L,M,N,II)= 1,44834
KK=	419	I= 4	J=-1	K= 1	L= 9	M= 0	N= 1	II= 3	X(I,J,K,L,M,N,II)= 1,36794
KK=	420	I= 4	J=-1	K= 1	L= 9	M= 0	N= 1	II= 4	X(I,J,K,L,M,N,II)= 1,28767
KK=	421	I= 4	J=-1	K= 1	L= 9	M= 0	N= 2	II= 1	X(I,J,K,L,M,N,II)= 1,46868
KK=	422	I= 4	J=-1	K= 1	L= 9	M= 0	N= 2	II= 2	X(I,J,K,L,M,N,II)= 1,38825
KK=	423	I= 4	J=-1	K= 1	L= 9	M= 0	N= 2	II= 3	X(I,J,K,L,M,N,II)= 1,30795
KK=	424	I= 4	J=-1	K= 1	L= 9	M= 0	N= 2	II= 4	X(I,J,K,L,M,N,II)= 1,22777
KK=	425	I= 4	J=-1	K= 1	L= 9	M= 0	N= 3	II= 1	X(I,J,K,L,M,N,II)= 1,40857
KK=	426	I= 4	J=-1	K= 1	L= 9	M= 0	N= 3	II= 2	X(I,J,K,L,M,N,II)= 1,32823
KK=	427	I= 4	J=-1	K= 1	L= 9	M= 0	N= 3	II= 3	X(I,J,K,L,M,N,II)= 1,24803
KK=	428	I= 4	J=-1	K= 1	L= 9	M= 0	N= 3	II= 4	X(I,J,K,L,M,N,II)= 1,16795
KK=	429	I= 4	J=-1	K= 1	L= 9	M= 0	N= 4	II= 1	X(I,J,K,L,M,N,II)= 1,34853
KK=	430	I= 4	J=-1	K= 1	L= 9	M= 0	N= 4	II= 2	X(I,J,K,L,M,N,II)= 1,26829
KK=	431	I= 4	J=-1	K= 1	L= 9	M= 0	N= 4	II= 3	X(I,J,K,L,M,N,II)= 1,18817
KK=	432	I= 4	J=-1	K= 1	L= 9	M= 0	N= 4	II= 4	X(I,J,K,L,M,N,II)= 1,10819
KK=	433	I= 4	J=-1	K= 1	L= 9	M= 1	N=-1	II= 1	X(I,J,K,L,M,N,II)= ,78178
KK=	434	I= 4	J=-1	K= 1	L= 9	M= 1	N=-1	II= 2	X(I,J,K,L,M,N,II)= ,70243
KK=	435	I= 4	J=-1	K= 1	L= 9	M= 1	N=-1	II= 3	X(I,J,K,L,M,N,II)= ,62321
KK=	436	I= 4	J=-1	K= 1	L= 9	M= 1	N=-1	II= 4	X(I,J,K,L,M,N,II)= ,54411
KK=	437	I= 4	J=-1	K= 1	L= 9	M= 1	N= 0	II= 1	X(I,J,K,L,M,N,II)= ,72247
KK=	438	I= 4	J=-1	K= 1	L= 9	M= 1	N= 0	II= 2	X(I,J,K,L,M,N,II)= ,64322
KK=	439	I= 4	J=-1	K= 1	L= 9	M= 1	N= 0	II= 3	X(I,J,K,L,M,N,II)= ,56409
KK=	440	I= 4	J=-1	K= 1	L= 9	M= 1	N= 0	II= 4	X(I,J,K,L,M,N,II)= ,48509
KK=	441	I= 4	J=-1	K= 1	L= 9	M= 1	N= 1	II= 1	X(I,J,K,L,M,N,II)= ,66324
KK=	442	I= 4	J=-1	K= 1	L= 9	M= 1	N= 1	II= 2	X(I,J,K,L,M,N,II)= ,58408
KK=	443	I= 4	J=-1	K= 1	L= 9	M= 1	N= 1	II= 3	X(I,J,K,L,M,N,II)= ,50505
KK=	444	I= 4	J=-1	K= 1	L= 9	M= 1	N= 1	II= 4	X(I,J,K,L,M,N,II)= ,42614
KK=	445	I= 4	J=-1	K= 1	L= 9	M= 1	N= 2	II= 1	X(I,J,K,L,M,N,II)= ,60408
KK=	446	I= 4	J=-1	K= 1	L= 9	M= 1	N= 2	II= 2	X(I,J,K,L,M,N,II)= ,52501
KK=	447	I= 4	J=-1	K= 1	L= 9	M= 1	N= 2	II= 3	X(I,J,K,L,M,N,II)= ,44607
KK=	448	I= 4	J=-1	K= 1	L= 9	M= 1	N= 2	II= 4	X(I,J,K,L,M,N,II)= ,36725
KK=	449	I= 4	J=-1	K= 1	L= 9	M= 1	N= 3	II= 1	X(I,J,K,L,M,N,II)= ,54498
KK=	450	I= 4	J=-1	K= 1	L= 9	M= 1	N= 3	II= 2	X(I,J,K,L,M,N,II)= ,46601
KK=	451	I= 4	J=-1	K= 1	L= 9	M= 1	N= 3	II= 3	X(I,J,K,L,M,N,II)= ,38716
KK=	452	I= 4	J=-1	K= 1	L= 9	M= 1	N= 3	II= 4	X(I,J,K,L,M,N,II)= ,30844
KK=	453	I= 4	J=-1	K= 1	L= 9	M= 1	N= 4	II= 1	X(I,J,K,L,M,N,II)= ,48596
KK=	454	I= 4	J=-1	K= 1	L= 9	M= 1	N= 4	II= 2	X(I,J,K,L,M,N,II)= ,40708
KK=	455	I= 4	J=-1	K= 1	L= 9	M= 1	N= 4	II= 3	X(I,J,K,L,M,N,II)= ,32832
KK=	456	I= 4	J=-1	K= 1	L= 9	M= 1	N= 4	II= 4	X(I,J,K,L,M,N,II)= ,24969
KK=	457	I= 4	J=-1	K= 1	L= 9	M= 2	N=-1	II= 1	X(I,J,K,L,M,N,II)= -,07121
KK=	458	I= 4	J=-1	K= 1	L= 9	M= 2	N=-1	II= 2	X(I,J,K,L,M,N,II)= -,14922
KK=	459	I= 4	J=-1	K= 1	L= 9	M= 2	N=-1	II= 3	X(I,J,K,L,M,N,II)= -,22711
KK=	460	I= 4	J=-1	K= 1	L= 9	M= 2	N=-1	II= 4	X(I,J,K,L,M,N,II)= -,30487
KK=	461	I= 4	J=-1	K= 1	L= 9	M= 2	N= 0	II= 1	X(I,J,K,L,M,N,II)= -,12951
KK=	462	I= 4	J=-1	K= 1	L= 9	M= 2	N= 0	II= 2	X(I,J,K,L,M,N,II)= -,20743

KK=	463	I= 4	J=-1	K= 1	L= 9	M= 2	N= 0	II= 3	X(I,J,K,L,M,N,II)= -,28523
KK=	464	I= 4	J=-1	K= 1	L= 9	M= 2	N= 0	II= 4	X(I,J,K,L,M,N,II)= -,36290
KK=	465	I= 4	J=-1	K= 1	L= 9	M= 2	N= 1	II= 1	X(I,J,K,L,M,N,II)= -,18775
KK=	466	I= 4	J=-1	K= 1	L= 9	M= 2	N= 1	II= 2	X(I,J,K,L,M,N,II)= -,26558
KK=	467	I= 4	J=-1	K= 1	L= 9	M= 2	N= 1	II= 3	X(I,J,K,L,M,N,II)= -,34328
KK=	468	I= 4	J=-1	K= 1	L= 9	M= 2	N= 1	II= 4	X(I,J,K,L,M,N,II)= -,42087
KK=	469	I= 4	J=-1	K= 1	L= 9	M= 2	N= 2	II= 1	X(I,J,K,L,M,N,II)= -,24592
KK=	470	I= 4	J=-1	K= 1	L= 9	M= 2	N= 2	II= 2	X(I,J,K,L,M,N,II)= -,32365
KK=	471	I= 4	J=-1	K= 1	L= 9	M= 2	N= 2	II= 3	X(I,J,K,L,M,N,II)= -,40127
KK=	472	I= 4	J=-1	K= 1	L= 9	M= 2	N= 2	II= 4	X(I,J,K,L,M,N,II)= -,47876
KK=	473	I= 4	J=-1	K= 1	L= 9	M= 2	N= 3	II= 1	X(I,J,K,L,M,N,II)= -,30402
KK=	474	I= 4	J=-1	K= 1	L= 9	M= 2	N= 3	II= 2	X(I,J,K,L,M,N,II)= -,38166
KK=	475	I= 4	J=-1	K= 1	L= 9	M= 2	N= 3	II= 3	X(I,J,K,L,M,N,II)= -,45919
KK=	476	I= 4	J=-1	K= 1	L= 9	M= 2	N= 3	II= 4	X(I,J,K,L,M,N,II)= -,53659
KK=	477	I= 4	J=-1	K= 1	L= 9	M= 2	N= 4	II= 1	X(I,J,K,L,M,N,II)= -,36205
KK=	478	I= 4	J=-1	K= 1	L= 9	M= 2	N= 4	II= 2	X(I,J,K,L,M,N,II)= -,43961
KK=	479	I= 4	J=-1	K= 1	L= 9	M= 2	N= 4	II= 3	X(I,J,K,L,M,N,II)= -,51704
KK=	480	I= 4	J=-1	K= 1	L= 9	M= 2	N= 4	II= 4	X(I,J,K,L,M,N,II)= -,59435
KK=	481	I= 4	J=-1	K= 1	L=10	M=-2	N=-1	II= 1	X(I,J,K,L,M,N,II)= 2,62213
KK=	482	I= 4	J=-1	K= 1	L=10	M=-2	N=-1	II= 2	X(I,J,K,L,M,N,II)= 2,53987
KK=	483	I= 4	J=-1	K= 1	L=10	M=-2	N=-1	II= 3	X(I,J,K,L,M,N,II)= 2,45773
KK=	484	I= 4	J=-1	K= 1	L=10	M=-2	N=-1	II= 4	X(I,J,K,L,M,N,II)= 2,37572
KK=	485	I= 4	J=-1	K= 1	L=10	M=-2	N= 0	II= 1	X(I,J,K,L,M,N,II)= 2,56065
KK=	486	I= 4	J=-1	K= 1	L=10	M=-2	N= 0	II= 2	X(I,J,K,L,M,N,II)= 2,47848
KK=	487	I= 4	J=-1	K= 1	L=10	M=-2	N= 0	II= 3	X(I,J,K,L,M,N,II)= 2,39644
KK=	488	I= 4	J=-1	K= 1	L=10	M=-2	N= 0	II= 4	X(I,J,K,L,M,N,II)= 2,31453
KK=	489	I= 4	J=-1	K= 1	L=10	M=-2	N= 1	II= 1	X(I,J,K,L,M,N,II)= 2,49923
KK=	490	I= 4	J=-1	K= 1	L=10	M=-2	N= 1	II= 2	X(I,J,K,L,M,N,II)= 2,41716
KK=	491	I= 4	J=-1	K= 1	L=10	M=-2	N= 1	II= 3	X(I,J,K,L,M,N,II)= 2,33522
KK=	492	I= 4	J=-1	K= 1	L=10	M=-2	N= 1	II= 4	X(I,J,K,L,M,N,II)= 2,25341
KK=	493	I= 4	J=-1	K= 1	L=10	M=-2	N= 2	II= 1	X(I,J,K,L,M,N,II)= 2,43789
KK=	494	I= 4	J=-1	K= 1	L=10	M=-2	N= 2	II= 2	X(I,J,K,L,M,N,II)= 2,35592
KK=	495	I= 4	J=-1	K= 1	L=10	M=-2	N= 2	II= 3	X(I,J,K,L,M,N,II)= 2,27408
KK=	496	I= 4	J=-1	K= 1	L=10	M=-2	N= 2	II= 4	X(I,J,K,L,M,N,II)= 2,19236
KK=	497	I= 4	J=-1	K= 1	L=10	M=-2	N= 3	II= 1	X(I,J,K,L,M,N,II)= 2,37662
KK=	498	I= 4	J=-1	K= 1	L=10	M=-2	N= 3	II= 2	X(I,J,K,L,M,N,II)= 2,29475
KK=	499	I= 4	J=-1	K= 1	L=10	M=-2	N= 3	II= 3	X(I,J,K,L,M,N,II)= 2,21300
KK=	500	I= 4	J=-1	K= 1	L=10	M=-2	N= 3	II= 4	X(I,J,K,L,M,N,II)= 2,13139

