WORKING PAPER

INTEGRATION OF EQUITY AND EFFICIENCY CRITERIA FOR BUDGET ALLOCATION

ECONOMIC ANALYSIS BRANCH
PLANNING DIVISION

REGIONAL ECONOMIC EXPANSION CANADA
EXPANSION ÉCONOMIQUE RÉGIONALE CANADA

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Canada Dept of Regional Economic Expansion

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SUMMARY

The decision maker faced with a fixed budget must, of necessity, be selective in allocating his resources. Such selectivity calls for a set of criteria on the basis of which competing projects can be evaluated. Benefit-cost analysis was developed to deal with this problem of project evaluation and budget allocation; however, the technique has traditionally emphasized economic efficiency as its main criterion. Consequently, no consideration is given to the matter of who the beneficiaries of the program are or what group of the population bears the attendant costs.

In allocating its budget, DREE must, in addition to achieving allocative efficiency, give considerable weight to the relative needs (equity) of the potential beneficiaries, i.e., the relative need levels of the regions or provinces of the country. These two criteria must, therefore, be integrated such that they yield an explicit "decision rule" for Departmental budget allocation.

This paper defines RDIA grant/job benefits in terms of value added per worker and costs in terms of capital grants per job created. The efficiency measure is, therefore, the ratio of value added per worker to cost per job by industry and province. The equity measure developed is an "index of need" - need in terms of relative employment and income levels in each province.

As a systematic resolution of the conflict between these criteria, the paper suggests and outlines the concept of an explicit preference function between efficiency and equity. Insofar as

the decision maker is forced to make explicit the extent to which he is willing to forego economic returns for distributional ends, the weighted net benefits will be maximized and projects can be ranked accordingly.

An examination of the historical distribution of RDIA grants, by province and by industry shows no apparent consistency from either an efficiency or an equity point of view. A clear need for a decision rule to improve selection procedures is therefore indicated.

I. INTRODUCTION

The preparation of the recent "B" budget under the direction of the Incentives Division has resulted in a number of fundamental questions regarding the selection of projects and allocation of RDIA funds, respectively. The Regional Development Incentives Act charges the Department with providing "incentives for the development of productive employment opportunities in regions of Canada determined to require special measures to facilitate economic expansion and social adjustment". Insofar as both equity and efficiency considerations are inherent in meeting this objective, project selection criteria must reflect both these considerations and at the same time be operationally useful in budget allocation and program forecasting.

The specific questions raised by the Incentives Division (Memo: March 17, 1972; J. Smart to J.P. Francis) are those concerning:

1) The value of a job in each 2 digit SIC manufacturing industry.
2) The cost of the job that should be incorporated in the Department's budget.
3) The number of jobs to be created by industry (2 digit SIC) and province.
4) The amount of financing to be set aside by industry (2 digit SIC) and province for modernizations.

Upon review of the questions raised it was decided that the focus of this report would be directed at items 1) and 2) above. Items 3) and 4) will be considered subsequent to considerable discussion between the Planning and Incentives Divisions.

Therefore, the main objective of this report is to examine the goals of employment and income creation in terms of conventional but considerably modified benefit-cost analysis and to suggest a concept or model that integrates equity and efficiency considerations to yield guidelines for budget allocation and budget forecasting, with considerable emphasis on the former.

The amount of quantitative information contained herein is considered to be secondary to the development of the framework on "decision rule" for budget allocation. Should the concept described below prove acceptable, the empirical detail required can be then developed.

The following sections of this report examine historical policy goals, criteria for project selection, the decision making problems involving equity and efficiency, the value and cost of a job by industry and province, the historical allocation of RDIA funds and finally the economic characteristics of 2-digit industries as well as their implications with regard to future RDIA grant levels.

II. THE ENDS AND MEANS OF DREE

As previously stated, the objective of the Department is to reduce economic disparities between the various regions of Canada. More specifically, this means reducing long-term inter-regional gaps in unemployment rates; improving labour force participation rates and narrowing the per capita income gaps among the regions.

The main instrument adopted by DREE to gain these objectives is a system of capital subventions to secondary manufacturing industries which locate, expand or modernize their operations in the "designated" or slow-growth regions of the country. Each grant is a once-and-for-all cash incentive and has a statutory limit based on a formulation of relative and absolute assistance to capital and labour, respectively.

However, as these subventions were not considered to be enough to attract viable industry to areas deficient in basic services, the federal govenment designated 22 "special areas" for the purpose of infrastructure assistance.

Simply stated, these are the major economic ends and means of the Department and, as such, reflect a welfare function of redistribution to the less economically developed regions.

What is not so simple is the assessment and evaluation of the relative values that the economic analyst and the decision-maker, respectively, place on the dual and interdependent goals of reducing unemployment and increasing per capita income.

III EQUITY-EFFICIENCY TRADE-OFFS AND BENEFIT-COST ANALYSIS

In any program involving the creation of improved employment and income opportunities the decision maker must develop, on an equity basis, an index of need among competing interest groups; also, an efficiency criterion based on cost and output considerations. These must be introduced into the decision making and allocation process resulting, of necessity, in a trade-off between the two values.

Similarly in the selection and implementation of RDIA programs there exists a basic trade-off between equity and efficiency criteria, based on the observation that less developed regions are generally less efficient in the production of goods on the basis of private costs and benefits than their more developed neighbours. It is this basic conflict which has given rise to questions regarding the effectiveness of the historical allocation of RDIA grants between the country's regions.

It is suggested that the goal of income redistribution (equity) will continually be thwarted by administrative pressures to show "good" results (efficiency) in the absence of systematic choice criteria. The essential feature of developing a "decision rule" is the quantification of the extent to which the decision-maker is willing to forego efficiency for equity gains.

Conventional benefit-cost techniques are designed to assist the decision-maker with a limited budget to select those projects which yield the highest benefits. The major shortfall of this technique, from our point of view, is that no significance is attached to either the beneficiaries of the project or to those who bear its costs.

Therefore, although this report sets the budget allocation problems of the Incentives Division in the framework of benefit-cost analysis, major modifications, consisting of the integration of equity with efficiency criteria, were made to the technique.

Benefits are measured by the value of a job for each industry by province. Costs are measured in terms of the capital costs (the sum of capital and labour grants) per job incurred by the Department. All indirect costs and benefits are ignored, as are administrative and social costs. Therefore, the direct value of a job created by the RDIA program relative to its capital cost is the sole efficiency criterion.

The index of need, or equity criterion, is measured by the degree of unemployment and level of per capita income present in each province. This measure is considered in detail in a later section.

Development of an Efficiency Index

Given a constrained budget, the objective could be to maximize the useful output from that budget or conversely, to minimize the input cost to achieve some desired level of output. Efficiency may then be defined as the ratio of useful output to total input. However, in this report, the value of a job represents the useful output while the Department's cost per job, albeit a partial input cost measure, would represent the "total" input.

The ideal approach in measuring the value of a job is to determine the dollar savings to society by taking an individual out of poverty or unemployment; adding to this the increase in productivity, the present value of the cost stream in terms of welfare payments, public housing, health programs,

education, crime, mass disorders and property damage. It goes without saying that the data and estimation constraints in arriving at such a measure, are insurmountable at the present time. Nevertheless, it can safely be stated that these costs or losses to society will occur if little is done to alleviate the economic condition of the less developed provincial economies.

A further problem is that of marginality, i.e., additional jobs created in a given industry or province are likely subject to diminishing output per worker. The utilization of average measures of value added per worker and cost per job implies constant returns to the increment of jobs created.

It was, therefore, decided to cast the problem in terms of full employment output potential from all factor inputs, reflecting thus the view of society at large. This is felt to yield a better measure of loss (potential output minus actual output) to society than the measurement of wages and salaries paid, as the latter reflects predominantly the view of the individual worker. Similarly, other measures of output potential, such as output (shipments) per worker were rejected in favour of census value added per worker. The former measure would involve some double counting in the output among manufacturing industries. However, it must be kept in mind that census value added is an aggregate of returns to capital and labour and hence should not be interpreted as labour productivity. Value added and the cost of a job by industry and province are expressed on a per worker basis as the central focus is on what increase in national wealth might be generated by employing an additional worker; and internal efficiency of budget allocation, i.e., what is the ratio of this value added to the Department's cost of a job.

One additional aspect in arriving at a measure of the value of a job is its time horizon. This would presumably extend to at least the capital life of the machinery and equipment in the plant. It follows, therefore, that the time dimension should be discounted back to the present and compared to the initial capital grant per job (albeit the payment of such a grant is made somewhere between 18 to 42 months after acceptance).

The relative time distribution of benefits and costs to the firm suggests that a certain number of jobs would be dropped after the payment period if their relative contribution to the value of output was less than or equal to the amortized value of the capital grant per job over the payment period. Should this be so, the ratio of the value of a job to its capital cost would be overestimated. In other words, it may prove beneficial to the applicant to engage surplus labour over the payment period, i.e., surplus to the economic requirements of the project. However, if this tends to become a major problem, the appropriate time distribution of the grant payment would offset this propensity to retire labour.

Development of an Equity Index

The equity index, developed herein, reflecting the dual criterion of low per capita earned income and high unemployment rate is largely based, with slight modifications, on an article by McGuire and Gunn (1969)[1]. They constructed their equity index for the United States Economic Development Administration, an agency of the U.S. government which makes grants and loans to economically depressed areas of the United States.

The equity index developed takes on a set of values $\lambda_1, \lambda_2 \ldots\ldots \lambda_n$ where $\lambda_i < 1$, n is i's (the province's) marginal utility (incremental satisfaction) of increased economic benefits in the form of increased income per capita or reduced unemployment, or both. The problem is to determine

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1. "The Integration of Equity and Efficiency Criteria in Public Project Selection". The Economic Journal. pp. 882-893.

a realistic set of weights to reflect the decision-maker's subjective judgements between provinces[1]. What is critical is that the project "benefit-cost" ratios (value of a job/cost of a job) may either be multiplied or weighted by different values of λi; if great enough, they will dominate efficiency as a criterion; if small enough, they will yield an ordering of projects that would differ only slightly from that achieved through orthodox benefit-cost analysis.

Given the dual goals of improved employment and income opportunities, unemployment rates and per capita earned income levels were used as proxy indicators of provincial need or marginal utility. For the period 1966 to 1970 the average (unweighted) provincial unemployment rates and per capita earned income levels were selected for the calculations of λ_i (the index level of need for each province relative to that of Ontario).

As there are significant variations in both income levels and unemployment rates, the trade-offs between income and employment are made explicit in a welfare function. Therefore, $\lambda_i = \lambda_i \ (E_i, Y_i)$ where E_i represents the province's employment rate and Y_i is per capita earned income. The functional form that is used is one for which the marginal utilities of additional income and additional jobs are independent and therefore additive. Therefore,

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1. The index therefore attempts to reflect the relative need between different provinces for economic assistance insofar as their respective income and employment levels accurately indicate their economic need.

$$\lambda_i = a \left(\frac{\bar{E}}{E_i}\right)^{\alpha} + b \left(\frac{\bar{Y}}{y^i}\right)^{\beta}$$