C2

BRITISH LEYLAND

RANGE DETERMINISTIC APPRAISAL

OUTPUT IN ASCENDING ORDER
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1	-8,98471	-8,93226	-8,91448	-8,87971	-8,86192	-8,84413	-8,82711	-8,80931	-8,79150	-8,77466
2	-8,77368	-8,75663	-8,73880	-8,72174	-8,72097	-8,70390	-8,68605	-8,66819	-8,65110	-8,63323
3	-8,61535	-8,58035	-8,56245	-8,50949	-8,26763	-8,21433	-8,21091	-8,19628	-8,19530	-8,16096
4	-8,15754	-8,14290	-8,14191	-8,13947	-8,12483	-8,12384	-8,10753	-8,10411	-8,08945	-8,08846
5	-8,08602	-8,07136	-8,07037	-8,06793	-8,05404	-8,05326	-8,05227	-8,05062	-8,03394	-8,03495
6	-8,03251	-8,01782	-8,01684	-8,01439	-8,00049	-7,99970	-7,99872	-7,99706	-7,99627	-7,98237
7	-7,98138	-7,98059	-7,97893	-7,96423	-7,96324	-7,96080	-7,94609	-7,94510	-7,94344	-7,94265
8	-7,92873	-7,92776	-7,92695	-7,92529	-7,91057	-7,90958	-7,90713	-7,89241	-7,89142	-7,88897
9	-7,87325	-7,87159	-7,85686	-7,85586	-7,85341	-7,83567	-7,83768	-7,83523	-7,81949	-7,79963
10	-7,78487	-7,78388	-7,78142	-7,76566	-7,72755	-7,71177	-7,53916	-7,48874	-7,48500	-7,47303
11	-7,46667	-7,43453	-7,43079	-7,42384	-7,41880	-7,41618	-7,41590	-7,41243	-7,40811	-7,40066
12	-7,39407	-7,38025	-7,37651	-7,36955	-7,36450	-7,36188	-7,36160	-7,35813	-7,35381	-7,35117
13	-7,34612	-7,34350	-7,34322	-7,33975	-7,33542	-7,32774	-7,32591	-7,32216	-7,32136	-7,31520
14	-7,31014	-7,30752	-7,30724	-7,30377	-7,29944	-7,29680	-7,29176	-7,28912	-7,28884	-7,28536
15	-7,28103	-7,27839	-7,27334	-7,27151	-7,27071	-7,27043	-7,26775	-7,26695	-7,26262	-7,26078
16	-7,25572	-7,25492	-7,25309	-7,25281	-7,24934	-7,24500	-7,24236	-7,23730	-7,23467	-7,23439
17	-7,23091	-7,22658	-7,22393	-7,21887	-7,21704	-7,21626	-7,21596	-7,21248	-7,20814	-7,20630
18	-7,20550	-7,20124	-7,20043	-7,19860	-7,19832	-7,19752	-7,19484	-7,19050	-7,18970	-7,18786
19	-7,18279	-7,18016	-7,17988	-7,17640	-7,17206	-7,16941	-7,16434	-7,16171	-7,16143	-7,15796
20	-7,15360	-7,15175	-7,15095	-7,14588	-7,14405	-7,14377	-7,14297	-7,13594	-7,13514	-7,13329
21	-7,12822	-7,12558	-7,12530	-7,12182	-7,11747	-7,11482	-7,10975	-7,10711	-7,10683	-7,10334
22	-7,09899	-7,09634	-7,09127	-7,08835	-7,08139	-7,08051	-7,07866	-7,07094	-7,07066	-7,06282
23	-7,06017	-7,05509	-7,05245	-7,05217	-7,04868	-7,04432	-7,04167	-7,03659	-7,03367	-7,02782
24	-7,02582	-7,00969	-7,00545	-6,99772	-6,99744	-6,98959	-6,98693	-6,98184	-6,97892	-6,97419
25	-6,97106	-6,95603	-6,93787	-6,93213	-6,92411	-6,92069	-6,91624	-6,90232	-6,88414	-6,86674
26	-6,86595	-6,84854	-6,83034	-6,81292	-6,81213	-6,79902	-6,79670	-6,77648	-6,75825	-6,75512
27	-6,74400	-6,74080	-6,73930	-6,72537	-6,72255	-6,70430	-6,70004	-6,69651	-6,68891	-6,68852
28	-6,68421	-6,68140	-6,68069	-6,67026	-6,66857	-6,66556	-6,65161	-6,65030	-6,64490	-6,64136
29	-6,63376	-6,63336	-6,62905	-6,62623	-6,62552	-6,62315	-6,62315	-6,62315	-6,62315	-6,62270
30	-6,61509	-6,61469	-6,61037	-6,60756	-6,60685	-6,59641	-6,59623	-6,59169	-6,58969	-6,58615
31	-6,57854	-6,57814	-6,57772	-6,57382	-6,57101	-6,57029	-6,56792	-6,56792	-6,56792	-6,56792
32	-6,56747	-6,55984	-6,55945	-6,55513	-6,55231	-6,55160	-6,54922	-6,54922	-6,54922	-6,54922
33	-6,54877	-6,54114	-6,54075	-6,53643	-6,53442	-6,53361	-6,53289	-6,53088	-6,52325	-6,52286
34	-6,52244	-6,51853	-6,51772	-6,51571	-6,51500	-6,51262	-6,51262	-6,51262	-6,51262	-6,51217
35	-6,50454	-6,50414	-6,49981	-6,49699	-6,49628	-6,49390	-6,49390	-6,49390	-6,49390	-6,49365
36	-6,48582	-6,48542	-6,48109	-6,47908	-6,47827	-6,47756	-6,47554	-6,47517	-6,47517	-6,47517
37	-6,47517	-6,47472	-6,46751	-6,46709	-6,46669	-6,46317	-6,46236	-6,46035	-6,45964	-6,45882
38	-6,45726	-6,45726	-6,45726	-6,45726	-6,45680	-6,44916	-6,44877	-6,44444	-6,44161	-6,44090
39	-6,43852	-6,43852	-6,43852	-6,43852	-6,43806	-6,43042	-6,43003	-6,42569	-6,42287	-6,42215
40	-6,42013	-6,41977	-6,41977	-6,41977	-6,41977	-6,41932	-6,41209	-6,41167	-6,41128	-6,40694
41	-6,40493	-6,40421	-6,40340	-6,40183	-6,40183	-6,40183	-6,40183	-6,40137	-6,40101	-6,40101
42	-6,40101	-6,40101	-6,39333	-6,38899	-6,38617	-6,38543	-6,38306	-6,38306	-6,38306	-6,38306
43	-6,38261	-6,37496	-6,37457	-6,37022	-6,36740	-6,36668	-6,36429	-6,36429	-6,36429	-6,36429
44	-6,36384	-6,35619	-6,35579	-6,35145	-6,34931	-6,34790	-6,34633	-6,34633	-6,34633	-6,34633
45	-6,34588	-6,34552	-6,34552	-6,34552	-6,34552	-6,33783	-6,33065	-6,32994	-6,32755	-6,32755
46	-6,32755	-6,32755	-6,32710	-6,31904	-6,31469	-6,31186	-6,31116	-6,30876	-6,30876	-6,30876
47	-6,30876	-6,30830	-6,30064	-6,30026	-6,29590	-6,29489	-6,29235	-6,29140	-6,28996	-6,28996
48	-6,28996	-6,28996	-6,27647	-6,27547	-6,27197	-6,27197	-6,27197	-6,27197	-6,27151	-6,26345
49	-6,25626	-6,25554	-6,25315	-6,25315	-6,25315	-6,25315	-6,25270	-6,24463	-6,24041	-6,24028
50	-6,23692	-6,23672	-6,23433	-6,23433	-6,23433	-6,23433	-6,22197	-6,22096	-6,21848	-6,20352
51	-6,20251	-6,19748	-6,19748	-6,19748	-6,19748	-6,19703	-6,18895	-6,18794	-6,18587	-6,18237
52	-6,18103	-6,17864	-6,17864	-6,17864	-6,17864	-6,16740	-6,16640	-6,16391	-6,14893	-6,14793
53	-6,14543	-6,13386	-6,13126	-6,13046	-6,12945	-6,12776	-6,12288	-6,12288	-6,12288	-6,12288
54	-6,11555	-6,11277	-6,11177	-6,10927	-6,09428	-6,09327	-6,09078	-6,07971	-6,07659	-6,07578
55	-6,07477	-6,07308	-6,07228	-6,06138	-6,05808	-6,05707	-6,05627	-6,05457	-6,04694	-6,04306
56	-6,03957	-6,03856	-6,03606	-6,02550	-6,02105	-6,02004	-6,01834	-6,01754	-6,00976	-6,00715
57	-6,00332	-6,00231	-6,00151	-5,99981	-5,99384	-5,99103	-5,98879	-5,98479	-5,98378	-5,98128
58	-5,97210	-5,97122	-5,97043	-5,96625	-5,96523	-5,96273	-5,95766	-5,95380	-5,95285	-5,94962
59	-5,94668	-5,94499	-5,94174	-5,93786	-5,93504	-5,93486	-5,93448	-5,92995	-5,92893	-5,92643
60	-5,91891	-5,91689	-5,91609	-5,91609	-5,91138	-5,91037	-5,90787	-5,90164	-5,89850	-5,89778
61	-5,89714	-5,89359	-5,89180	-5,89059	-5,89059	-5,89059	-5,89059	-5,88569	-5,88268	-5,88182
62	-5,88010	-5,87900	-5,87881	-5,87462	-5,87152	-5,86672	-5,86285	-5,86169	-5,86002	-5,85984
63	-5,85645	-5,85544	-5,85293	-5,84555	-5,84408	-5,84387	-5,84168	-5,84104	-5,83749	-5,83685
64	-5,83449	-5,83449	-5,83449	-5,83449	-5,83265	-5,82959	-5,82657	-5,82571	-5,82566	-5,82476
65	-5,82288	-5,82270	-5,82205	-5,81850	-5,81671	-5,81550	-5,81550	-5,81550	-5,81550	-5,81059
66	-5,80849	-5,80757	-5,80723	-5,80671	-5,80388	-5,80370	-5,79950	-5,79794	-5,79159	-5,78940
67	-5,78771	-5,78552	-5,78488	-5,78470	-5,78183	-5,78133	-5,77832	-5,77832	-5,77832	-5,77832
68	-5,77648	-5,77341	-5,77115	-5,77039	-5,76953	-5,76870	-5,76858	-5,76670	-5,76651	-5,76587
69	-5,76231	-5,76052	-5,75931	-5,75931	-5,75931	-5,75931	-5,75747	-5,75440	-5,75270	-5,75229
70	-5,75137	-5,75051	-5,74956	-5,74768	-5,74749	-5,74329	-5,74150	-5,74029	-5,74029	-5,74029
71	-5,74029	-5,73537	-5,73326	-5,73317	-5,73235	-5,73148	-5,72930	-5,72865	-5,72847	-5,72509
72	-5,72427	-5,72209	-5,72209	-5,72209	-5,72209	-5,72026	-5,71717	-5,71634	-5,71414	-5,71328
73	-5,71245	-5,71233	-5,71026	-5,70962	-5,70606	-5,70426	-5,70305	-5,70305	-5,70305	-5,70305
74	-5,70121	-5,69813	-5,69811	-5,69602	-5,69510	-5,69426	-5,69329	-5,69141	-5,69122	-5,68701
75	-5,68521	-5,68401	-5,68401	-5,68401	-5,68401	-5,68216	-5,67909	-5,67697	-5,67688	-5,67606
76	-5,67519	-5,67426	-5,67236	-5,67217	-5,66879	-5,66796	-5,66616	-5,66578	-5,66578	-5,66578
77	-5,66578	-5,66495	-5,66495	-5,66495	-5,66495	-5,66394	-5,66085	-5,66003	-5,65792	-5,65783
78	-5,65614	-5,65602	-5,65394	-5,65330	-5,64973	-5,64793	-5,64672	-5,64672	-5,64672	-5,64672
79	-5,64488	-5,64180	-5,63969	-5,63877	-5,63790	-5,63695	-5,63488	-5,63067	-5,62887	-5,62766
80	-5,62766	-5,62766	-5,62766	-5,62581	-5,62273	-5,62062	-5,61970	-5,61883	-5,61788	-5,61599
81	-5,61581	-5,61160	-5,60979	-5,60941	-5,60941	-5,60941	-5,60941	-5,60858	-5,60858	-5,60858
82	-5,60858	-5,60756	-5,60673	-5,60560	-5,60365	-5,60154	-5,60145	-5,59975	-5,59963	-5,59880
83	-5,59691	-5,59335	-5,59154	-5,59071	-5,59033	-5,59033	-5,59033	-5,59033	-5,58848	-5,58540

84	-5,58329	-5,58246	-5,58236	-5,58055	-5,57847	-5,57426	-5,57245	-5,57124	-5,57124	-5,57124
85	-5,57124	-5,56939	-5,56631	-5,56419	-5,56327	-5,56241	-5,56145	-5,55938	-5,55516	-5,55413
86	-5,55336	-5,55214	-5,55214	-5,55214	-5,55214	-5,55112	-5,55032	-5,55029	-5,54721	-5,54509
87	-5,54330	-5,54318	-5,54235	-5,54046	-5,53809	-5,53508	-5,53425	-5,53387	-5,53387	-5,53387
88	-5,53387	-5,53202	-5,53160	-5,52682	-5,52599	-5,52589	-5,52407	-5,51778	-5,51597	-5,51476
89	-5,51476	-5,51476	-5,51476	-5,51291	-5,50982	-5,50770	-5,50678	-5,50496	-5,50288	-5,49879
90	-5,49866	-5,69685	-5,49564	-5,49564	-5,49564	-5,49566	-5,49497	-5,49378	-5,49070	-5,68858
91	-5,48787	-5,48679	-5,48583	-5,48273	-5,48005	-5,47977	-5,47772	-5,47623	-5,47549	-5,47182
92	-5,46945	-5,46753	-5,46399	-5,45942	-5,45821	-5,45821	-5,45821	-5,45821	-5,45749	-5,45635
93	-5,45114	-5,45022	-5,44882	-5,44840	-5,44338	-5,44209	-5,44028	-5,43955	-5,43906	-5,43906
94	-5,43906	-5,43906	-5,43721	-5,43412	-5,43245	-5,43200	-5,42925	-5,42730	-5,42462	-5,42433
95	-5,42113	-5,42079	-5,41638	-5,41369	-5,41284	-5,40853	-5,40585	-5,40557	-5,40203	-5,39973
96	-5,39761	-5,39388	-5,39176	-5,39036	-5,38976	-5,38790	-5,38407	-5,38364	-5,38326	-5,38242
97	-5,38242	-5,38242	-5,38242	-5,38056	-5,37696	-5,37534	-5,37528	-5,37427	-5,37259	-5,37180
98	-5,36912	-5,36883	-5,36529	-5,36446	-5,36087	-5,35818	-5,35617	-5,35302	-5,35033	-5,35005
99	-5,34650	-5,34208	-5,33939	-5,33888	-5,33535	-5,33422	-5,33236	-5,33154	-5,33125	-5,32853
100	-5,32771	-5,32385	-5,32328	-5,32140	-5,32026	-5,31924	-5,31673	-5,31624	-5,31587	-5,31542
101	-5,31356	-5,31327	-5,30972	-5,30773	-5,30530	-5,30260	-5,30163	-5,30062	-5,29943	-5,29743
102	-5,29475	-5,29446	-5,29091	-5,28649	-5,28381	-5,28379	-5,28028	-5,27862	-5,27675	-5,27593
103	-5,27565	-5,27210	-5,26767	-5,26579	-5,26517	-5,26497	-5,26415	-5,26164	-5,26062	-5,25980
104	-5,25793	-5,25764	-5,25682	-5,25409	-5,25240	-5,24966	-5,24884	-5,24696	-5,24652	-5,24550
105	-5,24299	-5,24179	-5,23910	-5,23881	-5,23637	-5,23526	-5,23083	-5,22867	-5,22812	-5,22786
106	-5,22685	-5,22514	-5,22295	-5,22026	-5,21997	-5,21642	-5,21198	-5,21010	-5,21001	-5,20928
107	-5,20899	-5,20702	-5,20648	-5,20411	-5,20223	-5,20195	-5,20113	-5,19893	-5,19553	-5,19396
108	-5,19314	-5,19134	-5,19125	-5,19099	-5,19032	-5,18781	-5,18607	-5,18338	-5,18310	-5,17954
109	-5,17949	-5,17807	-5,17629	-5,17510	-5,17348	-5,17267	-5,17239	-5,17165	-5,16994	-5,16913
110	-5,16721	-5,16452	-5,16424	-5,16068	-5,16023	-5,15624	-5,15479	-5,15377	-5,15353	-5,15296
111	-5,15125	-5,15010	-5,14835	-5,14646	-5,14646	-5,14646	-5,14646	-5,14537	-5,14200	-5,13860
112	-5,13737	-5,13610	-5,13548	-5,13508	-5,13405	-5,13256	-5,13084	-5,12760	-5,12731	-5,12340
113	-5,12273	-5,12253	-5,11933	-5,11931	-5,11740	-5,11660	-5,11638	-5,11478	-5,11467	-5,11386
114	-5,11141	-5,10872	-5,10843	-5,10489	-5,10487	-5,10326	-5,10042	-5,10005	-5,09951	-5,09849
115	-5,09771	-5,09768	-5,09597	-5,09496	-5,09312	-5,09253	-5,08954	-5,08946	-5,08946	-5,08946
116	-5,08946	-5,08701	-5,08500	-5,08397	-5,08160	-5,08153	-5,08080	-5,07978	-5,07891	-5,07725
117	-5,07704	-5,07382	-5,07064	-5,07017	-5,07017	-5,07017	-5,07017	-5,06867	-5,06570	-5,06551
118	-5,06230	-5,06208	-5,06105	-5,06074	-5,05853	-5,05774	-5,05453	-5,05285	-5,05256	-5,05014
119	-5,04640	-5,04621	-5,04454	-5,04300	-5,04233	-5,04183	-5,04061	-5,03844	-5,03790	-5,03664
120	-5,03606	-5,03365	-5,03240	-5,03240	-5,03240	-5,03240	-5,03161	-5,02995	-5,02866	-5,02793
121	-5,02690	-5,02563	-5,02543	-5,02453	-5,02440	-5,02369	-5,02188	-5,02183	-5,01997	-5,01859
122	-5,01674	-5,01387	-5,01355	-5,01308	-5,01308	-5,01308	-5,01308	-5,01260	-5,01063	-5,00861
123	-5,00842	-5,00758	-5,00668	-5,00566	-5,00521	-5,00313	-5,00251	-5,00064	-4,99742	-4,99621
124	-4,99533	-4,99423	-4,99376	-4,99376	-4,99376	-4,99376	-4,98929	-4,98910	-4,98691	-4,98588
125	-4,98588	-4,98132	-4,98078	-4,97893	-4,97809	-4,97769	-4,97677	-4,97527	-4,97527	-4,97527
126	-4,97527	-4,97281	-4,97152	-4,97080	-4,96996	-4,96976	-4,96966	-4,96739	-4,96655	-4,96644
127	-4,96469	-4,96282	-4,96198	-4,96144	-4,95959	-4,95902	-4,95821	-4,95640	-4,95593	-4,95593
128	-4,95593	-4,95593	-4,95545	-4,95347	-4,95218	-4,95146	-4,95126	-4,95123	-4,95042	-4,95020
129	-4,94804	-4,94767	-4,94534	-4,94348	-4,94209	-4,94045	-4,94025	-4,93904	-4,93705	-4,93658
130	-4,93658	-4,93658	-4,93658	-4,93610	-4,93412	-4,93211	-4,93191	-4,93143	-4,92869	-4,92599
131	-4,92412	-4,92358	-4,92187	-4,92174	-4,92090	-4,91969	-4,91807	-4,91807	-4,91807	-4,91807
132	-4,91770	-4,91723	-4,91723	-4,91723	-4,91723	-4,91561	-4,91432	-4,91359	-4,91275	-4,91256
133	-4,90934	-4,90748	-4,90561	-4,90476	-4,90422	-4,90410	-4,90329	-4,90238	-4,89918	-4,89871
134	-4,89871	-4,89871	-4,89871	-4,89822	-4,89625	-4,89496	-4,89423	-4,89319	-4,89215	-4,89081
135	-4,88811	-4,88624	-4,88551	-4,88486	-4,88301	-4,88180	-4,87981	-4,87934	-4,87934	-4,87934
136	-4,87934	-4,87885	-4,87688	-4,87589	-4,87558	-4,87486	-4,87466	-4,87144	-4,86873	-4,86691
137	-4,86686	-4,86632	-4,86548	-4,86363	-4,86242	-4,86080	-4,86080	-4,86080	-4,86080	-4,86043
138	-4,85996	-4,85996	-4,85996	-4,85996	-4,85947	-4,85834	-4,85750	-4,85705	-4,85548	-4,85528
139	-4,85206	-4,85020	-4,84999	-4,84935	-4,84830	-4,84748	-4,84694	-4,84509	-4,84303	-4,84188
140	-4,84142	-4,84142	-4,84142	-4,84142	-4,84104	-4,84093	-4,83895	-4,83766	-4,83693	-4,83589
141	-4,83080	-4,83050	-4,82893	-4,82755	-4,82570	-4,82448	-4,82249	-4,82202	-4,82202	-4,82202
142	-4,82202	-4,82154	-4,81956	-4,81827	-4,81754	-4,81411	-4,81188	-4,81141	-4,80953	-4,80899
143	-4,80815	-4,80630	-4,80517	-4,80508	-4,80309	-4,80262	-4,80262	-4,80262	-4,80262	-4,80213
144	-4,80100	-4,80016	-4,79971	-4,79886	-4,79813	-4,79794	-4,79471	-4,79382	-4,79326	-4,79285
145	-4,79200	-4,79013	-4,78959	-4,78902	-4,78568	-4,78452	-4,78406	-4,78406	-4,78406	-4,78406
146	-4,78368	-4,78357	-4,78273	-4,78159	-4,78030	-4,77853	-4,77680	-4,77343	-4,77017	-4,76832
147	-4,76710	-4,76626	-4,76511	-4,76464	-4,76464	-4,76464	-4,76464	-4,76415	-4,76217	-4,76088
148	-4,76015	-4,75679	-4,75401	-4,75213	-4,75075	-4,74894	-4,74889	-4,74768	-4,74568	-4,74534
149	-4,74521	-4,74521	-4,74521	-4,74521	-4,74473	-4,74275	-4,74230	-4,74145	-4,74072	-4,73814
150	-4,73758	-4,73729	-4,73718	-4,73458	-4,73277	-4,73270	-4,73216	-4,72991	-4,72918	-4,72825
151	-4,72625	-4,72614	-4,72529	-4,72416	-4,72286	-4,72109	-4,71854	-4,71599	-4,71373	-4,71272
152	-4,70965	-4,70881	-4,70766	-4,70719	-4,70719	-4,70719	-4,70719	-4,70670	-4,70471	-4,70342
153	-4,69949	-4,69797	-4,69654	-4,69328	-4,69265	-4,69142	-4,69021	-4,68904	-4,68821	-4,68774
154	-4,68774	-4,68774	-4,68774	-4,68725	-4,68527	-4,68397	-4,68324	-4,68297	-4,68127	-4,68087
155	-4,67709	-4,67646	-4,67521	-4,67359	-4,67286	-4,67075	-4,67044	-4,67044	-4,67044	-4,67044
156	-4,66998	-4,66875	-4,66779	-4,66536	-4,66221	-4,66181	-4,65740	-4,65521	-4,65453	-4,65380
157	-4,65129	-4,64918	-4,64719	-4,64600	-4,64589	-4,64314	-4,64215	-4,63901	-4,63833	-4,63628
158	-4,63574	-4,63267	-4,63266	-4,63066	-4,63019	-4,63019	-4,63019	-4,63019	-4,62980	-4,62970
159	-4,62772	-4,62642	-4,62489	-4,62449	-4,62407	-4,62325	-4,62008	-4,61953	-4,61721	-4,61648
160	-4,61405	-4,61405	-4,61405	-4,61405	-4,61359	-4,61318	-4,61118	-4,61022	-4,60581	-4,60541
161	-4,60100	-4,59812	-4,59739	-4,59497	-4,59497	-4,59497	-4,59497	-4,59451	-4,59370	-4,59012
162	-4,58830	-4,58672	-4,58632	-4,58627	-4,58190	-4,57986	-4,57910	-4,57903	-4,57830	-4,57813
163	-4,57624	-4,57391	-4,57209	-4,57121	-4,57092	-4,57010	-4,56880	-4,56845	-4,56805	-4,56762
164	-4,56735	-4,56363	-4,56290	-4,56280	-4,56190	-4,56076	-4,56003	-4,55760	-4,55760	-4,55760
165	-4,55760	-4,55714	-4,55555	-4,55498	-4,55354	-4,55258	-4,54935	-4,54895	-4,54843	-4,54453
166	-4,54165	-4,54092	-4,53849	-4,53849	-4,53849	-4,53849	-4,53803	-4,53604	-4,53418	-4,53032
167	-4,53024	-4,52983	-4,52541	-4,52336	-4,52314	-4,52253	-4,52180	-4,51974	-4,51937	-4,51937
168	-4,51937	-4,51937	-4,51891	-4,51796	-4,51524	-4,51495	-4,51155	-4,51138	-4,51111	-4,51111
169	-4,51071	-4,50712	-4,50692	-4,50629	-4,50424	-4,50420	-4,50351	-4,50268	-4,50108	-4,50108
170	-4,50108	-4,50108	-4,50062	-4,49900	-4,49630	-4,49601	-4,49487	-4,49282	-4,49243	-4,49242
171	-4,48799	-4,48797	-4,48511	-4,43438	-4,48195	-4,48195	-4,48195	-4,48195	-4,48148	-4,48005
172	-4,47831	-4,47817	-4,47430	-4,47368	-4,47348	-4,47328	-4,46885	-4,46712	-4,46597	-4,46524
173	-4,46318	-4,46281	-4,46281	-4,46281	-4,46281	-4,46234	-4,46191	-4,45921	-4,45892	-4,45534
174	-4,45497	-4,45454	-4,45414	-4,45088	-4,44971	-4,44816	-4,44766	-4,44692	-4,44609	-4,44449
175	-4,44449	-4,44449	-4,44449	-4,44431	-4,44403	-4,44366	-4,44366	-4,44366	-4,44366	-4,44295
176	-4,44024	-4,43995	-4,43637	-4,43615	-4,43582	-4,43191	-4,43139	-4,43099	-4,42919	-4,42850
177	-4,42816	-4,42777	-4,42534	-4,42534	-4,42534	-4,42534	-4,42487	-4,42398	-4,42209	-4,42127
178	-4,42098	-4,41822	-4,41740	-4,41706	-4,41666	-4,41293	-4,41223	-4,41103	-4,40936	-4,40861
179	-4,40617	-4,40617	-4,40617	-4,40617	-4,40582	-4,40571	-4,40500	-4,40311	-4,40282	-4,39924

180	-4,39790	-4,39749	-4,39477	-4,39306	-4,39205	-4,39045	-4,39045	-4,39045	-4,39045	-4,38944
181	-4,38784	-4,38784	-4,38784	-4,38784	-4,38737	-4,38700	-4,38700	-4,38700	-4,38700	-4,38683
182	-4,38646	-4,38412	-4,38383	-4,38025	-4,37915	-4,37830	-4,37578	-4,37546	-4,37305	-4,37190
183	-4,37183	-4,37110	-4,37030	-4,36866	-4,36866	-4,36866	-4,36866	-4,36820	-4,36784	-4,36689
184	-4,36595	-4,36512	-4,36484	-4,36125	-4,35997	-4,35872	-4,35678	-4,35666	-4,35564	-4,35553
185	-4,35488	-4,35405	-4,35264	-4,35191	-4,35072	-4,34966	-4,34947	-4,34947	-4,34947	-4,34947
186	-4,34901	-4,34883	-4,34695	-4,34666	-4,34583	-4,34561	-4,34307	-4,34119	-4,34078	-4,33860
187	-4,33777	-4,33761	-4,33634	-4,33587	-4,33272	-4,33255	-4,33255	-4,33255	-4,33255	-4,33065
188	-4,33028	-4,33028	-4,33028	-4,33028	-4,32945	-4,32855	-4,32794	-4,32765	-4,32406	-4,32113
189	-4,32038	-4,31986	-4,31958	-4,31686	-4,31630	-4,31295	-4,31295	-4,31293	-4,31295	-4,31237
190	-4,31191	-4,31191	-4,31191	-4,31191	-4,31163	-4,31145	-4,30895	-4,30892	-4,30863	-4,30504
191	-4,30322	-4,30104	-4,30078	-4,30056	-4,30002	-4,29866	-4,29783	-4,29748	-4,29588	-4,29515
192	-4,29276	-4,29271	-4,29271	-4,29271	-4,29271	-4,29261	-4,29224	-4,29072	-4,29043	-4,28960
193	-4,28934	-4,28765	-4,28575	-4,28462	-4,28401	-4,28236	-4,28222	-4,28153	-4,28119	-4,28116
194	-4,27964	-4,27963	-4,27956	-4,27593	-4,27457	-4,27457	-4,27457	-4,27457	-4,27440	-4,27349
195	-4,27349	-4,27349	-4,27349	-4,27315	-4,27168	-4,27147	-4,27139	-4,27057	-4,26959	-4,26803
196	-4,26780	-4,26420	-4,26332	-4,26314	-4,26239	-4,26063	-4,26059	-4,26002	-4,25536	-4,25495
197	-4,25495	-4,25495	-4,25495	-4,25437	-4,25309	-4,25264	-4,25235	-4,25185	-4,25095	-4,24876
198	-4,24536	-4,24433	-4,24428	-4,24351	-4,24276	-4,24179	-4,24156	-4,23631	-4,23587	-4,23587
199	-4,23587	-4,23587	-4,23541	-4,23531	-4,23531	-4,23531	-4,23531	-4,23474	-4,23330	-4,23131
200	-4,22962	-4,22943	-4,22772	-4,22716	-4,22651	-4,22548	-4,22523	-4,22332	-4,22312	-4,22294
201	-4,22160	-4,21908	-4,21663	-4,21663	-4,21663	-4,21663	-4,21653	-4,21653	-4,21653	-4,21653
202	-4,21537	-4,21510	-4,21508	-4,21342	-4,21252	-4,21167	-4,21153	-4,21082	-4,21076	-4,20997
203	-4,20847	-4,20807	-4,20765	-4,20699	-4,20662	-4,20508	-4,20490	-4,20433	-4,20426	-4,20348
204	-4,20196	-4,19902	-4,19688	-4,19688	-4,19688	-4,19688	-4,19630	-4,19630	-4,19601	-4,19545
205	-4,19502	-4,19377	-4,19287	-4,19242	-4,19188	-4,19032	-4,18961	-4,18858	-4,18793	-4,18631
206	-4,18604	-4,18543	-4,18519	-4,18468	-4,18230	-4,17995	-4,17722	-4,17722	-4,17722	-4,17722
207	-4,17694	-4,17665	-4,17536	-4,17419	-4,17412	-4,17321	-4,17152	-4,17074	-4,16971	-4,16961
208	-4,16885	-4,16716	-4,16576	-4,16502	-4,16349	-4,15971	-4,15971	-4,15971	-4,15971	-4,15841
209	-4,15841	-4,15841	-4,15841	-4,15756	-4,15756	-4,15756	-4,15756	-4,15698	-4,15549	-4,15530
210	-4,15440	-4,15355	-4,15341	-4,15269	-4,15268	-4,15186	-4,15185	-4,15083	-4,14994	-4,14911
211	-4,14828	-4,14786	-4,14695	-4,14620	-4,14535	-4,14382	-4,13990	-4,13961	-4,13874	-4,13874
212	-4,13874	-4,13874	-4,13816	-4,13731	-4,13688	-4,13678	-4,13563	-4,13473	-4,13380	-4,13374
213	-4,13302	-4,13277	-4,13217	-4,13195	-4,13151	-4,13027	-4,13022	-4,12877	-4,12816	-4,12727
214	-4,12652	-4,12414	-4,12353	-4,12051	-4,11906	-4,11906	-4,11906	-4,11906	-4,11888	-4,11848
215	-4,11720	-4,11595	-4,11504	-4,11490	-4,11405	-4,11387	-4,11335	-4,11249	-4,11241	-4,11166

C3 OUTPUT OF TARGET DETERMINISTIC APPRAISAL

KK= SERIAL NUMBER	
I = % CHANGE IN A	A = PRICE PER UNIT OF OUTPUT
J = % CHANGE IN C	C = TOTAL NO. OF OUTPUT
K = % CHANGE IN B	B = MATERIAL COST PER UNIT OF OUTPUT
L = % CHANGE IN D	D = AVERAGE REMUNERATION PER MAN PER YEAR
M = % CHANGE IN E	E = TOTAL NO. OF EMPLOYEES
N = % CHANGE IN CI	CI= CAPITAL INTEREST CHARGES PER UNIT OF OUTPUT
II= % CHANGE IN F	F = FACILITIES COST PER UNIT OF OUTPUT
X = % CHANGE IN PRODUCTIVITY	
TA= 12	TA= AVERAGE % CHANGE REQUIRED AS TARGET

KK= 1	I= 6	J=-1	K= 1	L= 6	M=-2	N=-1	II= 1	X(I,J,K,L,M,N,II)= 11,94130
KK= 2	I= 6	J= 0	K= 1	L= 6	M=-1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 11,93154
KK= 3	I= 6	J= 0	K= 1	L= 7	M=-2	N=-1	II= 1	X(I,J,K,L,M,N,II)= 12,00455
KK= 4	I= 6	J= 0	K= 1	L= 7	M=-2	N=-1	II= 2	X(I,J,K,L,M,N,II)= 11,91181
KK= 5	I= 6	J= 0	K= 1	L= 7	M=-2	N= 0	II= 1	X(I,J,K,L,M,N,II)= 11,93524
KK= 6	I= 6	J= 1	K= 1	L= 6	M= 0	N=-1	II= 1	X(I,J,K,L,M,N,II)= 11,92196
KK= 7	I= 6	J= 1	K= 1	L= 7	M=-1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 11,98520
KK= 8	I= 6	J= 1	K= 1	L= 7	M=-1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 11,91591
KK= 9	I= 6	J= 1	K= 1	L= 8	M=-2	N=-1	II= 1	X(I,J,K,L,M,N,II)= 12,06661
KK= 10	I= 6	J= 1	K= 1	L= 8	M=-2	N=-1	II= 2	X(I,J,K,L,M,N,II)= 11,97377
KK= 11	I= 6	J= 1	K= 1	L= 8	M=-2	N= 0	II= 1	X(I,J,K,L,M,N,II)= 11,99722
KK= 12	I= 6	J= 1	K= 1	L= 8	M=-2	N= 0	II= 2	X(I,J,K,L,M,N,II)= 11,90450
KK= 13	I= 6	J= 1	K= 1	L= 8	M=-2	N= 1	II= 1	X(I,J,K,L,M,N,II)= 11,92792
KK= 14	I= 6	J= 2	K= 1	L= 6	M= 1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 11,91258
KK= 15	I= 6	J= 2	K= 1	L= 7	M= 0	N=-1	II= 1	X(I,J,K,L,M,N,II)= 11,96624
KK= 16	I= 6	J= 2	K= 1	L= 8	M=-1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 12,03787
KK= 17	I= 6	J= 2	K= 1	L= 8	M=-1	N=-1	II= 2	X(I,J,K,L,M,N,II)= 11,94507
KK= 18	I= 6	J= 2	K= 1	L= 8	M=-1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 11,96851
KK= 19	I= 6	J= 2	K= 1	L= 9	M=-2	N=-1	II= 2	X(I,J,K,L,M,N,II)= 12,03458
KK= 20	I= 6	J= 2	K= 1	L= 9	M=-2	N=-1	II= 3	X(I,J,K,L,M,N,II)= 11,94180
KK= 21	I= 6	J= 2	K= 1	L= 9	M=-2	N= 0	II= 1	X(I,J,K,L,M,N,II)= 12,05806
KK= 22	I= 6	J= 2	K= 1	L= 9	M=-2	N= 0	II= 2	X(I,J,K,L,M,N,II)= 11,96524
KK= 23	I= 6	J= 2	K= 1	L= 9	M=-2	N= 1	II= 1	X(I,J,K,L,M,N,II)= 11,98868
KK= 24	I= 6	J= 2	K= 1	L= 9	M=-2	N= 2	II= 1	X(I,J,K,L,M,N,II)= 11,91939
KK= 25	I= 6	J= 2	K= 2	L= 6	M=-2	N= 4	II= 4	X(I,J,K,L,M,N,II)= 12,09069
KK= 26	I= 7	J=-1	K= 1	L= 6	M= 1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 12,01315
KK= 27	I= 7	J=-1	K= 1	L= 6	M= 1	N=-1	II= 2	X(I,J,K,L,M,N,II)= 11,92282
KK= 28	I= 7	J=-1	K= 1	L= 6	M= 1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 11,94564
KK= 29	I= 7	J=-1	K= 1	L= 7	M= 0	N=-1	II= 1	X(I,J,K,L,M,N,II)= 12,06709
KK= 30	I= 7	J=-1	K= 1	L= 7	M= 0	N=-1	II= 2	X(I,J,K,L,M,N,II)= 11,97667
KK= 31	I= 7	J=-1	K= 1	L= 7	M= 0	N= 0	II= 1	X(I,J,K,L,M,N,II)= 11,99951
KK= 32	I= 7	J=-1	K= 1	L= 7	M= 0	N= 0	II= 2	X(I,J,K,L,M,N,II)= 11,90921
KK= 33	I= 7	J=-1	K= 1	L= 7	M= 0	N= 1	II= 1	X(I,J,K,L,M,N,II)= 11,93202
KK= 34	I= 7	J=-1	K= 1	L= 8	M=-1	N=-1	II= 2	X(I,J,K,L,M,N,II)= 12,04855
KK= 35	I= 7	J=-1	K= 1	L= 8	M=-1	N=-1	II= 3	X(I,J,K,L,M,N,II)= 11,95817
KK= 36	I= 7	J=-1	K= 1	L= 8	M=-1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 12,07142
KK= 37	I= 7	J=-1	K= 1	L= 8	M=-1	N= 0	II= 2	X(I,J,K,L,M,N,II)= 11,98100
KK= 38	I= 7	J=-1	K= 1	L= 8	M=-1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 12,00384
KK= 39	I= 7	J=-1	K= 1	L= 8	M=-1	N= 1	II= 2	X(I,J,K,L,M,N,II)= 11,91353
KK= 40	I= 7	J=-1	K= 1	L= 8	M=-1	N= 2	II= 1	X(I,J,K,L,M,N,II)= 11,93634
KK= 41	I= 7	J=-1	K= 1	L= 9	M=-2	N=-1	II= 3	X(I,J,K,L,M,N,II)= 12,04800
KK= 42	I= 7	J=-1	K= 1	L= 9	M=-2	N=-1	II= 4	X(I,J,K,L,M,N,II)= 11,95762
KK= 43	I= 7	J=-1	K= 1	L= 9	M=-2	N= 0	II= 2	X(I,J,K,L,M,N,II)= 12,07087
KK= 44	I= 7	J=-1	K= 1	L= 9	M=-2	N= 0	II= 3	X(I,J,K,L,M,N,II)= 11,98045
KK= 45	I= 7	J=-1	K= 1	L= 9	M=-2	N= 1	II= 1	X(I,J,K,L,M,N,II)= 12,09375
KK= 46	I= 7	J=-1	K= 1	L= 9	M=-2	N= 1	II= 2	X(I,J,K,L,M,N,II)= 12,00329
KK= 47	I= 7	J=-1	K= 1	L= 9	M=-2	N= 1	II= 3	X(I,J,K,L,M,N,II)= 11,91298
KK= 48	I= 7	J=-1	K= 1	L= 9	M=-2	N= 2	II= 1	X(I,J,K,L,M,N,II)= 12,02614
KK= 49	I= 7	J=-1	K= 1	L= 9	M=-2	N= 2	II= 2	X(I,J,K,L,M,N,II)= 11,93579
KK= 50	I= 7	J=-1	K= 1	L= 9	M=-2	N= 3	II= 1	X(I,J,K,L,M,N,II)= 11,95861
KK= 51	I= 7	J=-1	K= 2	L= 6	M=-1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 11,92434
KK= 52	I= 7	J=-1	K= 2	L= 7	M=-2	N=-1	II= 1	X(I,J,K,L,M,N,II)= 11,99746
KK= 53	I= 7	J=-1	K= 2	L= 7	M=-2	N=-1	II= 2	X(I,J,K,L,M,N,II)= 11,90552
KK= 54	I= 7	J=-1	K= 2	L= 7	M=-2	N= 0	II= 1	X(I,J,K,L,M,N,II)= 11,92874
KK= 55	I= 7	J= 0	K= 1	L= 6	M= 2	N=-1	II= 1	X(I,J,K,L,M,N,II)= 12,03221
KK= 56	I= 7	J= 0	K= 1	L= 6	M= 2	N=-1	II= 2	X(I,J,K,L,M,N,II)= 11,94185
KK= 57	I= 7	J= 0	K= 1	L= 6	M= 2	N= 0	II= 1	X(I,J,K,L,M,N,II)= 11,96467
KK= 58	I= 7	J= 0	K= 1	L= 7	M= 1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 12,07672
KK= 59	I= 7	J= 0	K= 1	L= 7	M= 1	N=-1	II= 2	X(I,J,K,L,M,N,II)= 11,98628
KK= 60	I= 7	J= 0	K= 1	L= 7	M= 1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 12,00913
KK= 61	I= 7	J= 0	K= 1	L= 7	M= 1	N= 0	II= 2	X(I,J,K,L,M,N,II)= 11,91880
KK= 62	I= 7	J= 0	K= 1	L= 7	M= 1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 11,94162
KK= 63	I= 7	J= 0	K= 1	L= 8	M= 0	N=-1	II= 2	X(I,J,K,L,M,N,II)= 12,04655
KK= 64	I= 7	J= 0	K= 1	L= 8	M= 0	N=-1	II= 3	X(I,J,K,L,M,N,II)= 11,95817
KK= 65	I= 7	J= 0	K= 1	L= 8	M= 0	N= 0	II= 1	X(I,J,K,L,M,N,II)= 12,07142
KK= 66	I= 7	J= 0	K= 1	L= 8	M= 0	N= 0	II= 2	X(I,J,K,L,M,N,II)= 11,98100
KK= 67	I= 7	J= 0	K= 1	L= 8	M= 0	N= 1	II= 1	X(I,J,K,L,M,N,II)= 12,00384
KK= 68	I= 7	J= 0	K= 1	L= 8	M= 0	N= 1	II= 2	X(I,J,K,L,M,N,II)= 11,91353
KK= 69	I= 7	J= 0	K= 1	L= 8	M= 0	N= 2	II= 1	X(I,J,K,L,M,N,II)= 11,93634
KK= 70	I= 7	J= 0	K= 1	L= 9	M=-1	N=-1	II= 3	X(I,J,K,L,M,N,II)= 12,03620
KK= 71	I= 7	J= 0	K= 1	L= 9	M=-1	N=-1	II= 4	X(I,J,K,L,M,N,II)= 11,94783
KK= 72	I= 7	J= 0	K= 1	L= 9	M=-1	N= 0	II= 2	X(I,J,K,L,M,N,II)= 12,06107
KK= 73	I= 7	J= 0	K= 1	L= 9	M=-1	N= 0	II= 3	X(I,J,K,L,M,N,II)= 11,97066
KK= 74	I= 7	J= 0	K= 1	L= 9	M=-1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 12,08394
KK= 75	I= 7	J= 0	K= 1	L= 9	M=-1	N= 1	II= 2	X(I,J,K,L,M,N,II)= 11,99350
KK= 76	I= 7	J= 0	K= 1	L= 9	M=-1	N= 1	II= 3	X(I,J,K,L,M,N,II)= 11,90320
KK= 77	I= 7	J= 0	K= 1	L= 9	M=-1	N= 2	II= 1	X(I,J,K,L,M,N,II)= 12,01634