Where: λ_i = area need indicator

$\bar{E}$ = average employment rate in Ontario

E_i = provincial employment rate

$\bar{Y}$ = average per capita earned income in Ontario

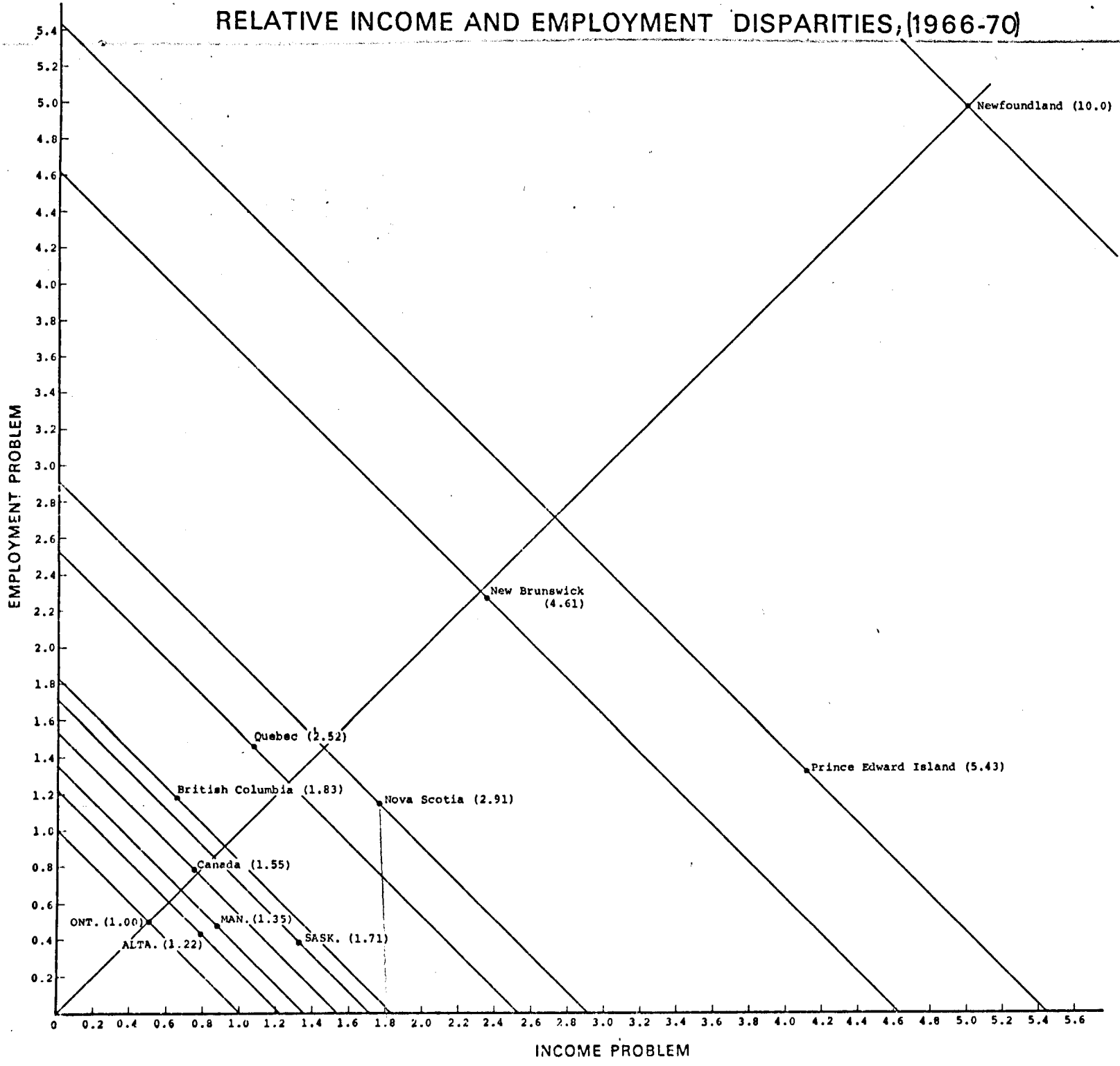
y_i = provincial per capita earned income.

The, coefficients a and b, in this expression can be set to reflect different value judgments about the welfare implications of provincial employment and income levels. The parameters determine how income and unemployment trade-off in the decision-maker's subjective values along any fixed value of λ. For example, if one thought that the creation of a new job was just as important in provinces with low unemployment rates as in provinces with high rates one would set $a = 0$ and $b = 1$. Once the range of values of λ and the values of a and b are selected, α and β may be calculated. In this report we have selected the following conditions to reflect what a decision maker's preference might be.

1. As no province has an average unemployment and income level equal to the Canadian average, Ontario was selected to represent a "state of bliss" and received a weight of 1, i.e., $\lambda = 1$. This establishes an origin.

2. The most economically depressed province, Newfoundland, was given a handicap of 10, i.e.,

RELATIVE INCOME AND EMPLOYMENT DISPARITIES, (1966-70)



$\lambda = 10$. The range 1 - 10 establishes a scale and gives effective weight to equity considerations.

3. In a province with an average unemployment rate and per capita income equal to that of Ontario, adding one job is as important as adding $\$ \bar{y}$ of income.
4. In a province such as Newfoundland, with very high unemployment rates ($E_i = 0.9053$) and very low incomes ($Y_i = \$1184$), adding one job is as important as adding \$1184 of per capita income.
5. At high income levels and high unemployment rates, jobs are more important than income, while at low income and low unemployment rates, income is more important than jobs. This is a diminishing marginal substitution assumption of jobs relative to income.

These five conditions, therefore, determine the parameters for Ontario as follows:

$$\lambda_i = 0.5\left(\frac{0.9667}{E_i}\right)^{70.0} + 0.5\left(\frac{\$2580}{Y_i}\right)^{5.2}$$

Figure 1 shows alternate levels of income and employment with the respective λ_i, using the parameters set out above. Similarly, Table 1 provides the actual values for employment, earned income per capita as well as λ_i, $\frac{\bar{E}}{E}$ and $\frac{\bar{Y}}{y}$ for each province over the period 1966-1970.

TABLE 1

INCOME AND EMPLOYMENT STATISTICS BY PROVINCE
RANKED BY INDEX OF NEED. 1966-70

Province	λ_i	Employment Rate % L.F.	Employment Need $\bar{E}/E_i$	Income Per Capita $	Income Need $\bar{Y}/Y_i$
Newfoundland	10.0	.9053	5.0	1184	5.0
Prince Edward Island	5.4	.9401	1.3	1266	4.1
New Brunswick	4.6	.9261	2.3	1528	2.3
Nova Scotia	2.9	.9441	1.1	1685	1.8
Quebec	2.5	.9375	1.5	2004	1.1
British Columbia	1.8	.9434	1.2	2364	0.6
Saskatchewan	1.7	.9734	0.4	1856	1.3
Manitoba	1.3	.9684	0.5	2136	0.9
Alberta	1.2	.9709	0.4	2214	0.8
Ontario	1.0	.9667	0.5	2580	0.5

The particular parameters that are shown in Table 1 above indicate very large marginal rates of substitution between income and employment for provinces suffering from low income only (Prince Edward Island, Saskatchewan, Manitoba and Alberta) or from high unemployment only (British Columbia). In other words, these former provinces higher per capita incomes are more important than employment while in the latter province lower unemployment levels are more important than per capita income. (See Page 11, Condition #5)

Integrating Equity and Efficiency

The previous section described a method for determining an explicit need or equity index; this is in contrast to economic orthodoxy which tends to reach decisions exclusively on the basis of efficiency criteria.

However, the decision-maker, in the real world, is faced with a number of highly complicated and inter-related problems; these are:

1) A larger number of applications that can be satisfied by his limited budget.
2) A wide variation in expected benefits from the many applications.
3) An equally wide variation in the relative need existant in the provinces in which applications originate.
4) A number of applications from poor areas or provinces which generally have lower benefit-cost ratios.

Given this range of variables, the problem is clear: a "decision rule" for budget allocation must be developed. Although a variety of rules are available, an explicit preference function between equity and efficiency is suggested. It is felt that such a function would enable the decision-maker to test the results of maximizing an objective function[1] which allows for only one or the other.

1. The objective function here refers to the dual goals of improved employment and income opportunities in the less developed provincial economies. However, efficiency criteria, for example, would tend to bias the budget allocation to the more developed provinces for most industries.

Let benefits (B) represent the value added per worker, per one dollar of RDIA cost per job, and λ_i represent the index of need.

Given a fixed budget, welfare benefits can be maximized over varying combinations of equity ($\sum \lambda_i B$) and efficiency ($\sum B$). Thus Figure 2 shows a frontier of welfare additions (curve WXYZ) that might be attained with a fixed budget. The points W, X, Y and Z on the welfare frontier refer, respectively, to:

W - Total benefits and welfare additions when efficiency is minimized.

X - Total benefits and welfare additions when the (weighted) average value of λ is maximized.

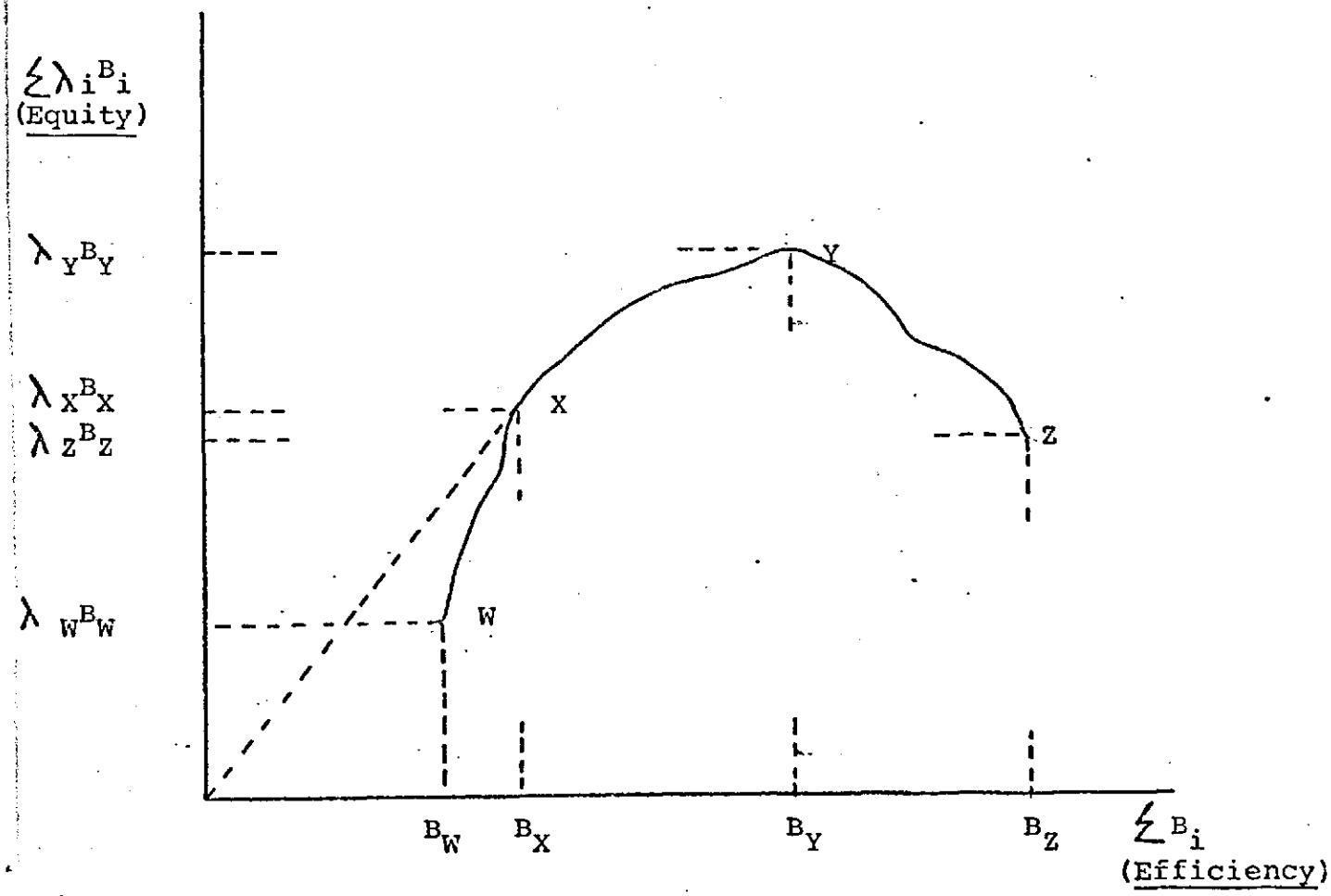
Y - Total benefits and welfare additions when welfare is maximized (equity and efficiency criteria).

Z - Total benefits and welfare additions when efficiency is the sole criterion.

In summary, then, Figure 2 illustrates the trade-offs involved for the decision-maker and indicates the costs (lost benefits and welfare additions) of not choosing applications that reflect his own equity-efficiency judgement.

Figure 2

WELFARE BENEFITS UNDER DIFFERENT EQUITY-EFFICIENCY COMBINATIONS



IV. HISTORICAL ALLOCATION OF RDIA GRANTS[1] BY INDUSTRY AND PROVINCE

As previously stated, DREE through its capital grants seeks to induce firms to modernize, expand or locate in the slow growth areas of the country in order to increase employment opportunities for the residents of these areas and, consequently, to raise their per capita incomes.

Tables 2 and 3, show the distribution of RDIA jobs by industry and province and the attendant average cost to DREE of the jobs thus created[2]. An examination of the data leads to the following observations.

1. In terms of the number of jobs created, the Province of Quebec was the major beneficiary of the program followed, but not closely, by Ontario, Manitoba, and New Brunswick; the provinces benefiting least were Prince Edward Island, British Columbia, and Saskatchewan. However, by reducing the number of jobs created to a ratio per unemployed persons per province, New Brunswick, Manitoba, Prince Edward Island and Nova Scotia were the major beneficiaries of the program. Those benefiting least were British Columbia, Ontario, Alberta and Newfoundland.

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1. All data contained herein pertain to the period 1969 to March 30, 1972 and were provided by the Information Systems Branch of the Evaluation and Administration Division.
2. Data applies to new plants only (Status 7).

TABLE 2

Number of RDIA Jobs by Industry and Province

July 1969 - April 1972

Industry \ Provinces	Canada	Nfld.	P.E.I.	N.B.	N.S.	P.Q.	Ont.	Man.	Sask.	Alta.	B.C.
All Manufacturing (Per 1,000 Unemployed)	43,998 (80)	1,408 (78)	519 (173)	3,504 (219)	2,681 (134)	24,451 (124)	3,992 (23)	3,782 (199)	1,077 (93)	1,849 (59)	735 (11)
Food & Beverage	5,915	975	406	1,214	251	1,956	210	281	280	342	
Tobacco	21		17		4						
Rubber	179			26		92	7	54			
Leather	789	29				583	142		14	21	
Textiles	2,599				61	2,315	141	29		53	
Knitting Mills	1,677			279	38	1,223		137			
Clothing	3,884			130		2,700	408	408	238		
Wood	6,328	101		522	394	2,411	1,282	313	121	611	573
Furniture	1,354	38	55	203	176	599	130	153			
Paper	1,413					923	30	67		393	
Printing	850			95		609	29	91	26		
Primary Metals	797			90		543	101	24		39	
Metal Fabricating	2,403	25	26	86	95	1,477	216	220	163	40	55
Machinery	1,187	17	15		93	677	148	237			
Transportation	4,885			118	295	2,733	173	1,128	177	248	13
Electrical Products	3,586	188		54	569	2,368	117	290			
Non-Metallic Minerals	791	22		36	8	648	10	58		3	6
Petroleum & Coal	7					7					
Chemicals	1,499	13		78		731	527	88		62	
Miscellaneous Manufacturing	3,834			573	701	1,856	321	204	58	37	88

Source: Incentives Division, DREE.

2. The industrial distribution of these jobs was such that the greatest numbers were generated in the Wood, Food and Beverage and Transportation Industries, although the Clothing, Miscellaneous Manufacturing and Electrical Products Industries, each accounted for between 3,500 and 4,000 jobs. The least number of jobs was generated in the Petroleum, Tobacco Processing and Rubber Products Industries.

3. In terms of the average cost per job to DREE (all manufacturing), Alberta ranks highest, followed by New Brunswick, Ontario and Newfoundland. All four provinces show cost per job relatives higher than the national average of $4,126 per job created.

4. In terms of the average cost per job by industry the Paper and Allied, Chemicals, Tobacco Processing and Petroleum and Coal Products Industries ranked considerably above the "all manufacturing" average. Industries in which the cost per job created was well below this average were Clothing, Metal Fabricating and Transportation Equipment.

5. Finally, an examination of the respective tables reveals the fact that both on a provincial distribution basis and an industrial distribution basis the deviations from the national average are very large and, on the surface at least, show no apparent consistent pattern. In other words, no clear "decision-rule" seems to have been applied by the decision maker in the selection of grant applications.

TABLE 3

DREE Cost Per Job by Industry and Province

July 1969 - April 1972

Industry \ Province	Canada	Nfld.	P.E.I.	N.B.	N.S.	P.Q.	Ont.	Man.	Sask.	Alta.	B.C.
All Manufacturing (Per Cent)	4,125 (100.0)	4,172 (101.1)	3,231 (78.3)	5,961 (144.5)	3,144 (76.2)	3,435 (83.3)	5,377 (130.3)	3,390 (82.2)	3,967 (96.1)	10,694 (259.2)	3,788 (91.8)
Food & Beverage	4,765	4,805	2,871	7,182	4,526	3,477	6,724	4,260	4,175	5,558	
Tobacco	9,009		10,236		3,794						
Rubber	3,206			7,624		2,001	4,375	2,984			
Leather	2,872	1,661				2,968	2,441		2,878	4,809	
Textiles	3,161				1,856	3,297	2,891	2,687		1,210	
Knitting Mills	2,841			6,774	3,006	2,377		671			
Clothing	1,163			1,042		1,149	801	1,552	1,682		
Wood	4,151	2,994		3,762	2,827	4,152	4,081	2,434	12,766	5,201	3,555
Furniture	3,016	2,434	3,547	5,060	5,255	1,862	3,465	1,821			
Paper	18,937					15,742	7,006	3,409		30,000	
Printing	3,576			7,303		2,826	3,900	4,511	3,882		
Primary Metals	3,382			7,633		2,198	5,148	1,767		6,473	
Metal Fabricating	2,432	3,219	2,740	4,541	6,437	1,759	4,317	2,484	2,133	2,220	3,200
Machinery	4,208	6,823	4,736		3,103	2,598	4,413	8,893			
Transportation	2,484			2,495	3,457	1,988	2,611	2,878	2,755	4,603	4,900
Electrical Products	3,382	2,108		4,407	1,822	4,027	1,538	2,550			
Non-Metallic Minerals	8,073	5,236		4,945	8,875	7,633	4,420	16,393		5,090	10,885
Petroleum & Coal	8,428					8,428					
Chemicals	10,327	3,026		4,365		7,408	15,992	3,371		16,148	
Miscellaneous Manufacturing	3,362			7,251	2,864	1,750	5,383.	5,181	3,137	6,521	3,246

Source: Incentives Division, DREE.

Capital to Labour Requirements, by Industry, and an Application of the Maximum Allowable Grant Criteria

Capital to labour requirements (K/L ratios) of the twenty 2-digit industries were calculated on the basis of DREE estimates of authorized and unauthorized capital[1] divided by the number of jobs created. These ratios are shown on Table 4 (Canada average by industry group) and Table 5 (K/L ratios by province). On the basis of these ratios the twenty industries were somewhat arbitrarily divided into three groups; highly capital intensive, moderately capital intensive and labour intensive industries. An examination of the distribution of RDIA jobs among these groups shows that 6.7 per cent were generated in the highly capital intensive group, in which there are four industries; 54.3 per cent were in the ten moderately capital intensive industries and 39.0% of all jobs created were in the remaining six labour intensive industries. The distribution of national employment among these groups was 20.7 per cent, 53.5 per cent and 25.8 per cent, respectively.

Section 5, subsection 4 of the Regional Development Incentives Act places a maximum constraint on the amount of each individual capital grant as follows: "No incentive or combination of incentives ... shall exceed the lesser of:

a) $30,000 for each job determined by the Minister to have been created directly in the operation, and

b) 1/2 of the capital to be employed in the application."

1. Total capital employed less working capital equal capital stock per new plant.

TABLE 4

Distribution of Capital to Labour Requirements
by Industry, Canada
July 1969 - April 1972

Industry	Capital/Labour	Job Distribution RDIA	Job Distribution CANADA
	$	%	%
Highly Capital Intensive			
Paper	169,741		
Chemicals	66,763	6.7	20.7
Petroleum	64,285		
Tobacco	39,821		
Moderately Capital Intensive			
Non-Metallic Minerals	19,571		
Food & Beverage	18,057		
Machinery	14,606		
Printing & Publishing	14,568		
Rubber	14,406	54.3	53.5
Primary Metals	12,841		
Knitting Mills	12,652		
Wood	11,979		
Electrical Products	11,863		
Textiles	11,128		
Labour Intensive			
Miscellaneous Manufacturing	9,495		
Furniture	8,354		
Leather	8,324	39.0	25.8
Metal Fabricating	8,163		
Transportation	6,668		
Clothing	3,842		

Source: -Incentives Division, DREE.
-D.B.S.

TABLE 5

Distribution of Capital Labour Requirements by Industry and Province

July 1969 - April 1972

	Canada	Nfld.	P.E.I.	N.B.	N.S.	P.Q.	Ont.	Man.	Sask.	Alta.	B.C.
Highly Capital Intensive											
Paper	169,741					141,691	21,700	26,700		271,330	
Chemicals	66,763	10,053		8,756		33,349	129,010	10,095		96,928	
Petroleum	64,285					64,285					
Tobacco	39,821		45,279		16,627						
Moderately Capital Intensive											
Non-Metallic Minerals	19,571	11,363		19,936	26,875		14,200	58,000		22,268	77,466
Food & Beverage	18,057	11,186	6,846	14,941	12,232	18,518	48,388	26,963	22,409	26,018	
Machinery	14,606	18,823	11,481		6,619	10,554	10,718	31,641			
Printing & Publishing	14,568			12,421		13,690	15,827	22,575	13,572		
Rubber	14,406			38,772		9,468	12,500	11,333			
Primary Metals	12,841			18,444		12,991	11,779	8,125		34,820	
Knitting Mills	12,652			16,752	2,710	12,985		4,087			
Wood	11,979	7,867		3,624	7,552	11,105	13,652	6,016	37,057	13,453	17,278
Electrical Products	11,863	3,723		7,370	4,745	15,520	2,384	5,909			
Textiles	11,128				4,986	11,393	14,461	3,093		2,148	
Labour Intensive											
Misc. Manufacturing	9,495			14,951	8,027	6,663	13,988	16,465	11,072	17,837	8,306
Furniture	8,354	4,210	7,254	11,027	13,809	6,392	11,444	5,016			
Leather	8,324	2,938				8,820	4,654		6,071	28,343	
Metal Fabricating	8,163	7,538	5,423	13,603	18,210	6,633	16,271	6,015	4,646	4,700	13,836
Transportation	6,668			6,705	8,752	6,283	6,007	6,576	8,401	7,479	17,846
Clothing	3,842			1,996		4,577	1,542	4,091	1,474		

Source: Incentives Division, DREE.

Table 6 (column 1) shows estimates of capital employed[1] of all firms by 2-digit industry aggregation in Incentives Division Status 7 (offers made and accepted) classification. Column 2 is the calculated maximum allowable cost (to DREE) per job created. Column 3 shows the actual cost per job created and in column 4 actual grants per job are shown as a percentage of the maximum allowable grant per job by industry. Table 7 regionalizes columns 2, 3 and 4 showing the maximum allowable and actual cost per job by industry and province.

With very few exceptions all grants are well below the maximum allowed by the RDIA with most grants being below 50 per cent of the maximum, both on the aggregate level and the provincial level.

Once again, data show no apparent consistent pattern, either across provinces, by industry or across industries for any given province. There does seem to be a tendency for grants as a per cent of the maximum to be somewhat higher, overall, in the case of the four Atlantic Provinces as opposed to the other regions, however, this is by no means a consistent phenomenon among the various industries, as the exceptions are many.

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1. Capital employed equals authorized capital, unauthorized capital plus working capital.

TABLE 6

Capital Employed and Cost per Job Estimates
by Industry, Canada
July 1969 - April 1972

Industry	Capital Employed $MM	Maximum Allowable Cost/Job $	Actual Cost/Job $	Actual as % of Maximum Cost/Job
Highly Capital Intensive				
Paper	370.9	30,000*	18,937	63.1
Chemicals	111.6	30,000*	10,327	34.4
Petroleum	.8	30,000*	8,428	28.1
Tobacco	1.0	24,459	9,009	36.8
Moderately Capital Intensive				
Non-Metallic Minerals	31.6	19,971	8,073	40.4
Food & Beverage	137.0	11,636	4,765	41.0
Machinery	28.8	12,389	4,208	34.0
Printing & Publishing	16.5	9,700	3,576	36.9
Rubber	3.7	10,388	3,206	30.9
Primary Metals	16.2	10,132	3,282	32.4
Knitting Mills	29.1	8,694	2,841	32.7
Wood	107.5	8,881	4,151	46.7
Electrical Products	60.5	8,437	3,382	40.1
Textiles	53.8	10,348	3,161	30.5
Labour Intensive				
Misc. Manufacturing	55.3	7,213	3,362	46.6
Furniture	15.8	5,576	3,016	54.1
Leather	9.0	5,728	2,872	50.1
Metal Fabrication	32.3	6,810	2,432	35.7
Transportation	62.9	6,636	2,484	37.4
Clothing	27.9	3,589	1,163	30.9

*This is the maximum as described by the RDIA.
Source: Incentives Division, DREE.