KK=	78	I= 7	J= 0	K= 1	L= 9	M=-1	N= 2	II= 2	X(I,J,K,L,M,N,II)= 11.92601
KK=	79	I= 7	J= 0	K= 1	L= 9	M=-1	N= 3	II= 1	X(I,J,K,L,M,N,II)= 11.94883
KK=	80	I= 7	J= 0	K= 1	L=10	M=-2	N=-1	II= 4	X(I,J,K,L,M,N,II)= 12.04565
KK=	81	I= 7	J= 0	K= 1	L=10	M=-2	N= 0	II= 3	X(I,J,K,L,M,N,II)= 12.06852
KK=	82	I= 7	J= 0	K= 1	L=10	M=-2	N= 0	II= 4	X(I,J,K,L,M,N,II)= 11.97810
KK=	83	I= 7	J= 0	K= 1	L=10	M=-2	N= 1	II= 2	X(I,J,K,L,M,N,II)= 12.09140
KK=	84	I= 7	J= 0	K= 1	L=10	M=-2	N= 1	II= 3	X(I,J,K,L,M,N,II)= 12.00094
KK=	85	I= 7	J= 0	K= 1	L=10	M=-2	N= 1	II= 4	X(I,J,K,L,M,N,II)= 11.91063
KK=	86	I= 7	J= 0	K= 1	L=10	M=-2	N= 2	II= 2	X(I,J,K,L,M,N,II)= 12.02379
KK=	87	I= 7	J= 0	K= 1	L=10	M=-2	N= 2	II= 3	X(I,J,K,L,M,N,II)= 11.93344
KK=	88	I= 7	J= 0	K= 1	L=10	M=-2	N= 3	II= 1	X(I,J,K,L,M,N,II)= 12.04665
KK=	89	I= 7	J= 0	K= 1	L=10	M=-2	N= 3	II= 2	X(I,J,K,L,M,N,II)= 11.95626
KK=	90	I= 7	J= 0	K= 1	L=10	M=-2	N= 4	II= 1	X(I,J,K,L,M,N,II)= 11.97909
KK=	91	I= 7	J= 0	K= 2	L= 6	M= 0	N=-1	II= 1	X(I,J,K,L,M,N,II)= 11.92434
KK=	92	I= 7	J= 0	K= 2	L= 7	M=-1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 11.98767
KK=	93	I= 7	J= 0	K= 2	L= 7	M=-1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 11.91897
KK=	94	I= 7	J= 0	K= 2	L= 8	M=-2	N=-1	II= 1	X(I,J,K,L,M,N,II)= 12.06920
KK=	95	I= 7	J= 0	K= 2	L= 8	M=-2	N=-1	II= 2	X(I,J,K,L,M,N,II)= 11.97715
KK=	96	I= 7	J= 0	K= 2	L= 8	M=-2	N= 0	II= 1	X(I,J,K,L,M,N,II)= 12.00040
KK=	97	I= 7	J= 0	K= 2	L= 8	M=-2	N= 0	II= 2	X(I,J,K,L,M,N,II)= 11.90846
KK=	98	I= 7	J= 0	K= 2	L= 8	M=-2	N= 1	II= 1	X(I,J,K,L,M,N,II)= 11.93168
KK=	99	I= 7	J= 1	K= 1	L= 7	M= 2	N=-1	II= 1	X(I,J,K,L,M,N,II)= 12.08615
KK=	100	I= 7	J= 1	K= 1	L= 7	M= 2	N=-1	II= 2	X(I,J,K,L,M,N,II)= 11.99570
KK=	101	I= 7	J= 1	K= 1	L= 7	M= 2	N=-1	II= 3	X(I,J,K,L,M,N,II)= 11.90540
KK=	102	I= 7	J= 1	K= 1	L= 7	M= 2	N= 0	II= 1	X(I,J,K,L,M,N,II)= 12.01855
KK=	103	I= 7	J= 1	K= 1	L= 7	M= 2	N= 0	II= 2	X(I,J,K,L,M,N,II)= 11.92821
KK=	104	I= 7	J= 1	K= 1	L= 7	M= 2	N= 1	II= 1	X(I,J,K,L,M,N,II)= 11.95103
KK=	105	I= 7	J= 1	K= 1	L= 8	M= 1	N=-1	II= 2	X(I,J,K,L,M,N,II)= 12.04855
KK=	106	I= 7	J= 1	K= 1	L= 8	M= 1	N=-1	II= 3	X(I,J,K,L,M,N,II)= 11.95817
KK=	107	I= 7	J= 1	K= 1	L= 8	M= 1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 12.07142
KK=	108	I= 7	J= 1	K= 1	L= 8	M= 1	N= 0	II= 2	X(I,J,K,L,M,N,II)= 11.98100
KK=	109	I= 7	J= 1	K= 1	L= 8	M= 1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 12.00384
KK=	110	I= 7	J= 1	K= 1	L= 8	M= 1	N= 1	II= 2	X(I,J,K,L,M,N,II)= 11.91353
KK=	111	I= 7	J= 1	K= 1	L= 8	M= 1	N= 2	II= 1	X(I,J,K,L,M,N,II)= 11.93634
KK=	112	I= 7	J= 1	K= 1	L= 9	M= 0	N=-1	II= 3	X(I,J,K,L,M,N,II)= 12.02860
KK=	113	I= 7	J= 1	K= 1	L= 9	M= 0	N=-1	II= 4	X(I,J,K,L,M,N,II)= 11.93825
KK=	114	I= 7	J= 1	K= 1	L= 9	M= 0	N= 0	II= 2	X(I,J,K,L,M,N,II)= 12.05146
KK=	115	I= 7	J= 1	K= 1	L= 9	M= 0	N= 0	II= 3	X(I,J,K,L,M,N,II)= 11.96107
KK=	116	I= 7	J= 1	K= 1	L= 9	M= 0	N= 1	II= 1	X(I,J,K,L,M,N,II)= 12.07433
KK=	117	I= 7	J= 1	K= 1	L= 9	M= 0	N= 1	II= 2	X(I,J,K,L,M,N,II)= 11.98390
KK=	118	I= 7	J= 1	K= 1	L= 9	M= 0	N= 2	II= 1	X(I,J,K,L,M,N,II)= 12.00674
KK=	119	I= 7	J= 1	K= 1	L= 9	M= 0	N= 2	II= 2	X(I,J,K,L,M,N,II)= 11.91642
KK=	120	I= 7	J= 1	K= 1	L= 9	M= 0	N= 3	II= 1	X(I,J,K,L,M,N,II)= 11.93924
KK=	121	I= 7	J= 1	K= 1	L=10	M=-1	N=-1	II= 4	X(I,J,K,L,M,N,II)= 12.02627
KK=	122	I= 7	J= 1	K= 1	L=10	M=-1	N= 0	II= 3	X(I,J,K,L,M,N,II)= 12.04913
KK=	123	I= 7	J= 1	K= 1	L=10	M=-1	N= 0	II= 4	X(I,J,K,L,M,N,II)= 11.95874
KK=	124	I= 7	J= 1	K= 1	L=10	M=-1	N= 1	II= 2	X(I,J,K,L,M,N,II)= 12.07200
KK=	125	I= 7	J= 1	K= 1	L=10	M=-1	N= 1	II= 3	X(I,J,K,L,M,N,II)= 11.98157
KK=	126	I= 7	J= 1	K= 1	L=10	M=-1	N= 2	II= 1	X(I,J,K,L,M,N,II)= 12.09487
KK=	127	I= 7	J= 1	K= 1	L=10	M=-1	N= 2	II= 2	X(I,J,K,L,M,N,II)= 12.00441
KK=	128	I= 7	J= 1	K= 1	L=10	M=-1	N= 2	II= 3	X(I,J,K,L,M,N,II)= 11.91410
KK=	129	I= 7	J= 1	K= 1	L=10	M=-1	N= 3	II= 1	X(I,J,K,L,M,N,II)= 12.02726
KK=	130	I= 7	J= 1	K= 1	L=10	M=-1	N= 3	II= 2	X(I,J,K,L,M,N,II)= 11.93691
KK=	131	I= 7	J= 1	K= 1	L=10	M=-1	N= 4	II= 1	X(I,J,K,L,M,N,II)= 11.95973
KK=	132	I= 7	J= 1	K= 2	L= 6	M= 1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 11.92434
KK=	133	I= 7	J= 1	K= 2	L= 7	M= 0	N=-1	II= 1	X(I,J,K,L,M,N,II)= 11.97809
KK=	134	I= 7	J= 1	K= 2	L= 7	M= 0	N= 0	II= 1	X(I,J,K,L,M,N,II)= 11.90939
KK=	135	I= 7	J= 1	K= 2	L= 8	M=-1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 12.04982
KK=	136	I= 7	J= 1	K= 2	L= 8	M=-1	N=-1	II= 2	X(I,J,K,L,M,N,II)= 11.95780
KK=	137	I= 7	J= 1	K= 2	L= 8	M=-1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 11.98104
KK=	138	I= 7	J= 1	K= 2	L= 8	M=-1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 11.91235
KK=	139	I= 7	J= 1	K= 2	L= 9	M=-2	N=-1	II= 2	X(I,J,K,L,M,N,II)= 12.04745
KK=	140	I= 7	J= 1	K= 2	L= 9	M=-2	N=-1	II= 3	X(I,J,K,L,M,N,II)= 11.95543
KK=	141	I= 7	J= 1	K= 2	L= 9	M=-2	N= 0	II= 1	X(I,J,K,L,M,N,II)= 12.07073
KK=	142	I= 7	J= 1	K= 2	L= 9	M=-2	N= 0	II= 2	X(I,J,K,L,M,N,II)= 11.97867
KK=	143	I= 7	J= 1	K= 2	L= 9	M=-2	N= 1	II= 1	X(I,J,K,L,M,N,II)= 12.00192
KK=	144	I= 7	J= 1	K= 2	L= 9	M=-2	N= 1	II= 2	X(I,J,K,L,M,N,II)= 11.90998
KK=	145	I= 7	J= 1	K= 2	L= 9	M=-2	N= 2	II= 1	X(I,J,K,L,M,N,II)= 11.93320
KK=	146	I= 7	J= 2	K= 1	L= 8	M= 2	N=-1	II= 2	X(I,J,K,L,M,N,II)= 12.04855
KK=	147	I= 7	J= 2	K= 1	L= 8	M= 2	N=-1	II= 3	X(I,J,K,L,M,N,II)= 11.95817
KK=	148	I= 7	J= 2	K= 1	L= 8	M= 2	N= 0	II= 1	X(I,J,K,L,M,N,II)= 12.07142
KK=	149	I= 7	J= 2	K= 1	L= 8	M= 2	N= 0	II= 2	X(I,J,K,L,M,N,II)= 11.98100
KK=	150	I= 7	J= 2	K= 1	L= 8	M= 2	N= 1	II= 1	X(I,J,K,L,M,N,II)= 12.00384
KK=	151	I= 7	J= 2	K= 1	L= 8	M= 2	N= 1	II= 2	X(I,J,K,L,M,N,II)= 11.91353
KK=	152	I= 7	J= 2	K= 1	L= 8	M= 2	N= 2	II= 1	X(I,J,K,L,M,N,II)= 11.93634
KK=	153	I= 7	J= 2	K= 1	L= 9	M= 1	N=-1	II= 3	X(I,J,K,L,M,N,II)= 12.01919
KK=	154	I= 7	J= 2	K= 1	L= 9	M= 1	N=-1	II= 4	X(I,J,K,L,M,N,II)= 11.92685
KK=	155	I= 7	J= 2	K= 1	L= 9	M= 1	N= 0	II= 2	X(I,J,K,L,M,N,II)= 12.04204
KK=	156	I= 7	J= 2	K= 1	L= 9	M= 1	N= 0	II= 3	X(I,J,K,L,M,N,II)= 11.95167
KK=	157	I= 7	J= 2	K= 1	L= 9	M= 1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 12.06491
KK=	158	I= 7	J= 2	K= 1	L= 9	M= 1	N= 1	II= 2	X(I,J,K,L,M,N,II)= 11.97450
KK=	159	I= 7	J= 2	K= 1	L= 9	M= 1	N= 2	II= 1	X(I,J,K,L,M,N,II)= 11.99733
KK=	160	I= 7	J= 2	K= 1	L= 9	M= 1	N= 2	II= 2	X(I,J,K,L,M,N,II)= 11.90703
KK=	161	I= 7	J= 2	K= 1	L= 9	M= 1	N= 3	II= 1	X(I,J,K,L,M,N,II)= 11.92984
KK=	162	I= 7	J= 2	K= 1	L=10	M= 0	N=-1	II= 3	X(I,J,K,L,M,N,II)= 12.09774
KK=	163	I= 7	J= 2	K= 1	L=10	M= 0	N=-1	II= 4	X(I,J,K,L,M,N,II)= 12.00727
KK=	164	I= 7	J= 2	K= 1	L=10	M= 0	N= 0	II= 3	X(I,J,K,L,M,N,II)= 12.03012
KK=	165	I= 7	J= 2	K= 1	L=10	M= 0	N= 0	II= 4	X(I,J,K,L,M,N,II)= 11.93977
KK=	166	I= 7	J= 2	K= 1	L=10	M= 0	N= 1	II= 2	X(I,J,K,L,M,N,II)= 12.05298
KK=	167	I= 7	J= 2	K= 1	L=10	M= 0	N= 1	II= 3	X(I,J,K,L,M,N,II)= 11.96259
KK=	168	I= 7	J= 2	K= 1	L=10	M= 0	N= 2	II= 1	X(I,J,K,L,M,N,II)= 12.07585
KK=	169	I= 7	J= 2	K= 1	L=10	M= 0	N= 2	II= 2	X(I,J,K,L,M,N,II)= 11.98542
KK=	170	I= 7	J= 2	K= 1	L=10	M= 0	N= 3	II= 1	X(I,J,K,L,M,N,II)= 12.00827
KK=	171	I= 7	J= 2	K= 1	L=10	M= 0	N= 3	II= 2	X(I,J,K,L,M,N,II)= 11.91794
KK=	172	I= 7	J= 2	K= 1	L=10	M= 0	N= 4	II= 1	X(I,J,K,L,M,N,II)= 11.94076
KK=	173	I= 7	J= 2	K= 2	L= 6	M= 2	N=-1	II= 1	X(I,J,K,L,M,N,II)= 11.92434

KK= 174	I= 7	J= 2	K= 2	L= 7	M= 1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 11,96869
KK= 175	I= 7	J= 2	K= 2	L= 7	M= 1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 11,90001
KK= 176	I= 7	J= 2	K= 2	L= 8	M= 0	N=-1	II= 1	X(I,J,K,L,M,N,II)= 12,03082
KK= 177	I= 7	J= 2	K= 2	L= 8	M= 0	N=-1	II= 2	X(I,J,K,L,M,N,II)= 11,93883
KK= 178	I= 7	J= 2	K= 2	L= 8	M= 0	N= 0	II= 1	X(I,J,K,L,M,N,II)= 11,96207
KK= 179	I= 7	J= 2	K= 2	L= 9	M=-1	N=-1	II= 2	X(I,J,K,L,M,N,II)= 12,01869
KK= 180	I= 7	J= 2	K= 2	L= 9	M=-1	N=-1	II= 3	X(I,J,K,L,M,N,II)= 11,92672
KK= 181	I= 7	J= 2	K= 2	L= 9	M=-1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 12,04196
KK= 182	I= 7	J= 2	K= 2	L= 9	M=-1	N= 0	II= 2	X(I,J,K,L,M,N,II)= 11,94995
KK= 183	I= 7	J= 2	K= 2	L= 9	M=-1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 11,97319
KK= 184	I= 7	J= 2	K= 2	L= 9	M=-1	N= 2	II= 1	X(I,J,K,L,M,N,II)= 11,90450
KK= 185	I= 7	J= 2	K= 2	L=10	M=-2	N=-1	II= 3	X(I,J,K,L,M,N,II)= 12,02432
KK= 186	I= 7	J= 2	K= 2	L=10	M=-2	N=-1	II= 4	X(I,J,K,L,M,N,II)= 11,93234
KK= 187	I= 7	J= 2	K= 2	L=10	M=-2	N= 0	II= 2	X(I,J,K,L,M,N,II)= 12,04759
KK= 188	I= 7	J= 2	K= 2	L=10	M=-2	N= 0	II= 3	X(I,J,K,L,M,N,II)= 11,95557
KK= 189	I= 7	J= 2	K= 2	L=10	M=-2	N= 1	II= 1	X(I,J,K,L,M,N,II)= 12,07087
KK= 190	I= 7	J= 2	K= 2	L=10	M=-2	N= 1	II= 2	X(I,J,K,L,M,N,II)= 11,97881
KK= 191	I= 7	J= 2	K= 2	L=10	M=-2	N= 2	II= 1	X(I,J,K,L,M,N,II)= 12,00207
KK= 192	I= 7	J= 2	K= 2	L=10	M=-2	N= 2	II= 2	X(I,J,K,L,M,N,II)= 11,91012
KK= 193	I= 7	J= 2	K= 2	L=10	M=-2	N= 3	II= 1	X(I,J,K,L,M,N,II)= 11,93335
KK= 194	I= 7	J= 2	K= 3	L= 8	M=-2	N=-1	II= 1	X(I,J,K,L,M,N,II)= 11,91878
KK= 195	I= 8	J=-1	K= 1	L= 8	M= 2	N=-1	II= 2	X(I,J,K,L,M,N,II)= 12,06336
KK= 196	I= 8	J=-1	K= 1	L= 8	M= 2	N=-1	II= 3	X(I,J,K,L,M,N,II)= 11,97525
KK= 197	I= 8	J=-1	K= 1	L= 8	M= 2	N= 0	II= 1	X(I,J,K,L,M,N,II)= 12,08565
KK= 198	I= 8	J=-1	K= 1	L= 8	M= 2	N= 0	II= 2	X(I,J,K,L,M,N,II)= 11,99751
KK= 199	I= 8	J=-1	K= 1	L= 8	M= 2	N= 0	II= 3	X(I,J,K,L,M,N,II)= 11,90950
KK= 200	I= 8	J=-1	K= 1	L= 8	M= 2	N= 1	II= 1	X(I,J,K,L,M,N,II)= 12,01978
KK= 201	I= 8	J=-1	K= 1	L= 8	M= 2	N= 1	II= 2	X(I,J,K,L,M,N,II)= 11,93173
KK= 202	I= 8	J=-1	K= 1	L= 8	M= 2	N= 2	II= 1	X(I,J,K,L,M,N,II)= 11,95397
KK= 203	I= 8	J=-1	K= 1	L= 9	M= 1	N=-1	II= 3	X(I,J,K,L,M,N,II)= 12,03654
KK= 204	I= 8	J=-1	K= 1	L= 9	M= 1	N=-1	II= 4	X(I,J,K,L,M,N,II)= 11,94847
KK= 205	I= 8	J=-1	K= 1	L= 9	M= 1	N= 0	II= 2	X(I,J,K,L,M,N,II)= 12,05882
KK= 206	I= 8	J=-1	K= 1	L= 9	M= 1	N= 0	II= 3	X(I,J,K,L,M,N,II)= 11,97072
KK= 207	I= 8	J=-1	K= 1	L= 9	M= 1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 12,08111
KK= 208	I= 8	J=-1	K= 1	L= 9	M= 1	N= 1	II= 2	X(I,J,K,L,M,N,II)= 11,99297
KK= 209	I= 8	J=-1	K= 1	L= 9	M= 1	N= 1	II= 3	X(I,J,K,L,M,N,II)= 11,90497
KK= 210	I= 8	J=-1	K= 1	L= 9	M= 1	N= 2	II= 1	X(I,J,K,L,M,N,II)= 12,01524
KK= 211	I= 8	J=-1	K= 1	L= 9	M= 1	N= 2	II= 2	X(I,J,K,L,M,N,II)= 11,92720
KK= 212	I= 8	J=-1	K= 1	L= 9	M= 1	N= 3	II= 1	X(I,J,K,L,M,N,II)= 11,94944
KK= 213	I= 8	J=-1	K= 1	L=10	M= 0	N=-1	II= 4	X(I,J,K,L,M,N,II)= 12,02724
KK= 214	I= 8	J=-1	K= 1	L=10	M= 0	N= 0	II= 3	X(I,J,K,L,M,N,II)= 12,04952
KK= 215	I= 8	J=-1	K= 1	L=10	M= 0	N= 0	II= 4	X(I,J,K,L,M,N,II)= 11,96143
KK= 216	I= 8	J=-1	K= 1	L=10	M= 0	N= 1	II= 2	X(I,J,K,L,M,N,II)= 12,07181
KK= 217	I= 8	J=-1	K= 1	L=10	M= 0	N= 1	II= 3	X(I,J,K,L,M,N,II)= 11,98368
KK= 218	I= 8	J=-1	K= 1	L=10	M= 0	N= 2	II= 1	X(I,J,K,L,M,N,II)= 12,09410
KK= 219	I= 8	J=-1	K= 1	L=10	M= 0	N= 2	II= 2	X(I,J,K,L,M,N,II)= 12,00594
KK= 220	I= 8	J=-1	K= 1	L=10	M= 0	N= 2	II= 3	X(I,J,K,L,M,N,II)= 11,91792
KK= 221	I= 8	J=-1	K= 1	L=10	M= 0	N= 3	II= 1	X(I,J,K,L,M,N,II)= 12,02821
KK= 222	I= 8	J=-1	K= 1	L=10	M= 0	N= 3	II= 2	X(I,J,K,L,M,N,II)= 11,94016
KK= 223	I= 8	J=-1	K= 1	L=10	M= 0	N= 4	II= 1	X(I,J,K,L,M,N,II)= 11,96240
KK= 224	I= 8	J=-1	K= 2	L= 6	M= 2	N=-1	II= 1	X(I,J,K,L,M,N,II)= 11,99602
KK= 225	I= 8	J=-1	K= 2	L= 6	M= 2	N=-1	II= 2	X(I,J,K,L,M,N,II)= 11,90646
KK= 226	I= 8	J=-1	K= 2	L= 6	M= 2	N= 0	II= 1	X(I,J,K,L,M,N,II)= 11,92909
KK= 227	I= 8	J=-1	K= 2	L= 7	M= 1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 12,04058
KK= 228	I= 8	J=-1	K= 2	L= 7	M= 1	N=-1	II= 2	X(I,J,K,L,M,N,II)= 11,95095
KK= 229	I= 8	J=-1	K= 2	L= 7	M= 1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 11,97359
KK= 230	I= 8	J=-1	K= 2	L= 7	M= 1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 11,90668
KK= 231	I= 8	J=-1	K= 2	L= 8	M= 0	N=-1	II= 2	X(I,J,K,L,M,N,II)= 12,01329
KK= 232	I= 8	J=-1	K= 2	L= 8	M= 0	N=-1	II= 3	X(I,J,K,L,M,N,II)= 11,92571
KK= 233	I= 8	J=-1	K= 2	L= 8	M= 0	N= 0	II= 1	X(I,J,K,L,M,N,II)= 12,03596
KK= 234	I= 8	J=-1	K= 2	L= 8	M= 0	N= 0	II= 2	X(I,J,K,L,M,N,II)= 11,94634
KK= 235	I= 8	J=-1	K= 2	L= 8	M= 0	N= 1	II= 1	X(I,J,K,L,M,N,II)= 11,96898
KK= 236	I= 8	J=-1	K= 2	L= 8	M= 0	N= 2	II= 1	X(I,J,K,L,M,N,II)= 11,90207
KK= 237	I= 8	J=-1	K= 2	L= 9	M=-1	N=-1	II= 2	X(I,J,K,L,M,N,II)= 12,09355
KK= 238	I= 8	J=-1	K= 2	L= 9	M=-1	N=-1	II= 3	X(I,J,K,L,M,N,II)= 12,00584
KK= 239	I= 8	J=-1	K= 2	L= 9	M=-1	N=-1	II= 4	X(I,J,K,L,M,N,II)= 11,91427
KK= 240	I= 8	J=-1	K= 2	L= 9	M=-1	N= 0	II= 2	X(I,J,K,L,M,N,II)= 12,02650
KK= 241	I= 8	J=-1	K= 2	L= 9	M=-1	N= 0	II= 3	X(I,J,K,L,M,N,II)= 11,93689
KK= 242	I= 8	J=-1	K= 2	L= 9	M=-1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 12,04917
KK= 243	I= 8	J=-1	K= 2	L= 9	M=-1	N= 1	II= 2	X(I,J,K,L,M,N,II)= 11,95953
KK= 244	I= 8	J=-1	K= 2	L= 9	M=-1	N= 2	II= 1	X(I,J,K,L,M,N,II)= 11,98217
KK= 245	I= 8	J=-1	K= 2	L= 9	M=-1	N= 3	II= 1	X(I,J,K,L,M,N,II)= 11,91525
KK= 246	I= 8	J=-1	K= 2	L=10	M=-2	N=-1	II= 4	X(I,J,K,L,M,N,II)= 12,01220
KK= 247	I= 8	J=-1	K= 2	L=10	M=-2	N= 0	II= 3	X(I,J,K,L,M,N,II)= 12,03486
KK= 248	I= 8	J=-1	K= 2	L=10	M=-2	N= 0	II= 4	X(I,J,K,L,M,N,II)= 11,94525
KK= 249	I= 8	J=-1	K= 2	L=10	M=-2	N= 1	II= 2	X(I,J,K,L,M,N,II)= 12,05754
KK= 250	I= 8	J=-1	K= 2	L=10	M=-2	N= 1	II= 3	X(I,J,K,L,M,N,II)= 11,96788
KK= 251	I= 8	J=-1	K= 2	L=10	M=-2	N= 2	II= 1	X(I,J,K,L,M,N,II)= 12,08022
KK= 252	I= 8	J=-1	K= 2	L=10	M=-2	N= 2	II= 2	X(I,J,K,L,M,N,II)= 11,99053
KK= 253	I= 8	J=-1	K= 2	L=10	M=-2	N= 2	II= 3	X(I,J,K,L,M,N,II)= 11,90098
KK= 254	I= 8	J=-1	K= 2	L=10	M=-2	N= 3	II= 1	X(I,J,K,L,M,N,II)= 12,01318
KK= 255	I= 8	J=-1	K= 2	L=10	M=-2	N= 3	II= 2	X(I,J,K,L,M,N,II)= 11,92360
KK= 256	I= 8	J=-1	K= 2	L=10	M=-2	N= 4	II= 1	X(I,J,K,L,M,N,II)= 11,94623
KK= 257	I= 8	J=-1	K= 3	L= 6	M= 0	N=-1	II= 1	X(I,J,K,L,M,N,II)= 11,90768
KK= 258	I= 8	J=-1	K= 3	L= 7	M=-1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 11,97109
KK= 259	I= 8	J=-1	K= 3	L= 7	M=-1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 11,90298
KK= 260	I= 8	J=-1	K= 3	L= 8	M=-2	N=-1	II= 1	X(I,J,K,L,M,N,II)= 12,05272
KK= 261	I= 8	J=-1	K= 3	L= 8	M=-2	N=-1	II= 2	X(I,J,K,L,M,N,II)= 11,96147
KK= 262	I= 8	J=-1	K= 3	L= 8	M=-2	N= 0	II= 1	X(I,J,K,L,M,N,II)= 11,98452
KK= 263	I= 8	J=-1	K= 3	L= 8	M=-2	N= 1	II= 1	X(I,J,K,L,M,N,II)= 11,91640
KK= 264	I= 8	J= 0	K= 1	L= 9	M= 2	N=-1	II= 3	X(I,J,K,L,M,N,II)= 12,05564
KK= 265	I= 8	J= 0	K= 1	L= 9	M= 2	N=-1	II= 4	X(I,J,K,L,M,N,II)= 11,96754
KK= 266	I= 8	J= 0	K= 1	L= 9	M= 2	N= 0	II= 2	X(I,J,K,L,M,N,II)= 12,07793
KK= 267	I= 8	J= 0	K= 1	L= 9	M= 2	N= 0	II= 3	X(I,J,K,L,M,N,II)= 11,98980
KK= 268	I= 8	J= 0	K= 1	L= 9	M= 2	N= 0	II= 4	X(I,J,K,L,M,N,II)= 11,90180
KK= 269	I= 8	J= 0	K= 1	L= 9	M= 2	N= 1	II= 2	X(I,J,K,L,M,N,II)= 12,01206