TABLE 7

Cost Per Job Estimates by Industry and Province

July 1969 - April 1972

$

Industry	Newfoundland			P.E.I.			New Brunswick			Nova Scotia			Quebec		
	Maximum	Actual	%	Maximum	Actual	%	Maximum	Actual	%	Maximum	Actual	%	Maximum	Actual	%
Highly Capital Intensive															
Paper													30,000	15,742	52.5
Chemicals	5,412	3,026	55.9				6,756	4,365	64.6				19,058	7,408	38.9
Petroleum													30,000	8,428	28.1
Tobacco				27,934	10,236	36.6				9,688	3,794	39.2			
Moderately Capital Intensive															
Non-Metallic Minerals	6,477	5,236	80.8				12,676	4,945	39.0	13,437	8,875	66.0	19,491	7,633	39.2
Food & Beverage	7,975	4,805	60.3	4,900	2,871	58.6	9,433	7,182	76.1	8,826	4,526	51.3	12,646	3,477	27.5
Machinery	10,206	5,823	66.8	8,140	4,736	58.2				5,062	3,103	61.3	11,927	2,598	21.8
Printing & Publishing							8,358	7,303	87.4				9,306	2,826	30.4
Rubber							23,213	7,624	32.8				7,323	2,001	27.3
Primary Metals							11,439	7,633	66.7				9,615	2,198	22.9
Knitting Mills							11,226	6,774	60.3	5,289	3,006	56.8	8,835	2,377	26.9
Wood							5,549	3,762	67.8	5,573	2,827	50.7	8,178	4,152	50.8
Electrical Products	6,113	2,994	49.0				6,859	4,407	64.3	4,701	1,822	38.8	10,274	4,027	39.2
Textiles	3,942	2,108	53.5							4,051	1,856	45.8	10,407	3,297	31.7
Labour Intensive															
Misc. Manufacturing							12,645	7,251	57.3	6,225	2,864	46.0	4,844	1,750	36.1
Furniture	4,868	2,434	50.0	6,391	3,547	55.5	5,765	5,060	87.8	5,765	5,255	91.0	4,734	1,862	39.3
Leather	5,534	1,661	30.0										5,967	2,968	49.7
Metal Fabricating	4,579	3,219	70.3	4,303	2,740	63.7	9,807	4,541	46.3	12,447	6,437	51.7	5,799	1,759	30.3
Transportation							6,734	2,495	37.1	9,324	3,457	37.1	6,418	1,988	31.0
Clothing							1,414	1,042	73.7				3,477	1,149	33.0

Source: Incentives Division, DREE.

TABLE 7a

Cost Per Job Estimates by Industry and Province

July 1969 - April 1972

$

Industry	Ontario			Manitoba			Saskatchewan			Alberta			British Columbia		
	Maximum	Actual	%	Maximum	Actual	%	Maximum	Actual	%	Maximum	Actual	%	Maximum	Actual	%
Highly Capital Intensive															
Paper	14,683	7,006	47.7	30,000	3,409	11.4				30,000	30,000	100.0			
Chemicals	30,000	15,992	53.3	6,911	3,371	48.8				30,000	16,148	53.8			
Petroleum															
Tobacco															
Moderately Capital Intensive															
Non-Metallic Minerals	14,600	4,420	30.3	30,000	16,393	54.6				13,634	5,090	37.3	30,000	10,885	36.3
Food & Beverages	30,000	6,724	22.4	16,342	4,260	26.1	13,166	4,175	31.7	16,946	5,558	32.8			
Machinery	10,017	4,413	44.1	18,488	8,893	48.1									
Printing & Publishing	10,241	3,900	38.1	13,925	4,511	32.4	8,421	3,882	46.1						
Rubber	10,464	4,375	41.8	9,426	2,984	31.7									
Primary Metals	6,954	5,148	74.0	6,000	1,767	29.5				25,102	6,473	25.8			
Knitting Mills				3,229	671	20.8									
Wood	9,209	4,081	44.3	6,196	2,434	39.3	21,686	12,766	58.9	15,188	5,201	34.2	8,745	3,555	40.7
Electrical Products	1,192	1,538*		6,892	2,550	37.0									
Textiles	15,451	2,891	18.7	3,555	2,687	75.6				5,144	1,210	23.5			
Labour Intensive															
Misc. Manufacturing	11,214	5,383	48.0	10,931	5,181	47.4	8,467	3,137	37.0	9,324	6,521	69.9	4,153	3,246	78.2
Furniture	6,684	3,465	51.8	3,792	1,821	48.0									
Leather	3,398	2,441	71.8				3,214	2,878	89.5	16,791	4,809	28.6			
Metal Fabricating	10,364	4,317	41.7	7,974	2,484	31.2	4,351	2,133	49.0	2,250	2,220	98.7	10,545	3,200	30.3
Transportation	6,394	2,611	40.8	5,431	2,878	53.0	8,958	2,755	30.8	9,805	4,603	46.9	14,115	4,900	34.7
Clothing	2,504	801	32.0	5,793	1,552	26.8	4,116	1,682	40.9						

*Unexplained Discrepancy.

Source: Incentives Division, DREE.

Application of Benefit-Cost Principles to the Allocation of RDIA Grants

1. Efficiency

As discussed in Sections II and III, data and estimation constraints prohibit the quantification of an ideal measure of the value, to society, of a job created. Consequently, value added per production worker is employed as a proxy measure. Costs, on the other hand, are measured in terms of the capital outlays (total offer) per job incurred by DREE. Table 8 shows the value added per production worker by industry and province.

An allocative efficiency measure is, therefore, approximated when value added per worker is divided by the cost of a job created. These calculations, by province and industry, are shown on Table 8a.

The table shows that for an expenditure of $1.00 on the part of DREE (cost) the Department would appear to expect $8.10 in value added (benefit) from the Transportation Industry but only $1.00 from the Paper Industry, and $5.70 from the Primary Metals Industry. Likewise from the $1.00 expenditure (cost) in the Food and Beverage Industry, the Department would appear to expect $5.90 in value added (benefit) from Quebec, $1.80 from Newfoundland and $2.70 from Prince Edward Island.

It is of note that the high ratio shown for the Petroleum and Coal Products Industry was derived in spite of a relatively high cost per job; this is due to the fact that value added per worker is exceptionally high in this industry. On the other hand, the above average ratio shown for the clothing industry reflects a combination of low productivity with an even lower cost per job created. Also, it should be noted that these two industries have the highest and lowest capital-labour ratios of the 2-digit industries.

TABLE 8

Value Added Per Production Worker, Manufacturing Activity, Canada, 1969

Province / Industry	Canada	Nfld.	P.E.I.	N.B.	N.S.	P.Q.	Ont.	Man.	Sask.	Alta.	B.C.
Total, All Manufacturing (Per Cent)	16.9 (100.0)	11.3 (66.9)	8.9 (52.7)	12.2 (72.2)	11.6 (68.6)	14.9 (88.2)	18.5 (109.5)	13.6 (80.5)	18.9 (111.8)	19.4 (114.8)	18.7 (110.7)
Food ? Beverage	20.2	8.5	7.8	12.7	9.7	20.7	23.8	16.5	19.9	20.7	23.1
Tobacco	27.4					21.3	39.3				
Rubber	19.6					17.0	20.5				
Leather	7.8					7.6	8.1	7.1		9.7	8.5
Textile	12.6			5.6	8.9	11.9	13.7	8.0	9.9	17.1	9.3
Knitting Mills	8.4				6.9	8.6	8.0				
Clothing	7.3			3.7	4.9	7.2	7.6	6.3		9.3	7.4
Wood	11.9	8.2	5.6	8.4	7.4	9.3	10.6	9.8	13.9	11.9	14.6
Furniture	10.8			8.8	5.8	10.3	11.3	9.3	10.2	10.1	11.7
Paper	18.7			15.4	22.9	17.4	17.3	20.4		23.4	26.1
Printing	20.8	16.9		17.5	17.5	20.5	21.4	18.2	15.8	19.9	24.1
Primary Metal	19.4					22.9	18.6	14.7		23.9	21.8
Metal Fabricating	15.5	9.9		11.6	8.8	14.4	16.3	12.8	12.5	15.5	16.7
Machinery	18.0				6.9	16.2	18.9	12.8	18.9	16.1	17.9
Transportation	20.1			8.5	10.0	17.9	22.6	11.9	16.3	10.5	15.1
Electrical Products	15.8			9.9	7.5	16.7	15.6	14.6		23.5	20.9
Non-Metallic Mineral	19.4	14.6		15.9	15.6	17.7	19.3	22.5	20.9	23.7	23.3
Petroleum and Coal	48.1					40.7	47.8		38.8	63.8	49.1
Chemicals	34.7	25.8		32.0	32.1	29.6	37.6	28.7	33.7	43.2	36.5
Misc. Manufacturing	13.8	9.6		12.0	10.6	11.7	15.1	10.6	10.6		12.1

TABLE 8a

A Measure of Efficiency

(Value Added Per Worker to RDIA Cost Per Job)

Industry / Province	Canada	Nfld.	P.E.I.	N.B.	N.S.	P.Q.	Ont.	Man.	Sask.	Alta.	B.C.
Total All Manufacturing (Per Cent)	4.1 (100.0)	2.7 (65.9)	2.8 (68.3)	2.0 (48.8	3.7 (90.2)	4.3 (104.9)	3.4 (82.9)	4.0 (97.6)	4.8 (117.1)	1.8 (43.9)	4.9 (119.5)
Food & Beverage	4.2	1.8	2.7	1.8	2.1	5.9	3.5	3.9	4.8	3.7	
Tobacco	3.0		*		*						
Rubber	6.1			*		8.5	4.7	*			
Leather	2.7	*				2.6	3.3		*	2.0	
Textiles	4.0				4.8	3.6	4.7	3.0		14.1	
Knitting Mills	2.9			*	2.3	3.6		*			
Clothing	6.3			3.6		6.3	9.5	4.1	*		
Wood	2.9	2.7		2.2	2.6	2.2	2.6	4.0	1.1	2.3	4.1
Furniture	3.6	*	*	1.7	1.1	5.5	3.3	5.1			
Paper	1.0					1.1	2.5	6.0		0.8	
Printing	5.8			2.4		7.3	5.5	4.0	4.1		
Primary Metals	5.7			*		10.4	3.6	8.3		3.7	
Metal Fabricating	6.4	3.1	*	2.6	1.4	8.2	3.8	5.1	5.9	7.0	5.2
Machinery	4.3	*	*		2.2	6.2	4.3	1.4			
Transportation	8.1			3.4	2.9	9.0	8.6	4.1	5.9	2.3	3.1
Electrical Products	4.7	*		2.2	4.1	4.1	10.1	5.7			
Non-Metallic Minerals	2.4	2.8		3.2	1.8	2.3	4.4	1.4		4.6	2.1
Petroleum & Coal	5.7					4.8					
Chemicals	3.4	8.5		7.3		4.0	2.4	8.5		2.7	
Misc. Manufacturing	4.1			1.6	3.7	6.7	2.8	2.0	3.4	*	3.7

Source: - Incentives Division, DREE
- D.B.S.

* Value added data supressed by D.B.S. and grants given to that industry.

The industrial groups which seemingly took the best advantage of the RDIA program to date were the Paper Industry, Non-Metallic Mineral Products and Leather Goods.

In regard to the provincial allocation of grants Alberta, New Brunswick and Nova Scotia with very low ratios, were those most favoured while Saskatchewan, British Columbia, Manitoba and Quebec show above average ratios, implying an adverse bias on the part of the Department in its allocation of grants to these latter provinces.

To conclude, therefore, it would seem that the allocation of RDIA grants either across provinces in an industry or across industries in any given province was not based on a measure of efficiency alone.

2. The Integrated Criterion

The integrated (equity-efficiency) index proposed is calculated by summing the efficiency and the equity indices for each province (i) such that

$$\text{Integrated Index}_i = K_1 B_i + K_2 \lambda_i B_i$$

where K_1 and K_2 are the decision-maker's respective preferences for efficiency and equity.

By assigning different values to the coefficients K_1 and K_2 in the above formula, the decision-maker puts more or less weight on either the equity or efficiency considerations. Implicitly this is a policy question and no acceptable

TABLE 9

Alternate "Decision Rules" for Budget Allocation

	EFFICIENCY ONLY $K_1 = 1.0$ $K_2 = 0.0$		$K_1 = 1.0$ $K_2 = 0.5$		$K_1 = 1.0$ $K_2 = 1.0$		$K_1 = 1.0$ $K_2 = 2.0$		$K_1 = 1.0$ $K_2 = 2.5$		$K_1 = 1.0$ $K_2 = 3.0$		$K_1 = 1.0$ $K_2 = 4.0$		EQUITY ONLY $K_1 = 0.0$ $K_2 = 1.0$	
	Index	Rank	Index	Rank	Index	Rank	Index	Rank	Index	Rank	Index	Rank	Index	Rank	Index	Rank
Newfoundland	2.7	8	7.7	1	12.7	1	22.7	1	27.7	1	32.7	1	42.7	1	10.0	1
P.E.I.	2.8	7	5.5	5	8.2	2	13.6	2	16.3	2	19.0	2	24.4	2	5.4	2
New Brunswick	2.0	9	4.3	8	6.6	5	11.2	3	13.5	3	15.8	3	20.4	3	4.6	3
Nova Scotia	3.7	5	5.1	6	6.6	6	9.5	4	10.9	4	12.4	4	15.3	4	2.9	4
Quebec	4.3	3	5.5	4	6.8	3	9.3	5	10.5	5	11.8	5	14.3	5	2.5	5
Ontario	3.4	6	3.9	9	4.4	9	5.4	9	5.9	9	6.4	9	7.4	9	1.0	10
Manitoba	4.0	4	4.6	7	5.3	8	6.6	8	7.2	8	7.9	8	9.2	8	1.3	8
Saskatchewan	4.8	2	5.6	3	6.5	7	8.2	7	9.0	7	9.9	7	11.6	7	1.7	7
Alberta	1.8	10	2.4	10	3.0	10	4.2	10	4.8	10	5.4	10	6.6	10	1.2	9
British Columbia	4.9	1	5.8	2	6.7	4	8.5	6	9.4	6	10.3	6	12.1	6	1.8	6

Formula: Integrated Index $= K_1 B_i + K_2 \lambda_i$. K_1 = the weight assigned to the efficiency consideration.

K_2 = the weight assigned to the equity consideration in the integration (equity-efficiency) process.

Source: Economic Analysis Branch calculations.

"decision Rule" can be devised until a firm policy decision has been made.

In the first column of Table 9 (Efficiency Only) the provinces are ranked on the basis of highest to lowest "benefit cost" ratios as shown in the all manufacturing row on Table 8a. In terms of efficiency alone, therefore, British Columbia ranks first and Alberta ranks last in the order of priorities in budget allocation.

In the column headed Equity Only, the provinces are ranked according to relative "need", whether it be from the point of view of employment or from the point of view of income, or both (Table 1, p. 12). Therefore, any budget allocation made on the basis of equity only would have to favour Newfoundland, Prince Edward Island, New Brunswick, Nova Scotia and Quebec, in descending order, leaving consideration for Alberta and Ontario last.

By way of example, let us examine the relative positions of New Brunswick and British Columbia in terms of this integrated criterion. In terms of efficiency alone, New Brunswick ranks ninth in the order of priorities while in terms of equity alone the province ranks third. In other words, as the weight (K_2) of equity increases, the greater is New Brunswick's claim on the RDIA budget. Conversely, as equity considerations are increased in weight, the smaller is the British Columbia claim on that same budget.

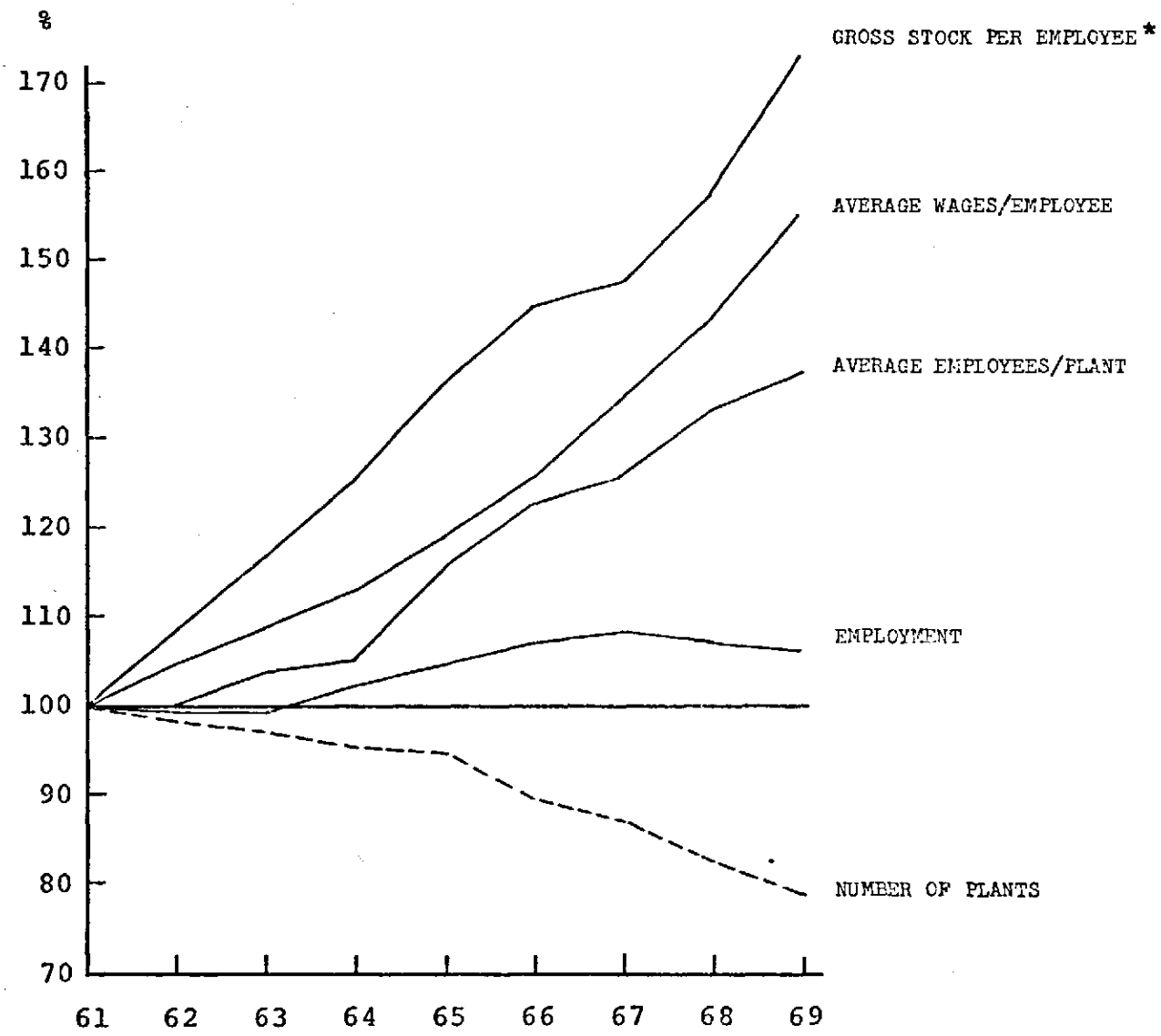
Thus, moving from left to right on Table 9, a very marked trade-off takes place between efficiency and equity considerations and the selection of a decision rule will reflect the decision-maker's trade-off between efficiency and equity in allocating his budget.

THE MAJOR FEATURE OF THE PROPOSED BUDGET ALLOCATIONS MODEL IS THAT IT FORCES THE DECISION-MAKER TO QUANTIFY HIS PREFERENCES.

A P P E N D I X

THE ECONOMIC CHARACTERISTICS OF 2-DIGIT SIC INDUSTRIES

FOOD AND BEVERAGE INDUSTRIES



*Capital/Labour ratio (K/L).

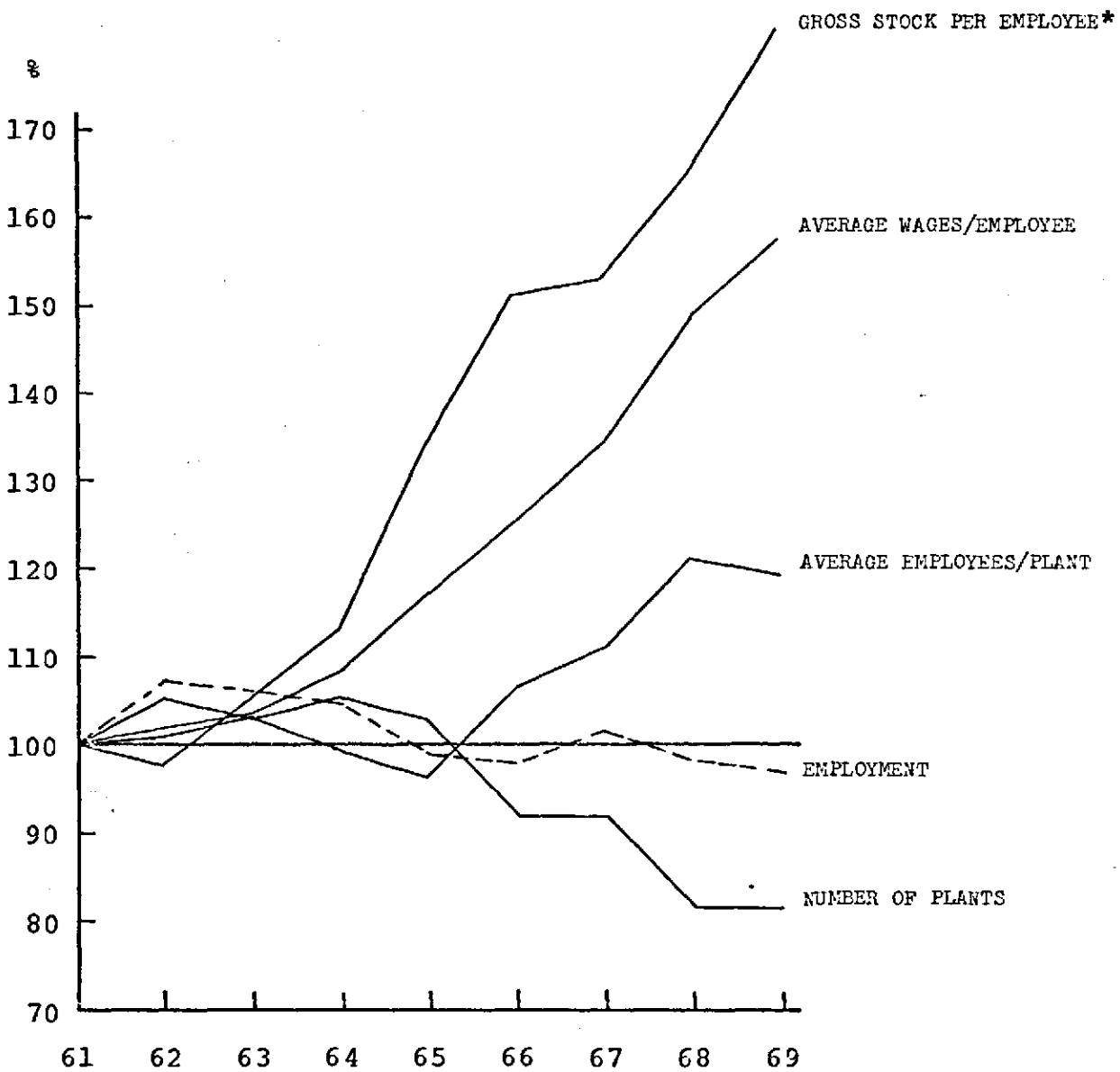
Food and Beverage Industries

	1961 Values	1969 Values
Total No. of Employees	270,762	224,083
Total No. of Plants	7,734	6,083
Average No. of Employees/ Plant	27	37
Average Wages Per Employee $	3,719	5,773
Gross Stock Per Employee* $	12,706	21,996

* Capital & Labour Ratio

Source: DBS - Catalogue No. 31-201 and 13-543

TOBACCO PRODUCTS INDUSTRIES



*Capital/Labour ratio (K/L).