KK= 270	I= 8	J= 0	K= 1	L= 9	M= 2	N= 1	II= 3	X(I,J,K,L,M,N,II)= 11,92403
KK= 271	I= 8	J= 0	K= 1	L= 9	M= 2	N= 2	II= 1	X(I,J,K,L,M,N,II)= 12,03433
KK= 272	I= 8	J= 0	K= 1	L= 9	M= 2	N= 2	II= 2	X(I,J,K,L,M,N,II)= 11,94626
KK= 273	I= 8	J= 0	K= 1	L= 9	M= 2	N= 3	II= 1	X(I,J,K,L,M,N,II)= 11,96851
KK= 274	I= 8	J= 0	K= 1	L= 9	M= 2	N= 4	II= 1	X(I,J,K,L,M,N,II)= 11,90277
KK= 275	I= 8	J= 0	K= 1	L=10	M= 1	N=-1	II= 4	X(I,J,K,L,M,N,II)= 12,03688
KK= 276	I= 8	J= 0	K= 1	L=10	M= 1	N= 0	II= 3	X(I,J,K,L,M,N,II)= 12,05916
KK= 277	I= 8	J= 0	K= 1	L=10	M= 1	N= 0	II= 4	X(I,J,K,L,M,N,II)= 11,97106
KK= 278	I= 8	J= 0	K= 1	L=10	M= 1	N= 1	II= 2	X(I,J,K,L,M,N,II)= 12,03145
KK= 279	I= 8	J= 0	K= 1	L=10	M= 1	N= 1	II= 3	X(I,J,K,L,M,N,II)= 11,99331
KK= 280	I= 8	J= 0	K= 1	L=10	M= 1	N= 1	II= 4	X(I,J,K,L,M,N,II)= 11,90531
KK= 281	I= 8	J= 0	K= 1	L=10	M= 1	N= 2	II= 2	X(I,J,K,L,M,N,II)= 12,01557
KK= 282	I= 8	J= 0	K= 1	L=10	M= 1	N= 2	II= 3	X(I,J,K,L,M,N,II)= 11,92754
KK= 283	I= 8	J= 0	K= 1	L=10	M= 1	N= 3	II= 1	X(I,J,K,L,M,N,II)= 12,03785
KK= 284	I= 8	J= 0	K= 1	L=10	M= 1	N= 3	II= 2	X(I,J,K,L,M,N,II)= 11,94978
KK= 285	I= 8	J= 0	K= 1	L=10	M= 1	N= 4	II= 1	X(I,J,K,L,M,N,II)= 11,97202
KK= 286	I= 8	J= 0	K= 2	L= 7	M= 2	N=-1	II= 1	X(I,J,K,L,M,N,II)= 12,05966
KK= 287	I= 8	J= 0	K= 2	L= 7	M= 2	N=-1	II= 2	X(I,J,K,L,M,N,II)= 11,97000
KK= 288	I= 8	J= 0	K= 2	L= 7	M= 2	N= 0	II= 1	X(I,J,K,L,M,N,II)= 11,99265
KK= 289	I= 8	J= 0	K= 2	L= 7	M= 2	N= 0	II= 2	X(I,J,K,L,M,N,II)= 11,90310
KK= 290	I= 8	J= 0	K= 2	L= 7	M= 2	N= 1	II= 1	X(I,J,K,L,M,N,II)= 11,92572
KK= 291	I= 8	J= 0	K= 2	L= 8	M= 1	N=-1	II= 2	X(I,J,K,L,M,N,II)= 12,02292
KK= 292	I= 8	J= 0	K= 2	L= 8	M= 1	N=-1	II= 3	X(I,J,K,L,M,N,II)= 11,93332
KK= 293	I= 8	J= 0	K= 2	L= 8	M= 1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 12,04558
KK= 294	I= 8	J= 0	K= 2	L= 8	M= 1	N= 0	II= 2	X(I,J,K,L,M,N,II)= 11,95595
KK= 295	I= 8	J= 0	K= 2	L= 8	M= 1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 11,97859
KK= 296	I= 8	J= 0	K= 2	L= 8	M= 1	N= 2	II= 1	X(I,J,K,L,M,N,II)= 11,91168
KK= 297	I= 8	J= 0	K= 2	L= 9	M= 0	N=-1	II= 2	X(I,J,K,L,M,N,II)= 12,09353
KK= 298	I= 8	J= 0	K= 2	L= 9	M= 0	N=-1	II= 3	X(I,J,K,L,M,N,II)= 12,00384
KK= 299	I= 8	J= 0	K= 2	L= 9	M= 0	N=-1	II= 4	X(I,J,K,L,M,N,II)= 11,91427
KK= 300	I= 8	J= 0	K= 2	L= 9	M= 0	N= 0	II= 2	X(I,J,K,L,M,N,II)= 12,02650
KK= 301	I= 8	J= 0	K= 2	L= 9	M= 0	N= 0	II= 3	X(I,J,K,L,M,N,II)= 11,93689
KK= 302	I= 8	J= 0	K= 2	L= 9	M= 0	N= 1	II= 1	X(I,J,K,L,M,N,II)= 12,04917
KK= 303	I= 8	J= 0	K= 2	L= 9	M= 0	N= 1	II= 2	X(I,J,K,L,M,N,II)= 11,95953
KK= 304	I= 8	J= 0	K= 2	L= 9	M= 0	N= 2	II= 1	X(I,J,K,L,M,N,II)= 11,98217
KK= 305	I= 8	J= 0	K= 2	L= 9	M= 0	N= 3	II= 1	X(I,J,K,L,M,N,II)= 11,91525
KK= 306	I= 8	J= 0	K= 2	L=10	M=-1	N=-1	II= 3	X(I,J,K,L,M,N,II)= 12,09211
KK= 307	I= 8	J= 0	K= 2	L=10	M=-1	N=-1	II= 4	X(I,J,K,L,M,N,II)= 12,00240
KK= 308	I= 8	J= 0	K= 2	L=10	M=-1	N= 0	II= 3	X(I,J,K,L,M,N,II)= 12,02506
KK= 309	I= 8	J= 0	K= 2	L=10	M=-1	N= 0	II= 4	X(I,J,K,L,M,N,II)= 11,93546
KK= 310	I= 8	J= 0	K= 2	L=10	M=-1	N= 1	II= 2	X(I,J,K,L,M,N,II)= 12,04773
KK= 311	I= 8	J= 0	K= 2	L=10	M=-1	N= 1	II= 3	X(I,J,K,L,M,N,II)= 11,95809
KK= 312	I= 8	J= 0	K= 2	L=10	M=-1	N= 2	II= 1	X(I,J,K,L,M,N,II)= 12,07041
KK= 313	I= 8	J= 0	K= 2	L=10	M=-1	N= 2	II= 2	X(I,J,K,L,M,N,II)= 11,98073
KK= 314	I= 8	J= 0	K= 2	L=10	M=-1	N= 3	II= 1	X(I,J,K,L,M,N,II)= 12,00338
KK= 315	I= 8	J= 0	K= 2	L=10	M=-1	N= 3	II= 2	X(I,J,K,L,M,N,II)= 11,91382
KK= 316	I= 8	J= 0	K= 2	L=10	M=-1	N= 4	II= 1	X(I,J,K,L,M,N,II)= 11,93644
KK= 317	I= 8	J= 0	K= 3	L= 6	M= 1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 11,91728
KK= 318	I= 8	J= 0	K= 3	L= 7	M= 0	N=-1	II= 1	X(I,J,K,L,M,N,II)= 11,97109
KK= 319	I= 8	J= 0	K= 3	L= 7	M= 0	N= 0	II= 1	X(I,J,K,L,M,N,II)= 11,90298
KK= 320	I= 8	J= 0	K= 3	L= 8	M=-1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 12,04292
KK= 321	I= 8	J= 0	K= 3	L= 8	M=-1	N=-1	II= 2	X(I,J,K,L,M,N,II)= 11,95168
KK= 322	I= 8	J= 0	K= 3	L= 8	M=-1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 11,97473
KK= 323	I= 8	J= 0	K= 3	L= 8	M=-1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 11,90662
KK= 324	I= 8	J= 0	K= 3	L= 9	M=-2	N=-1	II= 2	X(I,J,K,L,M,N,II)= 12,04146
KK= 325	I= 8	J= 0	K= 3	L= 9	M=-2	N=-1	II= 3	X(I,J,K,L,M,N,II)= 11,95022
KK= 326	I= 8	J= 0	K= 3	L= 9	M=-2	N= 0	II= 1	X(I,J,K,L,M,N,II)= 12,06454
KK= 327	I= 8	J= 0	K= 3	L= 9	M=-2	N= 0	II= 2	X(I,J,K,L,M,N,II)= 11,97327
KK= 328	I= 8	J= 0	K= 3	L= 9	M=-2	N= 1	II= 1	X(I,J,K,L,M,N,II)= 11,99632
KK= 329	I= 8	J= 0	K= 3	L= 9	M=-2	N= 1	II= 2	X(I,J,K,L,M,N,II)= 11,90516
KK= 330	I= 8	J= 0	K= 3	L= 9	M=-2	N= 2	II= 1	X(I,J,K,L,M,N,II)= 11,92819
KK= 331	I= 8	J= 1	K= 1	L=10	M= 2	N=-1	II= 4	X(I,J,K,L,M,N,II)= 12,04632
KK= 332	I= 8	J= 1	K= 1	L=10	M= 2	N= 0	II= 3	X(I,J,K,L,M,N,II)= 12,06861
KK= 333	I= 8	J= 1	K= 1	L=10	M= 2	N= 0	II= 4	X(I,J,K,L,M,N,II)= 11,98049
KK= 334	I= 8	J= 1	K= 1	L=10	M= 2	N= 1	II= 2	X(I,J,K,L,M,N,II)= 12,09090
KK= 335	I= 8	J= 1	K= 1	L=10	M= 2	N= 1	II= 3	X(I,J,K,L,M,N,II)= 12,00275
KK= 336	I= 8	J= 1	K= 1	L=10	M= 2	N= 1	II= 4	X(I,J,K,L,M,N,II)= 11,91473
KK= 337	I= 8	J= 1	K= 1	L=10	M= 2	N= 2	II= 2	X(I,J,K,L,M,N,II)= 12,02502
KK= 338	I= 8	J= 1	K= 1	L=10	M= 2	N= 2	II= 3	X(I,J,K,L,M,N,II)= 11,93697
KK= 339	I= 8	J= 1	K= 1	L=10	M= 2	N= 3	II= 1	X(I,J,K,L,M,N,II)= 12,04729
KK= 340	I= 8	J= 1	K= 1	L=10	M= 2	N= 3	II= 2	X(I,J,K,L,M,N,II)= 11,95921
KK= 341	I= 8	J= 1	K= 1	L=10	M= 2	N= 4	II= 1	X(I,J,K,L,M,N,II)= 11,98146
KK= 342	I= 8	J= 1	K= 2	L= 8	M= 2	N=-1	II= 2	X(I,J,K,L,M,N,II)= 12,03235
KK= 343	I= 8	J= 1	K= 2	L= 8	M= 2	N=-1	II= 3	X(I,J,K,L,M,N,II)= 11,94274
KK= 344	I= 8	J= 1	K= 2	L= 8	M= 2	N= 0	II= 1	X(I,J,K,L,M,N,II)= 12,05502
KK= 345	I= 8	J= 1	K= 2	L= 8	M= 2	N= 0	II= 2	X(I,J,K,L,M,N,II)= 11,96537
KK= 346	I= 8	J= 1	K= 2	L= 8	M= 2	N= 1	II= 1	X(I,J,K,L,M,N,II)= 11,98802
KK= 347	I= 8	J= 1	K= 2	L= 8	M= 2	N= 2	II= 1	X(I,J,K,L,M,N,II)= 11,92110
KK= 348	I= 8	J= 1	K= 2	L= 9	M= 1	N=-1	II= 2	X(I,J,K,L,M,N,II)= 12,09355
KK= 349	I= 8	J= 1	K= 2	L= 9	M= 1	N=-1	II= 3	X(I,J,K,L,M,N,II)= 12,00384
KK= 350	I= 8	J= 1	K= 2	L= 9	M= 1	N=-1	II= 4	X(I,J,K,L,M,N,II)= 11,91427
KK= 351	I= 8	J= 1	K= 2	L= 9	M= 1	N= 0	II= 2	X(I,J,K,L,M,N,II)= 12,02650
KK= 352	I= 8	J= 1	K= 2	L= 9	M= 1	N= 0	II= 3	X(I,J,K,L,M,N,II)= 11,93689
KK= 353	I= 8	J= 1	K= 2	L= 9	M= 1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 12,04917
KK= 354	I= 8	J= 1	K= 2	L= 9	M= 1	N= 1	II= 2	X(I,J,K,L,M,N,II)= 11,95953
KK= 355	I= 8	J= 1	K= 2	L= 9	M= 1	N= 2	II= 1	X(I,J,K,L,M,N,II)= 11,98217
KK= 356	I= 8	J= 1	K= 2	L= 9	M= 1	N= 3	II= 1	X(I,J,K,L,M,N,II)= 11,91525
KK= 357	I= 8	J= 1	K= 2	L=10	M= 0	N=-1	II= 3	X(I,J,K,L,M,N,II)= 12,08249
KK= 358	I= 8	J= 1	K= 2	L=10	M= 0	N=-1	II= 4	X(I,J,K,L,M,N,II)= 11,99279
KK= 359	I= 8	J= 1	K= 2	L=10	M= 0	N= 0	II= 3	X(I,J,K,L,M,N,II)= 12,01545
KK= 360	I= 8	J= 1	K= 2	L=10	M= 0	N= 0	II= 4	X(I,J,K,L,M,N,II)= 11,92586
KK= 361	I= 8	J= 1	K= 2	L=10	M= 0	N= 1	II= 2	X(I,J,K,L,M,N,II)= 12,03811
KK= 362	I= 8	J= 1	K= 2	L=10	M= 0	N= 1	II= 3	X(I,J,K,L,M,N,II)= 11,94849
KK= 363	I= 8	J= 1	K= 2	L=10	M= 0	N= 2	II= 1	X(I,J,K,L,M,N,II)= 12,06079
KK= 364	I= 8	J= 1	K= 2	L=10	M= 0	N= 2	II= 2	X(I,J,K,L,M,N,II)= 11,97113
KK= 365	I= 8	J= 1	K= 2	L=10	M= 0	N= 3	II= 1	X(I,J,K,L,M,N,II)= 11,99378

KK= 366	I= 8	J= 1	K= 2	L=10	M= 0	N= 3	II= 2	X(I,J,K,L,M,N,II)= 11,90423
KK= 367	I= 8	J= 1	K= 2	L=10	M= 0	N= 4	II= 1	X(I,J,K,L,M,N,II)= 11,92685
KK= 368	I= 8	J= 1	K= 3	L= 6	M= 2	N=-1	II= 1	X(I,J,K,L,M,N,II)= 11,92668
KK= 369	I= 8	J= 1	K= 3	L= 7	M= 1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 11,97109
KK= 370	I= 8	J= 1	K= 3	L= 7	M= 1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 11,90298
KK= 371	I= 8	J= 1	K= 3	L= 8	M= 0	N=-1	II= 1	X(I,J,K,L,M,N,II)= 12,03331
KK= 372	I= 8	J= 1	K= 3	L= 8	M= 0	N=-1	II= 2	X(I,J,K,L,M,N,II)= 11,94209
KK= 373	I= 8	J= 1	K= 3	L= 8	M= 0	N= 0	II= 1	X(I,J,K,L,M,N,II)= 11,96513
KK= 374	I= 8	J= 1	K= 3	L= 9	M=-1	N=-1	II= 2	X(I,J,K,L,M,N,II)= 12,02207
KK= 375	I= 8	J= 1	K= 3	L= 9	M=-1	N=-1	II= 3	X(I,J,K,L,M,N,II)= 11,93086
KK= 376	I= 8	J= 1	K= 3	L= 9	M=-1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 12,04514
KK= 377	I= 8	J= 1	K= 3	L= 9	M=-1	N= 0	II= 2	X(I,J,K,L,M,N,II)= 11,95390
KK= 378	I= 8	J= 1	K= 3	L= 9	M=-1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 11,97695
KK= 379	I= 8	J= 1	K= 3	L= 9	M=-1	N= 2	II= 1	X(I,J,K,L,M,N,II)= 11,90884
KK= 380	I= 8	J= 1	K= 3	L=10	M=-2	N=-1	II= 3	X(I,J,K,L,M,N,II)= 12,02861
KK= 381	I= 8	J= 1	K= 3	L=10	M=-2	N=-1	II= 4	X(I,J,K,L,M,N,II)= 11,93739
KK= 382	I= 8	J= 1	K= 3	L=10	M=-2	N= 0	II= 2	X(I,J,K,L,M,N,II)= 12,05169
KK= 383	I= 8	J= 1	K= 3	L=10	M=-2	N= 0	II= 3	X(I,J,K,L,M,N,II)= 11,96043
KK= 384	I= 8	J= 1	K= 3	L=10	M=-2	N= 1	II= 1	X(I,J,K,L,M,N,II)= 12,07477
KK= 385	I= 8	J= 1	K= 3	L=10	M=-2	N= 1	II= 2	X(I,J,K,L,M,N,II)= 11,98548
KK= 386	I= 8	J= 1	K= 3	L=10	M=-2	N= 2	II= 1	X(I,J,K,L,M,N,II)= 12,00654
KK= 387	I= 8	J= 1	K= 3	L=10	M=-2	N= 2	II= 2	X(I,J,K,L,M,N,II)= 11,91536
KK= 388	I= 8	J= 1	K= 3	L=10	M=-2	N= 3	II= 1	X(I,J,K,L,M,N,II)= 11,93840
KK= 389	I= 8	J= 1	K= 4	L= 8	M=-2	N=-1	II= 1	X(I,J,K,L,M,N,II)= 11,94142
KK= 390	I= 8	J= 2	K= 2	L= 9	M= 2	N=-1	II= 2	X(I,J,K,L,M,N,II)= 12,09355
KK= 391	I= 8	J= 2	K= 2	L= 9	M= 2	N=-1	II= 3	X(I,J,K,L,M,N,II)= 12,00384
KK= 392	I= 8	J= 2	K= 2	L= 9	M= 2	N=-1	II= 4	X(I,J,K,L,M,N,II)= 11,91427
KK= 393	I= 8	J= 2	K= 2	L= 9	M= 2	N= 0	II= 2	X(I,J,K,L,M,N,II)= 12,02650
KK= 394	I= 8	J= 2	K= 2	L= 9	M= 2	N= 0	II= 3	X(I,J,K,L,M,N,II)= 11,93689
KK= 395	I= 8	J= 2	K= 2	L= 9	M= 2	N= 1	II= 1	X(I,J,K,L,M,N,II)= 12,04917
KK= 396	I= 8	J= 2	K= 2	L= 9	M= 2	N= 1	II= 2	X(I,J,K,L,M,N,II)= 11,95953
KK= 397	I= 8	J= 2	K= 2	L= 9	M= 2	N= 2	II= 1	X(I,J,K,L,M,N,II)= 11,98217
KK= 398	I= 8	J= 2	K= 2	L= 9	M= 2	N= 3	II= 1	X(I,J,K,L,M,N,II)= 11,91525
KK= 399	I= 8	J= 2	K= 2	L=10	M= 1	N=-1	II= 3	X(I,J,K,L,M,N,II)= 12,07306
KK= 400	I= 8	J= 2	K= 2	L=10	M= 1	N=-1	II= 4	X(I,J,K,L,M,N,II)= 11,98338
KK= 401	I= 8	J= 2	K= 2	L=10	M= 1	N= 0	II= 2	X(I,J,K,L,M,N,II)= 12,09574
KK= 402	I= 8	J= 2	K= 2	L=10	M= 1	N= 0	II= 3	X(I,J,K,L,M,N,II)= 12,00603
KK= 403	I= 8	J= 2	K= 2	L=10	M= 1	N= 0	II= 4	X(I,J,K,L,M,N,II)= 11,91646
KK= 404	I= 8	J= 2	K= 2	L=10	M= 1	N= 1	II= 2	X(I,J,K,L,M,N,II)= 12,02869
KK= 405	I= 8	J= 2	K= 2	L=10	M= 1	N= 1	II= 3	X(I,J,K,L,M,N,II)= 11,93908
KK= 406	I= 8	J= 2	K= 2	L=10	M= 1	N= 2	II= 1	X(I,J,K,L,M,N,II)= 12,05136
KK= 407	I= 8	J= 2	K= 2	L=10	M= 1	N= 2	II= 2	X(I,J,K,L,M,N,II)= 11,96172
KK= 408	I= 8	J= 2	K= 2	L=10	M= 1	N= 3	II= 1	X(I,J,K,L,M,N,II)= 11,98435
KK= 409	I= 8	J= 2	K= 2	L=10	M= 1	N= 4	II= 1	X(I,J,K,L,M,N,II)= 11,91744
KK= 410	I= 8	J= 2	K= 3	L= 7	M= 2	N=-1	II= 1	X(I,J,K,L,M,N,II)= 11,97109
KK= 411	I= 8	J= 2	K= 3	L= 7	M= 2	N= 0	II= 1	X(I,J,K,L,M,N,II)= 11,90298
KK= 412	I= 8	J= 2	K= 3	L= 8	M= 1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 12,02390
KK= 413	I= 8	J= 2	K= 3	L= 8	M= 1	N=-1	II= 2	X(I,J,K,L,M,N,II)= 11,93269
KK= 414	I= 8	J= 2	K= 3	L= 8	M= 1	N= 0	II= 1	X(I,J,K,L,M,N,II)= 11,95573
KK= 415	I= 8	J= 2	K= 3	L= 9	M= 0	N=-1	II= 1	X(I,J,K,L,M,N,II)= 12,09439
KK= 416	I= 8	J= 2	K= 3	L= 9	M= 0	N=-1	II= 2	X(I,J,K,L,M,N,II)= 12,00307
KK= 417	I= 8	J= 2	K= 3	L= 9	M= 0	N=-1	II= 3	X(I,J,K,L,M,N,II)= 11,91189
KK= 418	I= 8	J= 2	K= 3	L= 9	M= 0	N= 0	II= 1	X(I,J,K,L,M,N,II)= 12,02613
KK= 419	I= 8	J= 2	K= 3	L= 9	M= 0	N= 0	II= 2	X(I,J,K,L,M,N,II)= 11,93492
KK= 420	I= 8	J= 2	K= 3	L= 9	M= 0	N= 1	II= 1	X(I,J,K,L,M,N,II)= 11,95796
KK= 421	I= 8	J= 2	K= 3	L=10	M=-1	N=-1	II= 2	X(I,J,K,L,M,N,II)= 12,09116
KK= 422	I= 8	J= 2	K= 3	L=10	M=-1	N=-1	II= 3	X(I,J,K,L,M,N,II)= 11,99984
KK= 423	I= 8	J= 2	K= 3	L=10	M=-1	N=-1	II= 4	X(I,J,K,L,M,N,II)= 11,90867
KK= 424	I= 8	J= 2	K= 3	L=10	M=-1	N= 0	II= 2	X(I,J,K,L,M,N,II)= 12,02291
KK= 425	I= 8	J= 2	K= 3	L=10	M=-1	N= 0	II= 3	X(I,J,K,L,M,N,II)= 11,93170
KK= 426	I= 8	J= 2	K= 3	L=10	M=-1	N= 1	II= 1	X(I,J,K,L,M,N,II)= 12,04598
KK= 427	I= 8	J= 2	K= 3	L=10	M=-1	N= 1	II= 2	X(I,J,K,L,M,N,II)= 11,95474
KK= 428	I= 8	J= 2	K= 3	L=10	M=-1	N= 2	II= 1	X(I,J,K,L,M,N,II)= 11,97779
KK= 429	I= 8	J= 2	K= 3	L=10	M=-1	N= 3	II= 1	X(I,J,K,L,M,N,II)= 11,90968
KK= 430	I= 8	J= 2	K= 4	L= 8	M=-1	N=-1	II= 1	X(I,J,K,L,M,N,II)= 11,91271
KK= 431	I= 8	J= 2	K= 4	L= 9	M=-2	N=-1	II= 1	X(I,J,K,L,M,N,II)= 12,00227
KK= 432	I= 8	J= 2	K= 4	L= 9	M=-2	N=-1	II= 2	X(I,J,K,L,M,N,II)= 11,90943
KK= 433	I= 8	J= 2	K= 4	L= 9	M=-2	N= 0	II= 1	X(I,J,K,L,M,N,II)= 11,93288
KK= 434	I= 8	J= 2	K= 5	L= 6	M=-2	N= 3	II= 4	X(I,J,K,L,M,N,II)= 12,03386
KK= 435	I= 8	J= 2	K= 5	L= 6	M=-2	N= 4	II= 3	X(I,J,K,L,M,N,II)= 12,05780
KK= 436	I= 8	J= 2	K= 5	L= 6	M=-2	N= 4	II= 4	X(I,J,K,L,M,N,II)= 11,96315