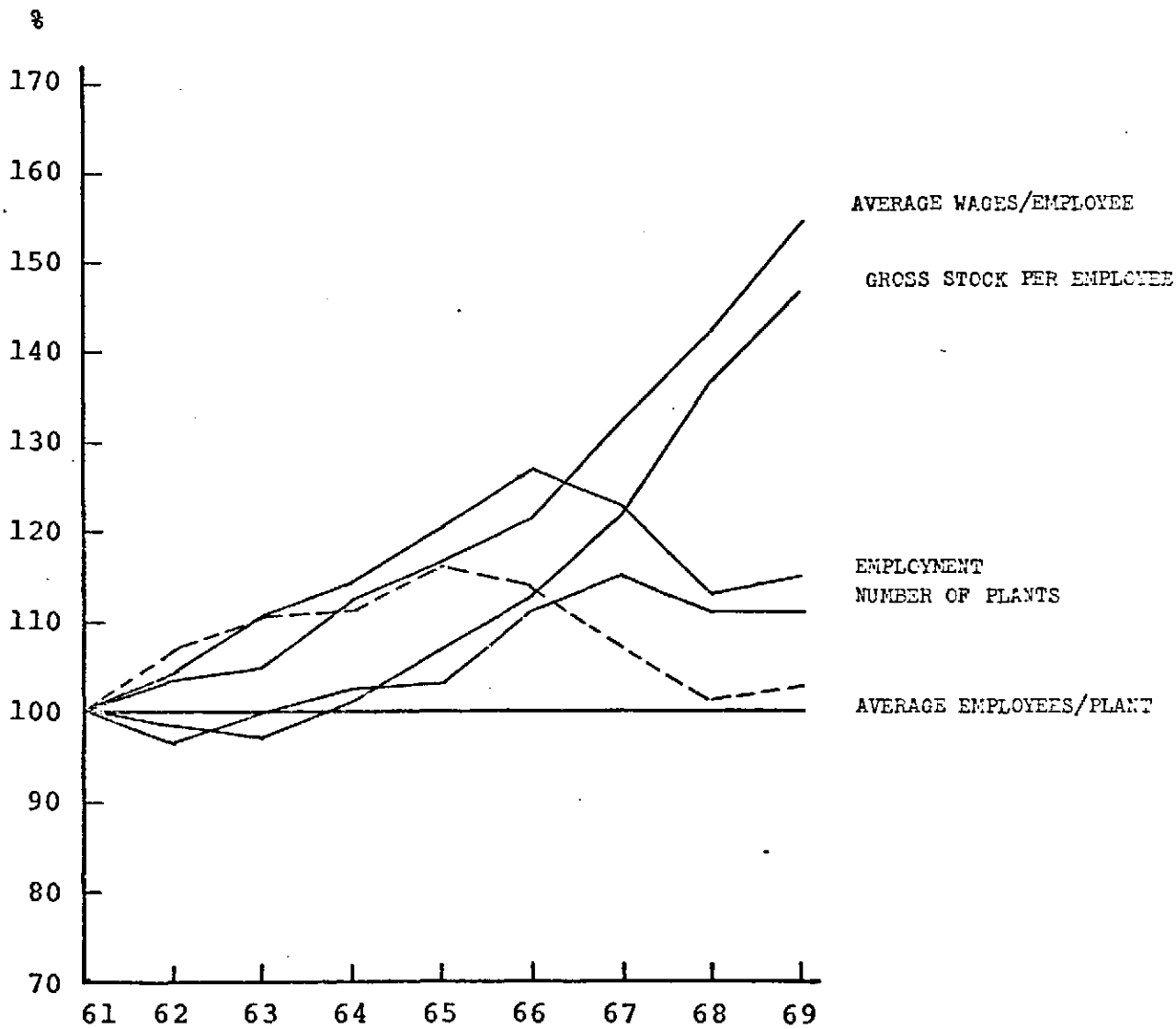
Tobacco Products Industries

	1961 Values	1969 Values
Total No. of Employees	10,392	10,049
Total No. of Plants	37	30
Average No. of Employees/ Plant	281	335
Average Wages Per Employee $	4,220	6,654
Gross Stock Per Employee* $	11,932	21,594

* Capital & Labour Ratio

Source: DBS - Catalogue No. 31-201 and 13-543

RUBBER INDUSTRIES



*Capital/Labour ratio (K/L).

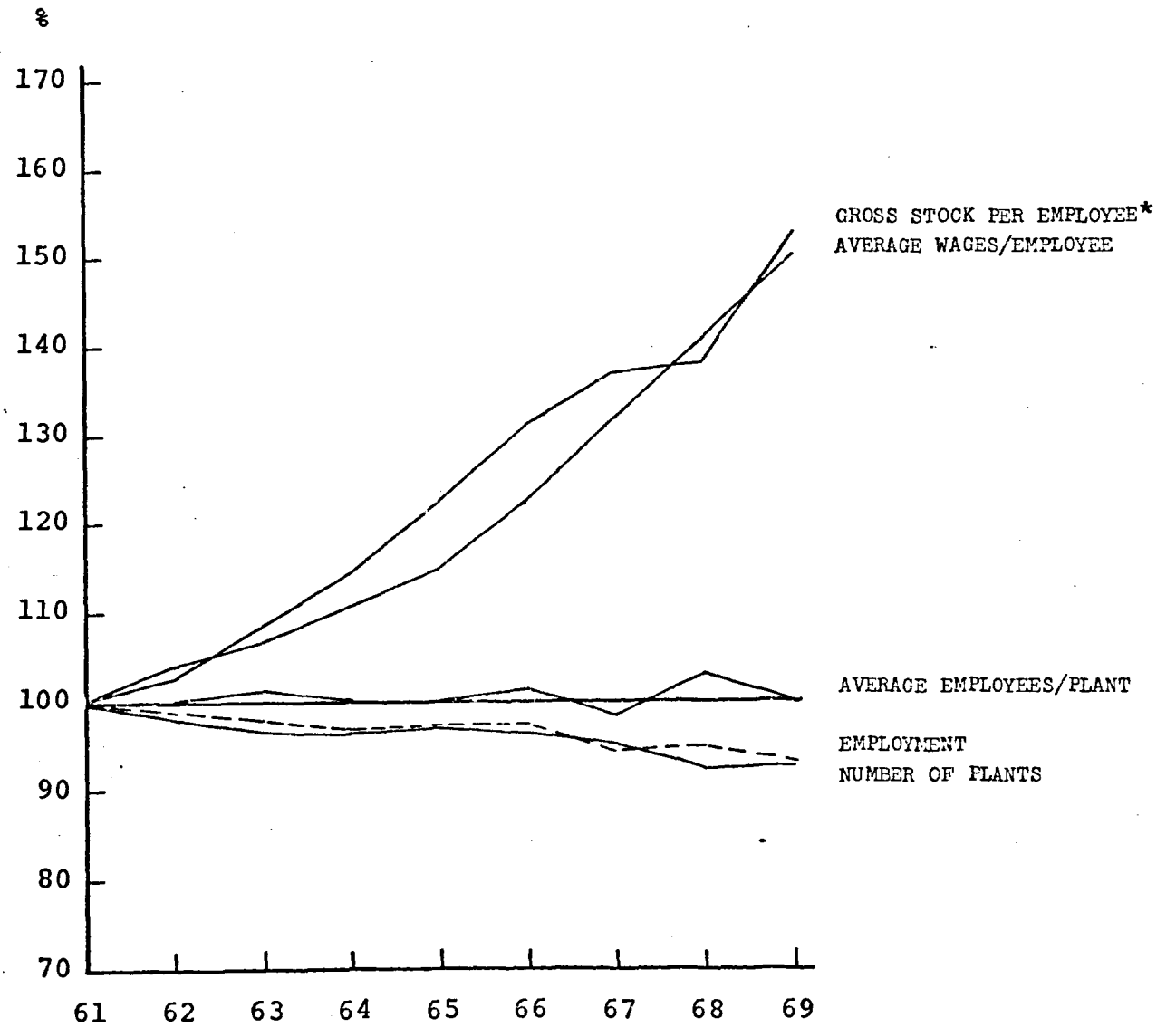
Rubber Industries

	1961 Values	1969 Values
Total No. of Employees	21,821	25,259
Total No. of Plants	93	104
Average No. of Employees/ Plant	235	243
Average Wages Per Employee $	4,381	6,777
Gross Stock Per Employee* $	13,473	19,914

* Capital & Labour Ratio

Source: DBS - Catalogue No. 31-201 and 13-543

LEATHER INDUSTRIES



*Capital/Labour ratio (K/L).

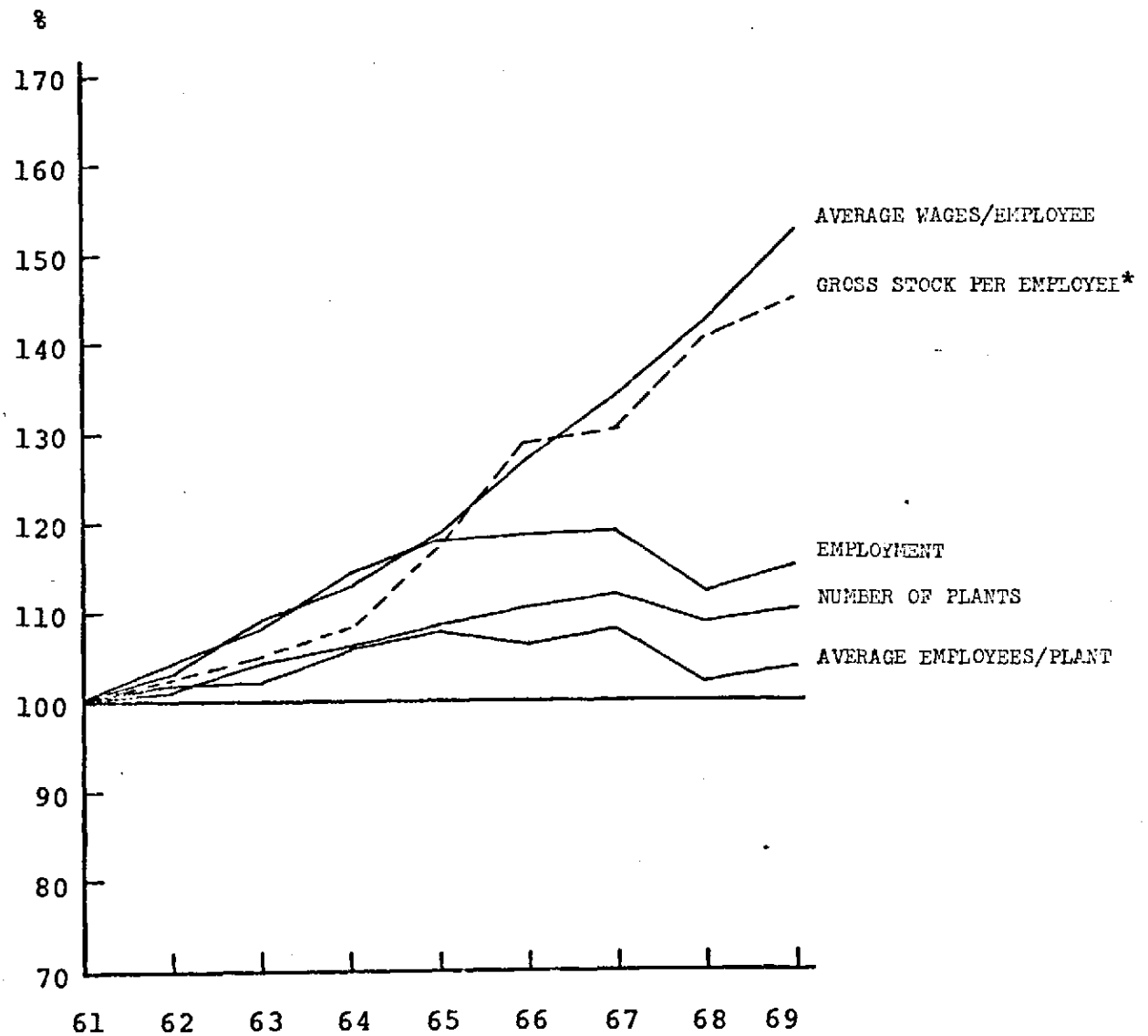
Leather Industries

	1961 Values	1969 Values
Total No. of Employees	33,283	31,192
Total No. of Plants	556	521
Average No. of Employees/ Plant	60	60
Average Wages Per Employee $	2,928	4,409
Gross Stock Per Employee* $	1,773	2,725

* Capital & Labour Ratio

Source: DBS - Catalogue No. 31-201 and 13-543

TEXTILE INDUSTRIES



*Capital/Labour ratio (K/L).

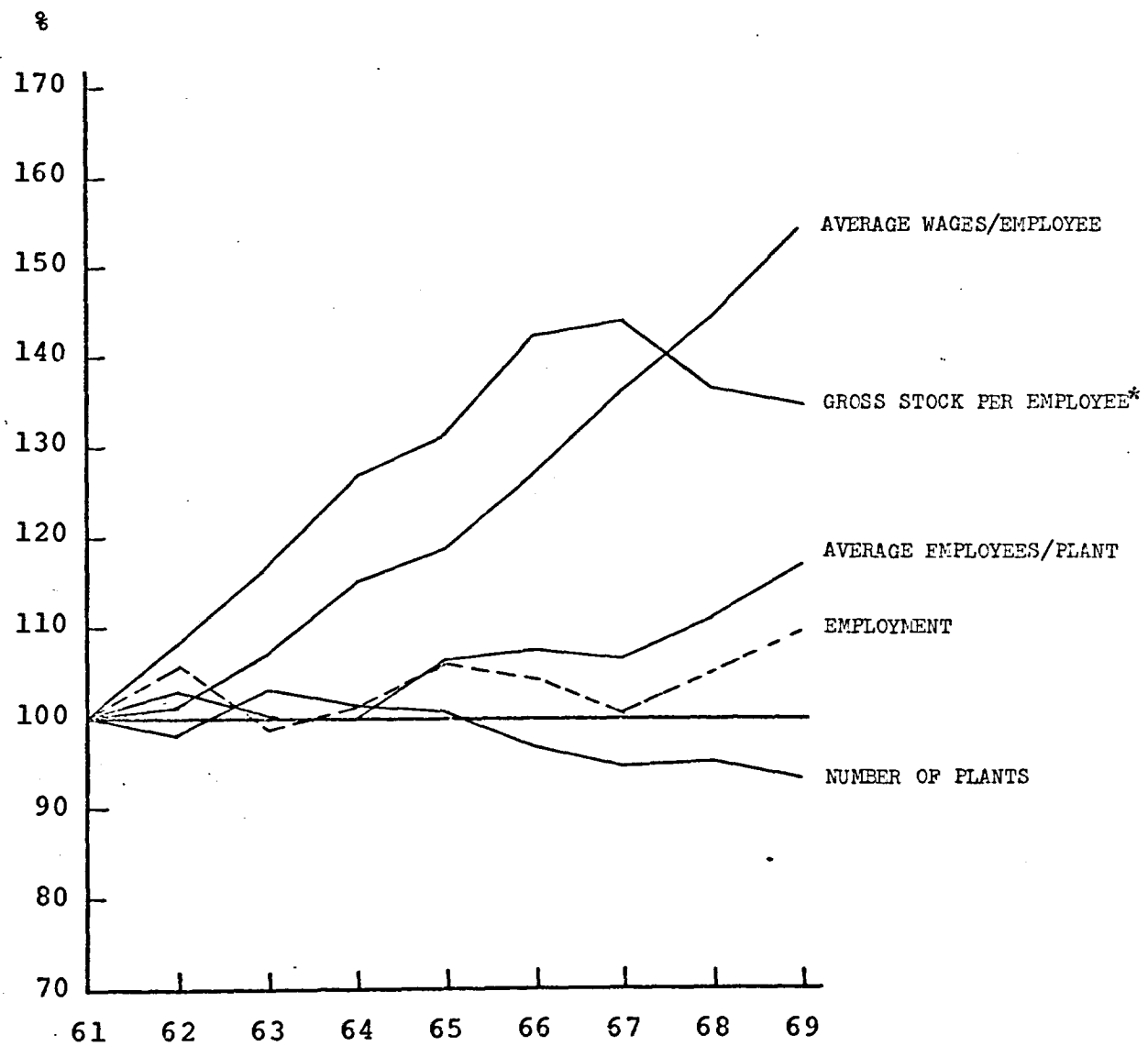
Textile Industries

	1961 Values	1969 Values
Total No. of Employees	64,969	75,329
Total No. of Plants	884	973
Average No. of Employees/ Plant	74	77
Average Wages Per Employee $	3,458	5,304
Gross Stock Per Employee* $	15,623	22,780

* Capital & Labour Ratio

Source: DBS - Catalogue No. 31-201 and 13-543

KNITTING MILLS



*Capital/Labour ratio (K/L)

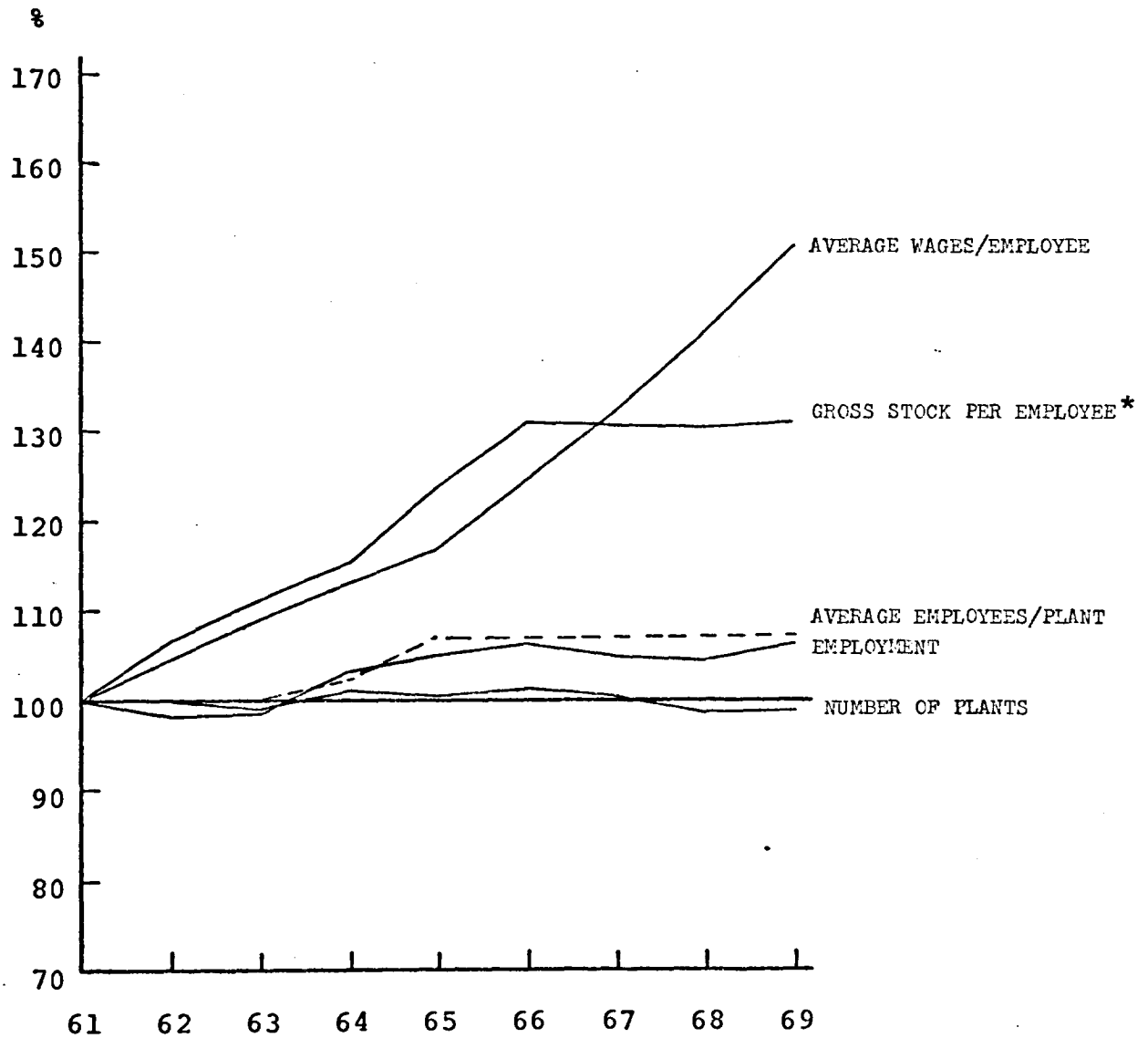
Knitting Mills

	1961 Values	1969 Values
Total No. of Employees	22,691	24,702
Total No. of Plants	358	333
Average No. of Employees/ Plant	63	74
Average Wages Per Employee $	2,741	4,245
Gross Stock Per Employee* $	5,994	8,097

* Capital & Labour Ratio

Source: DBS - Catalogue No. 31-201 and 13-543

CLOTHING INDUSTRIES



*Capital/Labour ratio (K/L).

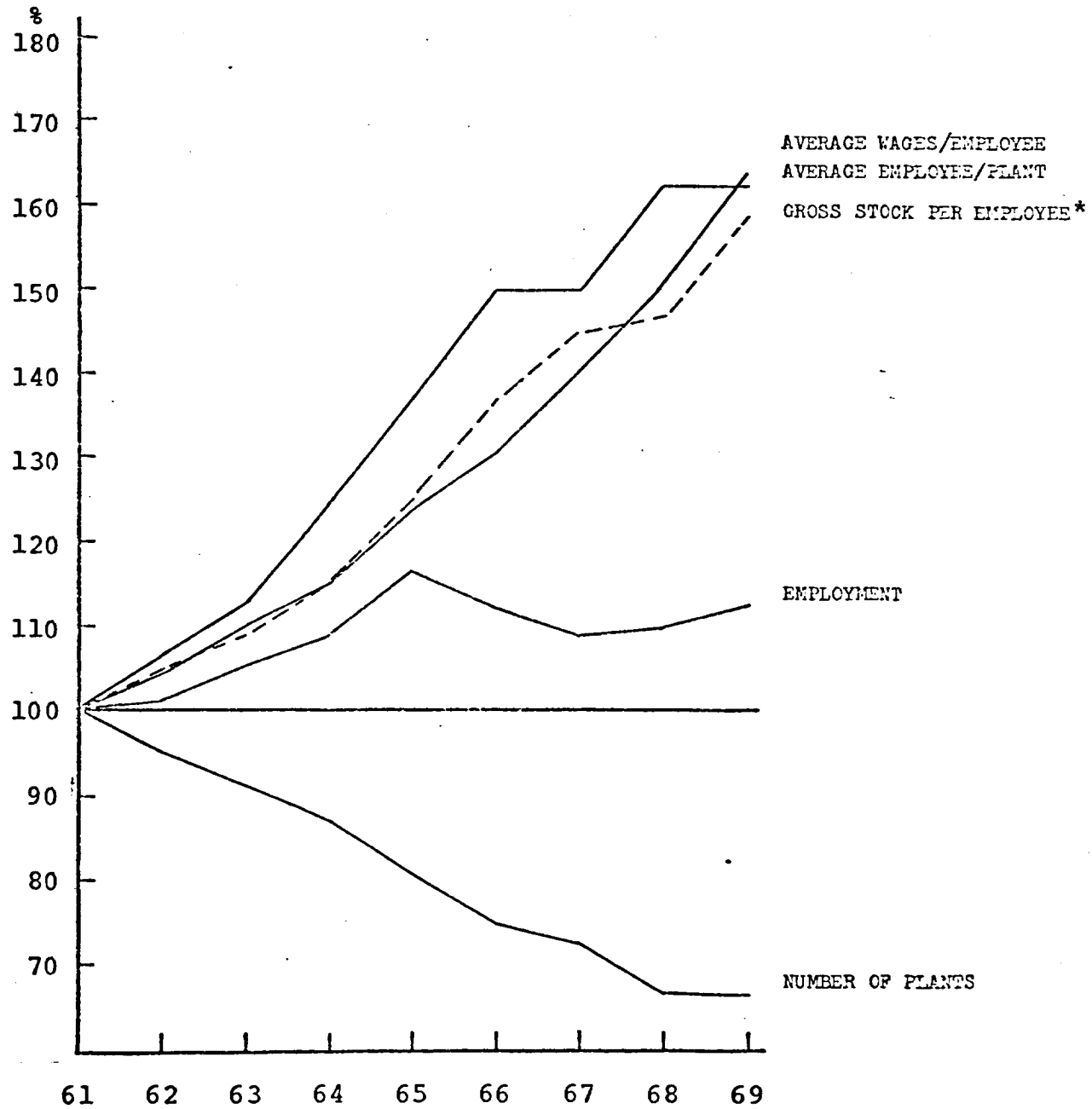
Clothing Industries

	1961 Values	1969 Values
Total No. of Employees	93,306	99,093
Total No. of Plants	2,307	2,289
Average No. of Employees/ Plant	40	43
Average Wages Per Employee $	2,745	4,163
Gross Stock Per Employee* $	2,036	2,674

* Capital & Labour Ratio

Source: DBS - Catalogue No. 31-201 and 13-543

WOOD INDUSTRIES



*Capital/Labour ratio (K/L).