END OF OUTPUT

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BRITISH LEYLAND

C4

TARGET DETERMINISTIC APPRAISAL

OUTPUT IN ASCENDING ORDER

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1	11.90001	11.90098	11.90180	11.90207	11.90277	11.90298	11.90298	11.90298	11.90298	11.90310
2	11.90320	11.90423	11.90450	11.90450	11.90487	11.90516	11.90531	11.90540	11.90552	11.90646
3	11.90662	11.90666	11.90703	11.90768	11.90846	11.90867	11.90884	11.90921	11.90939	11.90943
4	11.90950	11.90968	11.90998	11.91012	11.91063	11.91168	11.91181	11.91189	11.91235	11.91258
5	11.91271	11.91298	11.91353	11.91353	11.91353	11.91353	11.91382	11.91410	11.91427	11.91427
6	11.91427	11.91427	11.91473	11.91525	11.91525	11.91525	11.91525	11.91536	11.91591	11.91640
7	11.91642	11.91646	11.91728	11.91744	11.91792	11.91794	11.91878	11.91880	11.91897	11.91939
8	11.92110	11.92196	11.92282	11.92360	11.92371	11.92403	11.92434	11.92434	11.92434	11.92434
9	11.92572	11.92586	11.92601	11.92668	11.92672	11.92685	11.92720	11.92754	11.92792	11.92819
10	11.92821	11.92874	11.92885	11.92909	11.92984	11.93086	11.93154	11.93168	11.93170	11.93173
11	11.93202	11.93234	11.93269	11.93288	11.93320	11.93332	11.93335	11.93344	11.93492	11.93524
12	11.93546	11.93579	11.93634	11.93634	11.93634	11.93634	11.93644	11.93689	11.93689	11.93689
13	11.93689	11.93691	11.93697	11.93739	11.93825	11.93840	11.93883	11.93908	11.93924	11.93977
14	11.94016	11.94076	11.94130	11.94142	11.94162	11.94180	11.94185	11.94209	11.94274	11.94507
15	11.94525	11.94564	11.94623	11.94626	11.94634	11.94783	11.94847	11.94849	11.94883	11.94944
16	11.94978	11.94995	11.95022	11.95095	11.95103	11.95167	11.95168	11.95390	11.95397	11.95474
17	11.95543	11.95557	11.95573	11.95595	11.95626	11.95762	11.95780	11.95796	11.95809	11.95817
18	11.95817	11.95817	11.95817	11.95861	11.95874	11.95921	11.95953	11.95953	11.95953	11.95953
19	11.95973	11.96043	11.96107	11.96143	11.96147	11.96172	11.96207	11.96240	11.96259	11.96315
20	11.96467	11.96513	11.96524	11.96537	11.96624	11.96754	11.96788	11.96851	11.96851	11.96869
21	11.96898	11.97000	11.97066	11.97072	11.97106	11.97109	11.97109	11.97109	11.97109	11.97113
22	11.97202	11.97319	11.97327	11.97359	11.97377	11.97450	11.97473	11.97525	11.97667	11.97695
23	11.97715	11.97779	11.97809	11.97810	11.97859	11.97867	11.97881	11.97909	11.98045	11.98049
24	11.98073	11.98100	11.98100	11.98100	11.98100	11.98104	11.98146	11.98157	11.98217	11.98217
25	11.98217	11.98217	11.98338	11.98348	11.98368	11.98390	11.98436	11.98452	11.98520	11.98542
26	11.98628	11.98767	11.98802	11.98868	11.98980	11.99053	11.99265	11.99279	11.99297	11.99331
27	11.99350	11.99378	11.99570	11.99602	11.99632	11.99722	11.99733	11.99746	11.99751	11.99951
28	11.99984	12.00040	12.00094	12.00192	12.00207	12.00227	12.00240	12.00275	12.00307	12.00329
29	12.00338	12.00384	12.00384	12.00384	12.00384	12.00384	12.00384	12.00384	12.00384	12.00441
30	12.00455	12.00596	12.00603	12.00654	12.00674	12.00727	12.00827	12.00913	12.01206	12.01220
31	12.01315	12.01318	12.01329	12.01524	12.01545	12.01557	12.01634	12.01855	12.01869	12.01919
32	12.01978	12.02207	12.02291	12.02292	12.02379	12.02390	12.02432	12.02502	12.02506	12.02613
33	12.02614	12.02627	12.02650	12.02650	12.02650	12.02650	12.02724	12.02726	12.02821	12.02860
34	12.02861	12.02869	12.03012	12.03082	12.03221	12.03235	12.03331	12.03386	12.03433	12.03458
35	12.03486	12.03596	12.03654	12.03688	12.03735	12.03787	12.03811	12.03820	12.04058	12.04146
36	12.04196	12.04204	12.04252	12.04514	12.04558	12.04565	12.04598	12.04632	12.04665	12.04729
37	12.04745	12.04759	12.04773	12.04800	12.04855	12.04855	12.04855	12.04855	12.04913	12.04917
38	12.04917	12.04917	12.04917	12.04952	12.04982	12.05136	12.05146	12.05169	12.05272	12.05298
39	12.05502	12.05564	12.05754	12.05780	12.05806	12.05882	12.05916	12.05966	12.06079	12.06107
40	12.06336	12.06454	12.06491	12.06661	12.06709	12.06852	12.06861	12.06920	12.07041	12.07073
41	12.07087	12.07087	12.07142	12.07142	12.07142	12.07142	12.07181	12.07200	12.07306	12.07433
42	12.07477	12.07585	12.07672	12.07773	12.08022	12.08111	12.08145	12.08249	12.08394	12.08565
43	12.08615	12.09069	12.09090	12.09116	12.09140	12.09211	12.09355	12.09355	12.09355	12.09355
44	12.09375	12.09410	12.09439	12.09487	12.09574	12.09774				

END OF OUTPUT

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APPENDIX D

CALCULATION OF NORMAL DISTRIBUTION DEVIATES.

D. CALCULATION OF NORMAL DISTRIBUTION DEVIATES

The mathematical model used in the package in the computer centre of Aston University to calculate values of normal distribution, with given mean and standard deviation, can be described as follows:

A sequence of pseudo-random numbers, x_{r+1}, is formed from the two multiplicative congruential sequences as follows and scaled by M to produce the required sequence.

$$X_{r+1} = X_{1,r+1} + X_{2,r+1} \qquad \text{(Mod. M)}$$

where two multiplicative congruential sequences are equal to

$$X_{1,r+1} = b_1 X_{1,r} \qquad \text{(Mod M)}$$

$$X_{2,r+1} = b_2\ X_{2,r} \qquad \text{(Mod M)}$$

and the value of constants are:

$$M = 2^{46}$$

$$b_1 = 3^{15}$$

$$b_2 = 5^{9}$$

$$X_{1,o} = X_{2,o} = 1\,2\,3\,4\,5\,6\,7$$

The expressions mean to take the last value of random number, ($X_{1,r}$ or $X_{2,r}$), multiply it by the constant b and the result modulo M, that is, divide by M and treat the reminder as new X, (namely $X_{1,r+1}$ or $X_{2,r+1}$)

The next step is the computation of a pair of independent random variables from the standard normal distribution with mean zero and unit variance. These alternate elements of sequences, Y_{2i-1} and Y_{2i} are determined from the equations

$$Y_{2i-1} = \sqrt{-2Ln\,(X_{i-1}\ )} \quad . \quad SIN\ (2\,\pi\,x_{2i}\ )$$

$$Y_{2i} = \sqrt{-2Ln\ (X_{2i\ -1})} \quad . \quad COS\ (2\,\pi\,X_{2i}\ )$$

Using successive values of these alternate elements as Y in following equations

$$Z = BY + A$$

will give Z the value of normal distribution in which A and B are mean and standard deviation respectively (79, 80, 81).

APPENDIX E

CALCULATING MEANS AND STANDARD DEVIATIONS OF SEVEN COMPONENT VARIABLES USING POLYNOMIALS OF DEGREES FOUR.

A computer package is employed to forecast means and standard deviations of seven component variables of BritishLeyland for 1978 based on ten years statistical data using polynomial equations of degree four. The equation of each variable is used to calculate the forecasting value and its standard deviation. The results are given and represented in Tables El to E7 and figures El to E7 respectively.

E1 - PRICE PER UNIT OF OUTPUT

$A_t = .27392 + .79002\,x - .28732\,x^2 + .041168\,x^3 - .0017239\,x^4$

TABLE E1

	x	1	2	3	4	5	6	7	8	9	10	11
Actual value (£000's)	A	.864	.896	1.038	1.114	1.137	1.347	1.564	2.211	2.948	3.315	
Forecasting Value (£000's)	A_t	.816	1.006	1.030	1.030	1.110	1.332	1.707	2.223	2.812	3.371	3.753

$\sum (A_t - A)^2 = .06482$ $\qquad AS = \sqrt{\dfrac{(A_t - A)^2}{N-2}}$ $\qquad N = 10$

AM = 3.753

AS = .090

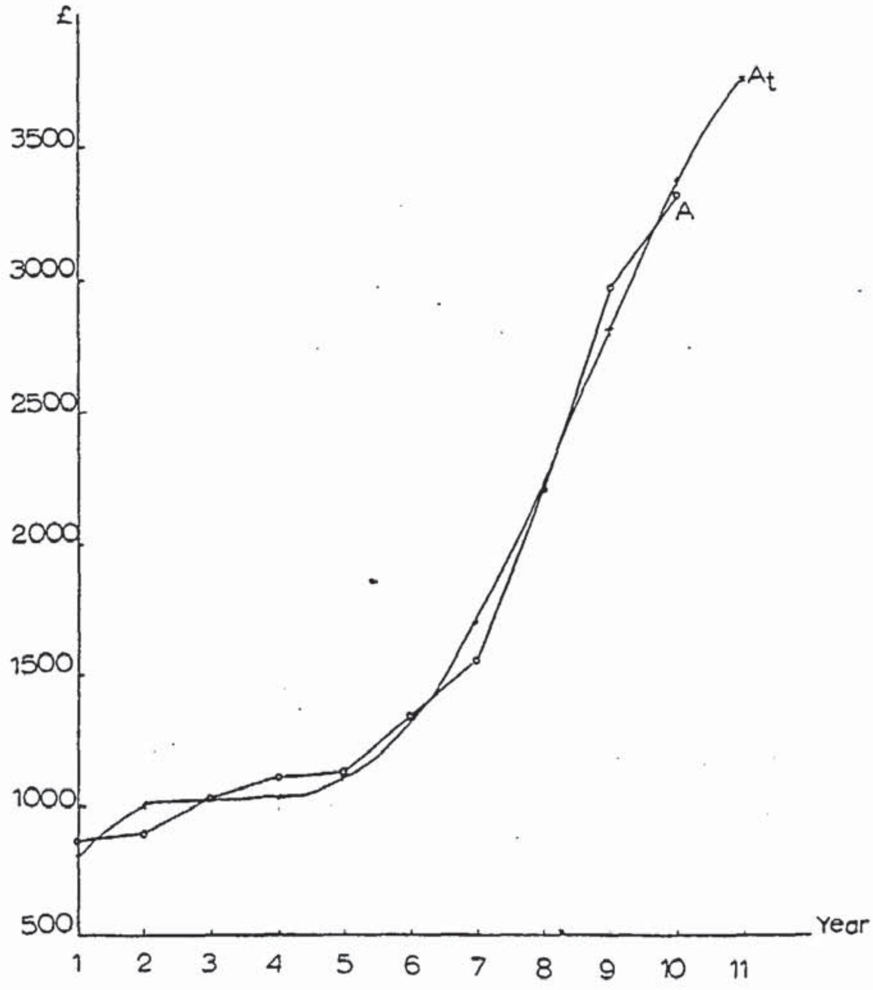

Fig.E1 Actual and Forecast Curves of A for B.L.

E.2 - COST OF BOUGHT-IN INPUT PER UNIT OF OUTPUT

$$B_t = .11833 + .57264\,x - .20695\,x^2 + .029504\,x^3 - .0012372\,x^4$$

TABLE E 2

Year	x	1	2	3	4	5	6	7	8	9	10	11
Actual value (£000's)	B	.544	.575	.686	.718	.744	.878	1.024	1.538	1.948	2.256	
Forecast value (£000's)	B_t	.512	.652	.670	.669	.723	.873	1.136	1.493	1.900	2.282	2.532

$\sum(B_t - B)^2 = .02747$ $\qquad$ $BS = \sqrt{\dfrac{(B_t - B)^2}{N-2}}$

BM = 2.532

BS = .059

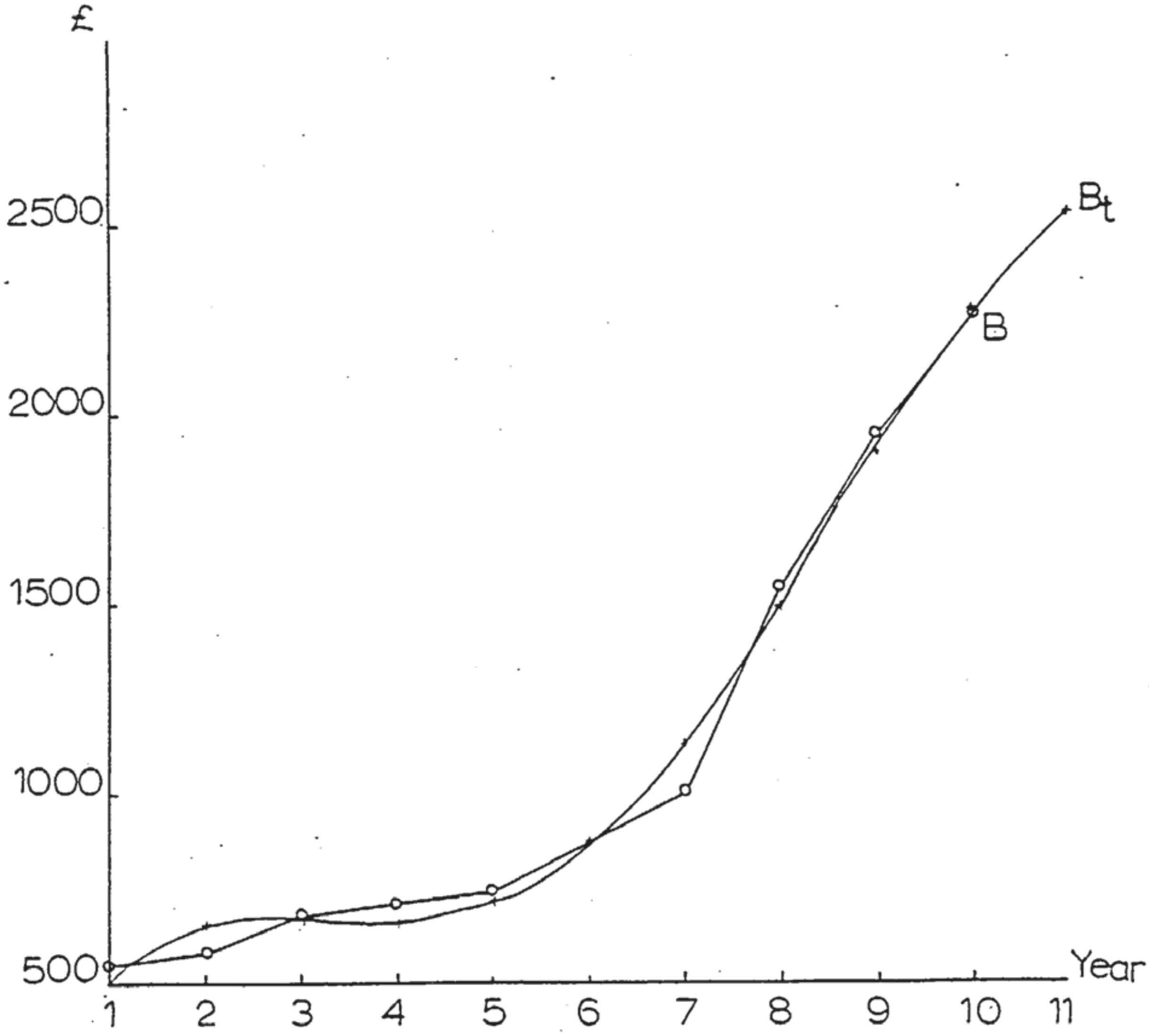

Fig.E2 Actual and Forecast Curves of Variable B for B.L.

E 3. - TOTAL OUTPUT QUANTITY

$C_t = 1294.5 - 341.04\,x + 134.50\,x^2 - 18.788\,x^3 + .81876\,x^4$

TABLE E 3

	x	1	2	3	4	5	6	7	8	9	10	11
Actual value (000's)	C	1050	1083	984	1057	1127	1161	1020	845	785	785	
Forecast value (000's)	C_t	1069.991	1013.216	1040.924	1089.511	1115.025	1093.165	1019.279	908.365	795.072	733.7	798.197

$\sum(C_t - C)^2 = 21060.41706$ $\qquad CS = \sqrt{\dfrac{(C_t - C)^2}{N - 2}}$

CM = 798.197
CS = 51.308

(000's)

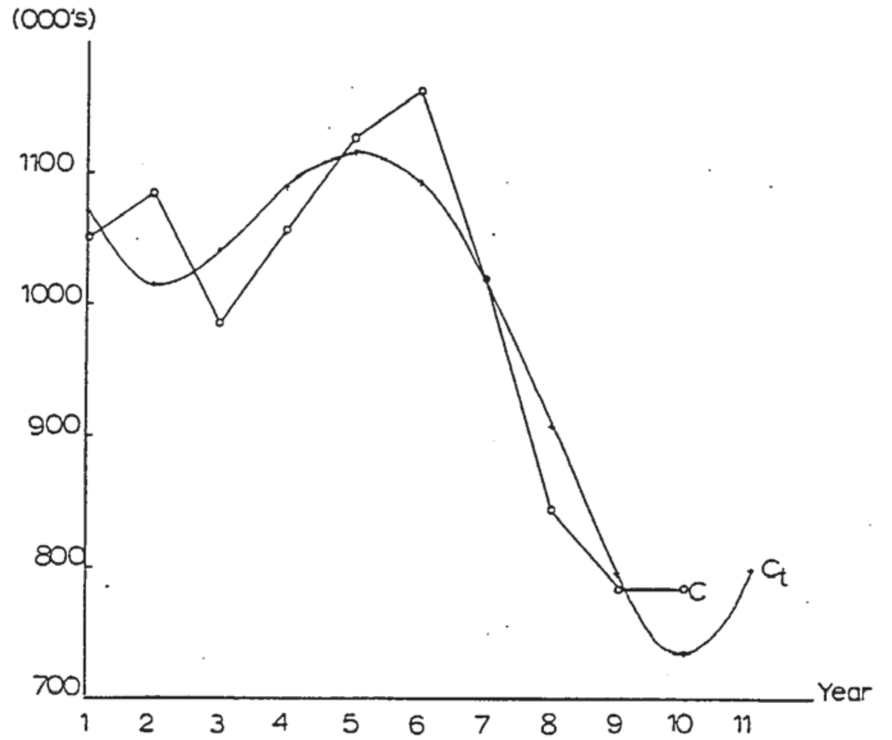

Fig.E3 Actual and Forecast Curves of Variable C for B.L.

E 4 - AVERAGE REMUNERATION PER EMPLOYEE PER YEAR

$$D_t = 1.3295 + .039379\,x - .021044\,x^2 + .009129\,x^3 - .00050874\,x^4$$

TABLE E.4

year	x	1	2	3	4	5	6	7	8	9	10	11
Actual value (£00's)	D	1.389	1.324	1.444	1.663	1.867	2.153	2.333	2.888	3.413	3.612	
Forecast value (£000's)	D_t	1.356	1.389	1.464	1.604	1.823	2.121	2.484	2.888	3.297	3.660	3.919

$\sum (D_t - D)^2 = .05068$

$$DS = \sqrt{\frac{(D_t - D)^2}{N - 2}}$$

DS = .080
DM = 3.919

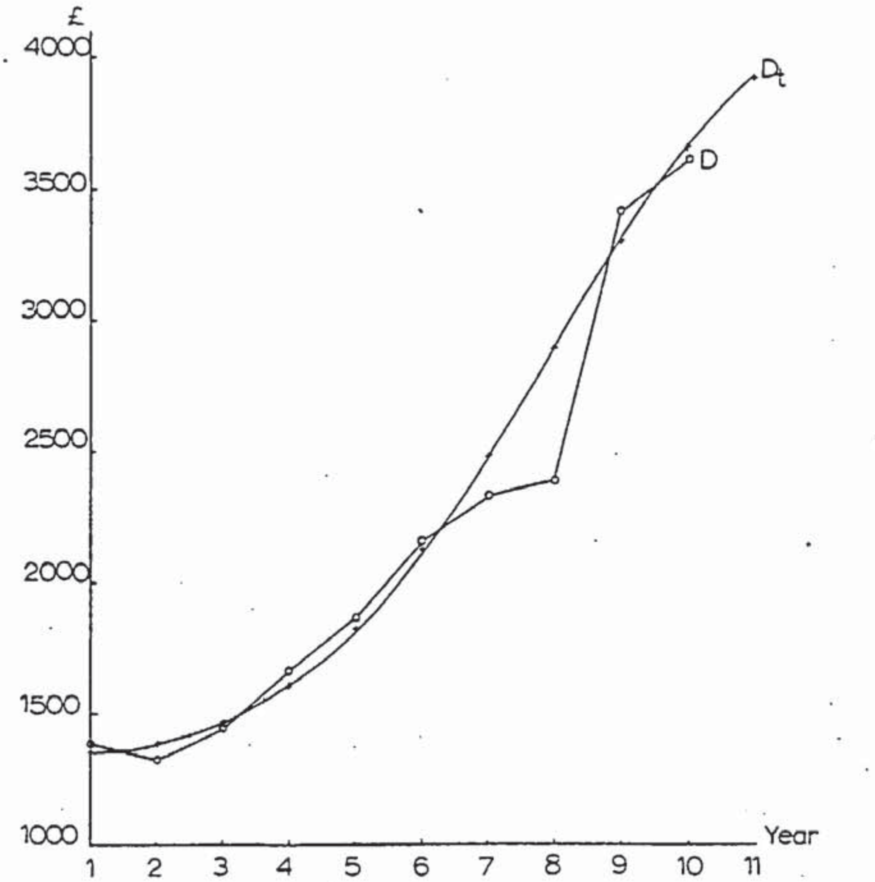

Fig.E4 Actual and Forecast Curves of Variable D for B.L.

E 5 Average Number of Employees

$E_t = 192.23 - 4.2987\, x + 3.1394\, x^2 - .51632\, x^3 + .024359\, x^4$

TABLE E 5

Year	x	1	2	3	4	5	6	7	8	9	10	11
Actual value (£000's)	E	188.2	196.4	199.5	193.7	190.8	204.1	207.8	191.5	183.4	194.6	
Forecast value (£000's)	E_t	190.579	192.449	195.621	198.457	199.906	199.500	197.358	194.181	191.255	190.453	194.230

$\sum (E_t - E)^2 = 358.1412453$

$$ES = \sqrt{\frac{(E_t - E)^2}{N - 2}}$$

EM = 194.230
ES = 6.691

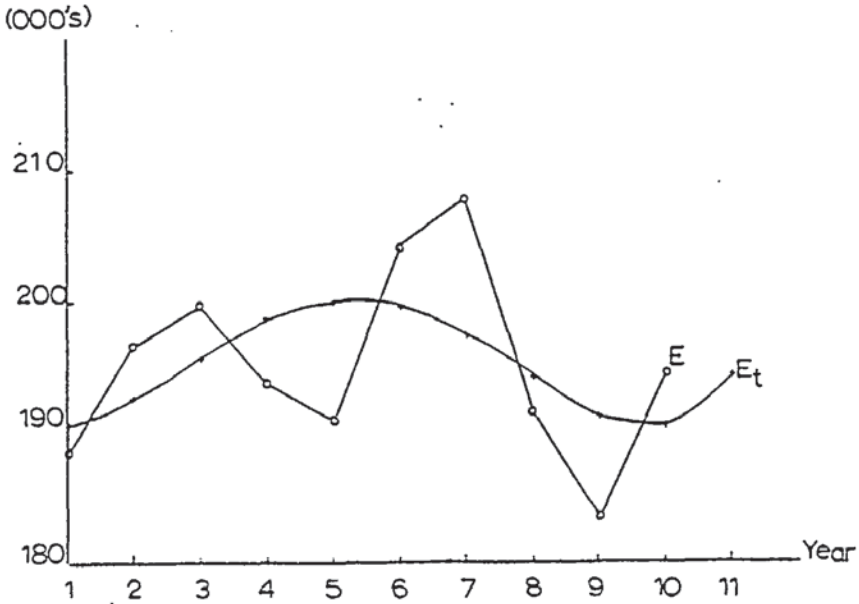

Fig. E5 Actual and Forecast Curves of Variable E for B.L.

E 6 - FACILITIES COST PER UNIT OF OUTPUT

$G_t = .015083 + .032649\, x - .011678\, x^2 + .0015355\, x^3 - .00006162\, x^4$

TABLE E 6

Year	x	1	2	3	4	5	6	7	8	9	10	11
Actual value (£000's)	G	.040	.039	.045	.047	.040	.041	.045	.064	.082	.091	
Forecast value (£000's)	G_t	.038	.045	.044	.041	.040	.042	.050	.063	.078	.093	.103

$\sum (G_t - G)^2 = .00012$

GM =.103
GS =.004

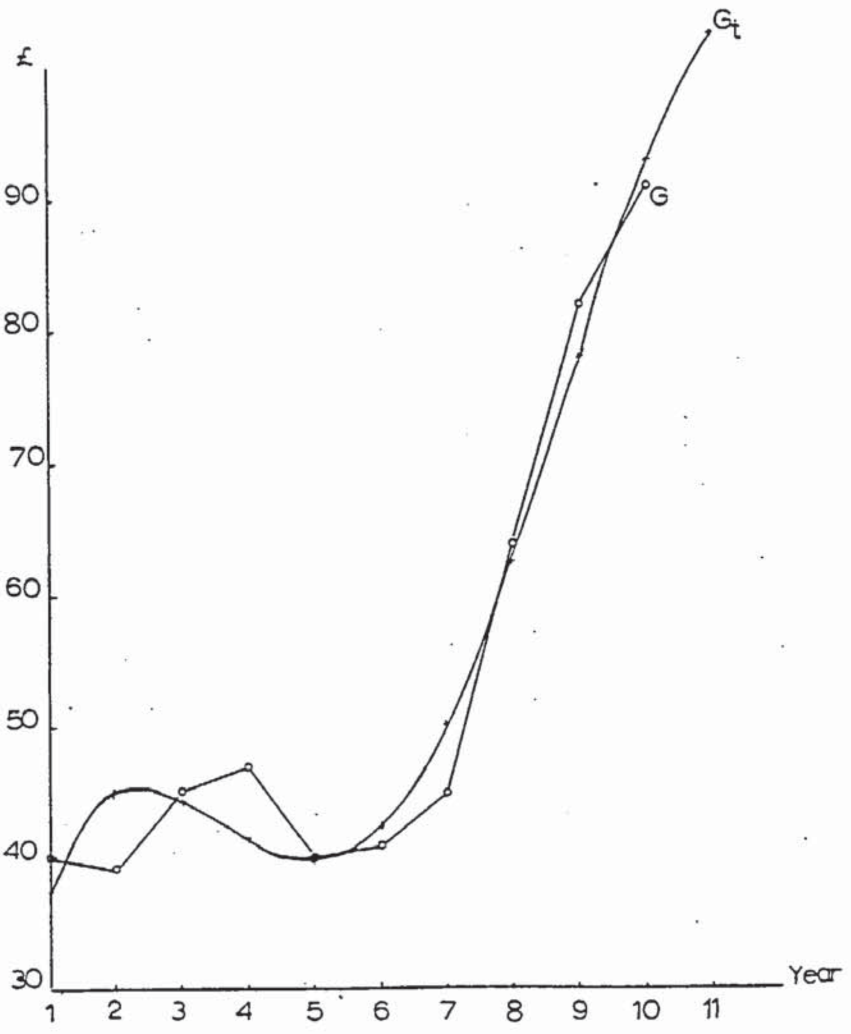

Fig.E 6 Actual and Forecast Curves of Variable G for B.L.

E 7 - CAPITAL INTEREST CHARGES PER UNIT OF OUTPUT

E_t - .014917 + .029077 x - .010839 x^2 + .0014919 x^3 - .000061626 x^4

TABLE E 7

Year	x	1	2	3	4	5	6	7	8	9	10	11
Actual value (£000's)	E	.007	.005	.011	.014	.008	.006	.017	.045	.048	.068	
Forecast value (£000's)	H_t	.005	.011	.010	.008	.007	.012	.021	.035	.052	.068	.077

$\sum(E_t - E)^2$ = .00024

ES = .005

EM = .007

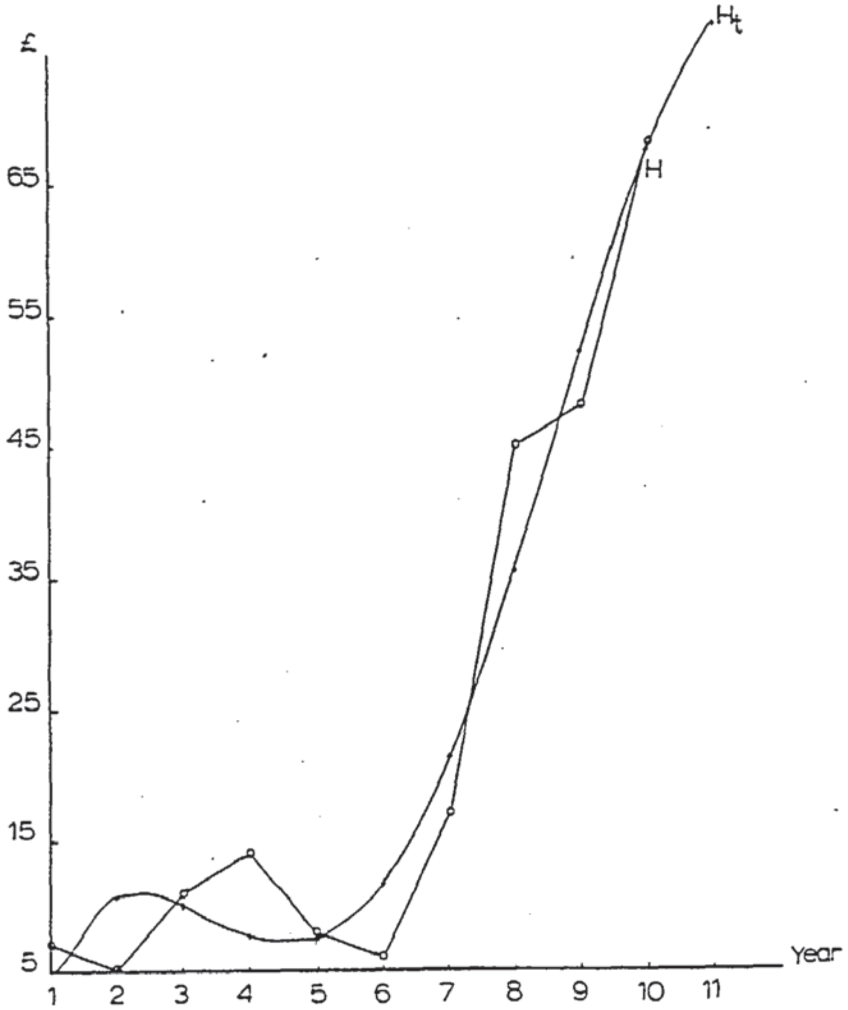

Fig.E.7 Actual and Forecast Curves of Variable H for B.L.

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