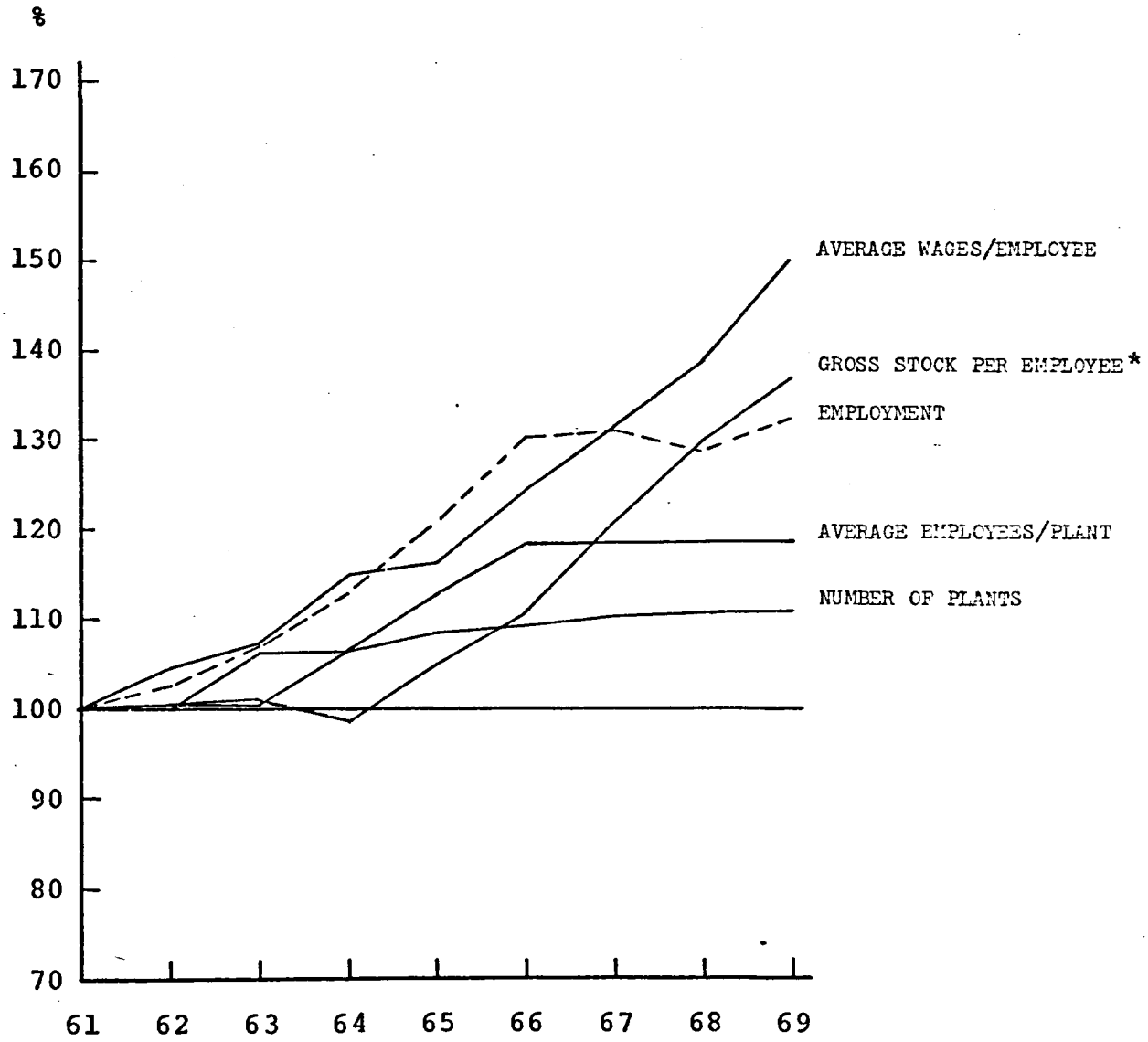
Wood Industries

	1961 Values	1969 Values
Total No. of Employees	82,085	92,546
Total No. of Plants	5,243	3,501
Average No. of Employees/ Plant	16	26
Average Wages Per Employee $	3,566	5,847
Gross Stock Per Employee* $	9,843	15,646

* Capital & Labour Ratio

Source: DBS - Catalogue No. 31-201 and 13-543

FURNITURE AND FIXTURE INDUSTRIES



*Capital/Labour ratio (K/L).

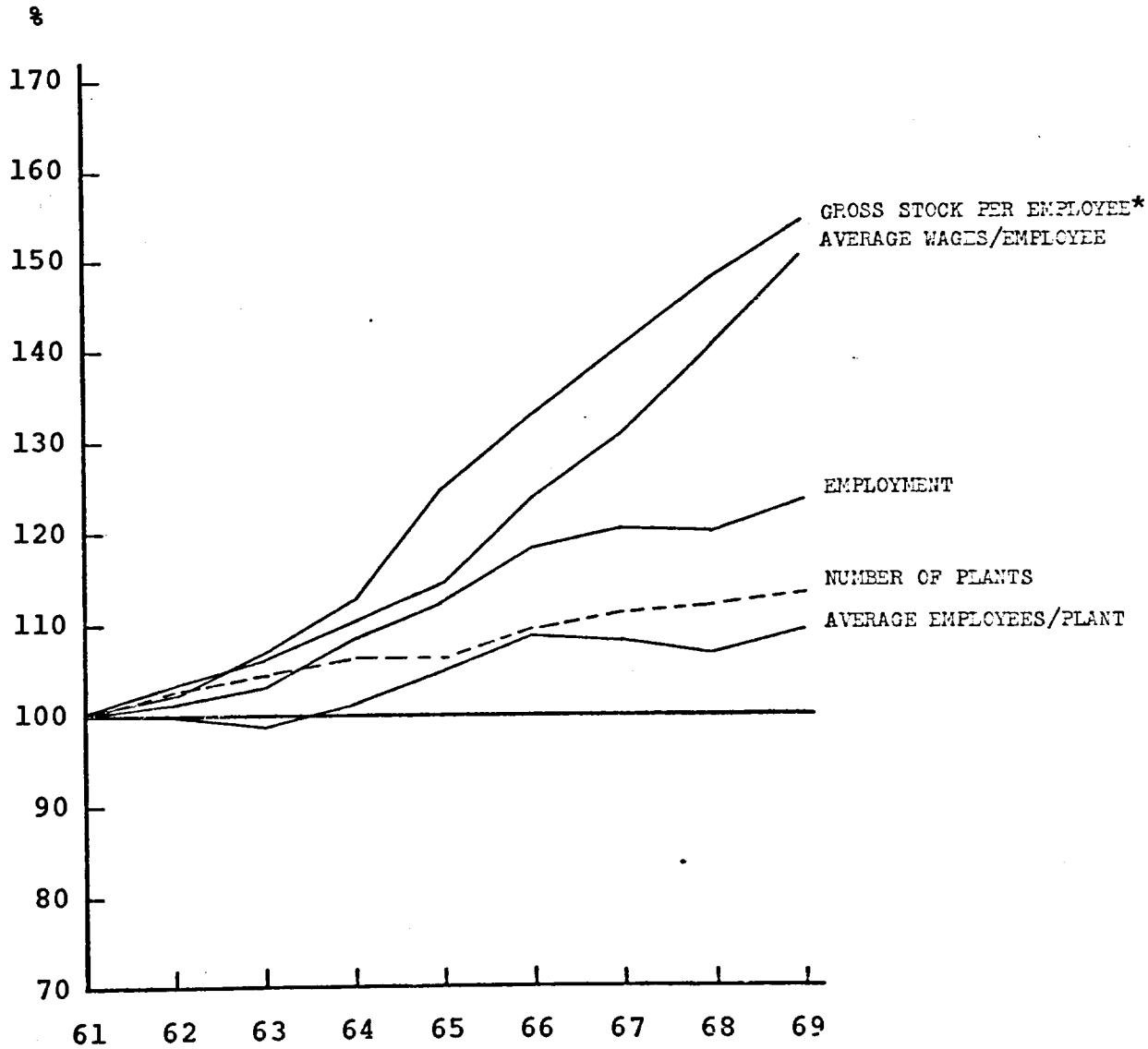
Furniture and Fixtures Industries

	1961 Values	1969 Values
Total No. of Employees	33,476	44,248
Total No. of Plants	2,087	2,313
Average No. of Employees/ Plant	16	19
Average Wages Per Employee $	3,499	5,262
Gross Stock Per Employee* $	4,152	5,718

* Capital & Labour Ratio

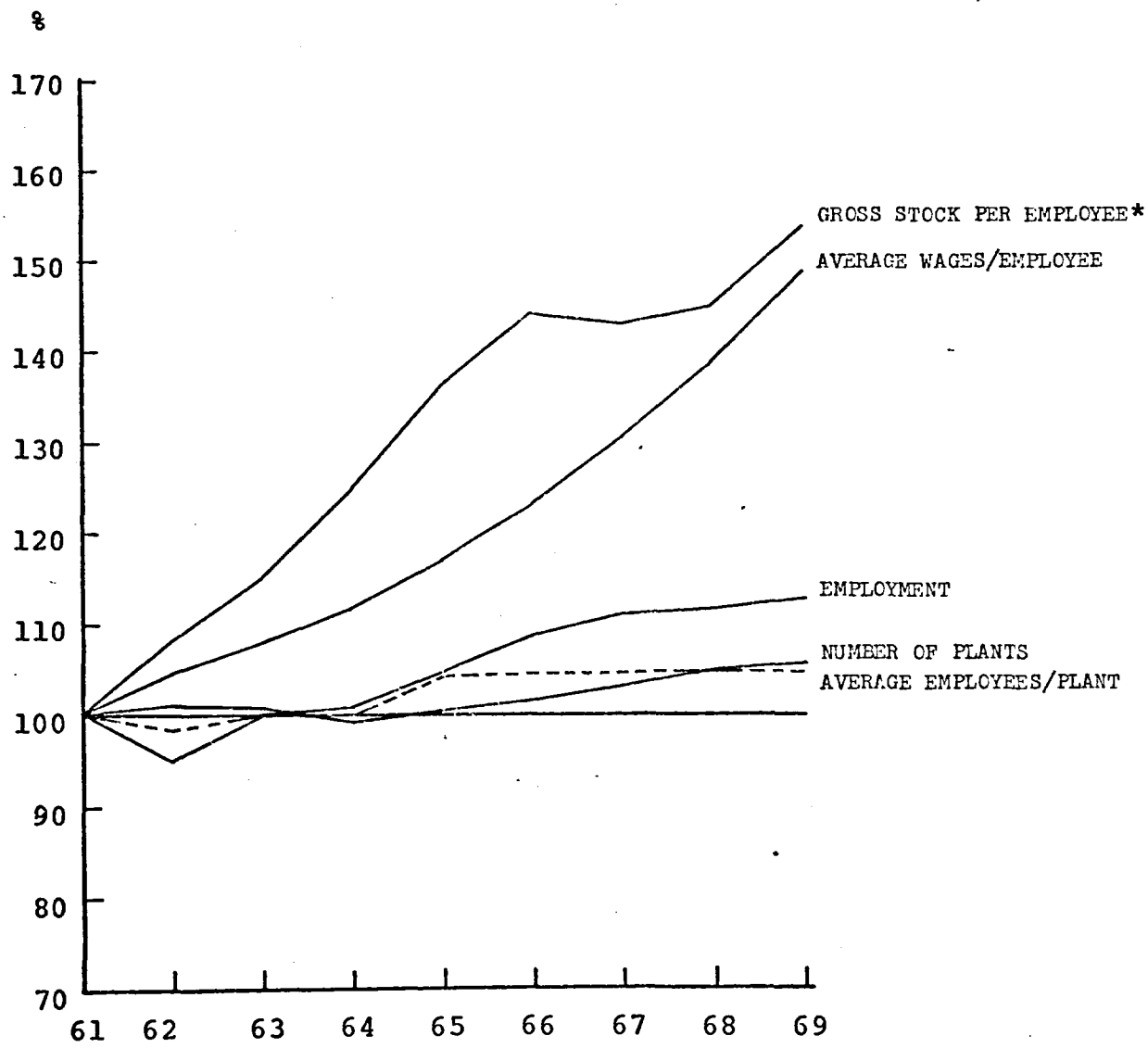
Source: DBS - Catalogue No. 31-201 and 13-543

PAPER AND ALLIED INDUSTRIES



*Capital/Labour ratio (K/L).

PRINTING, PUBLISHING AND ALLIED INDUSTRIES



*Capital/Labour ratio (K/L).

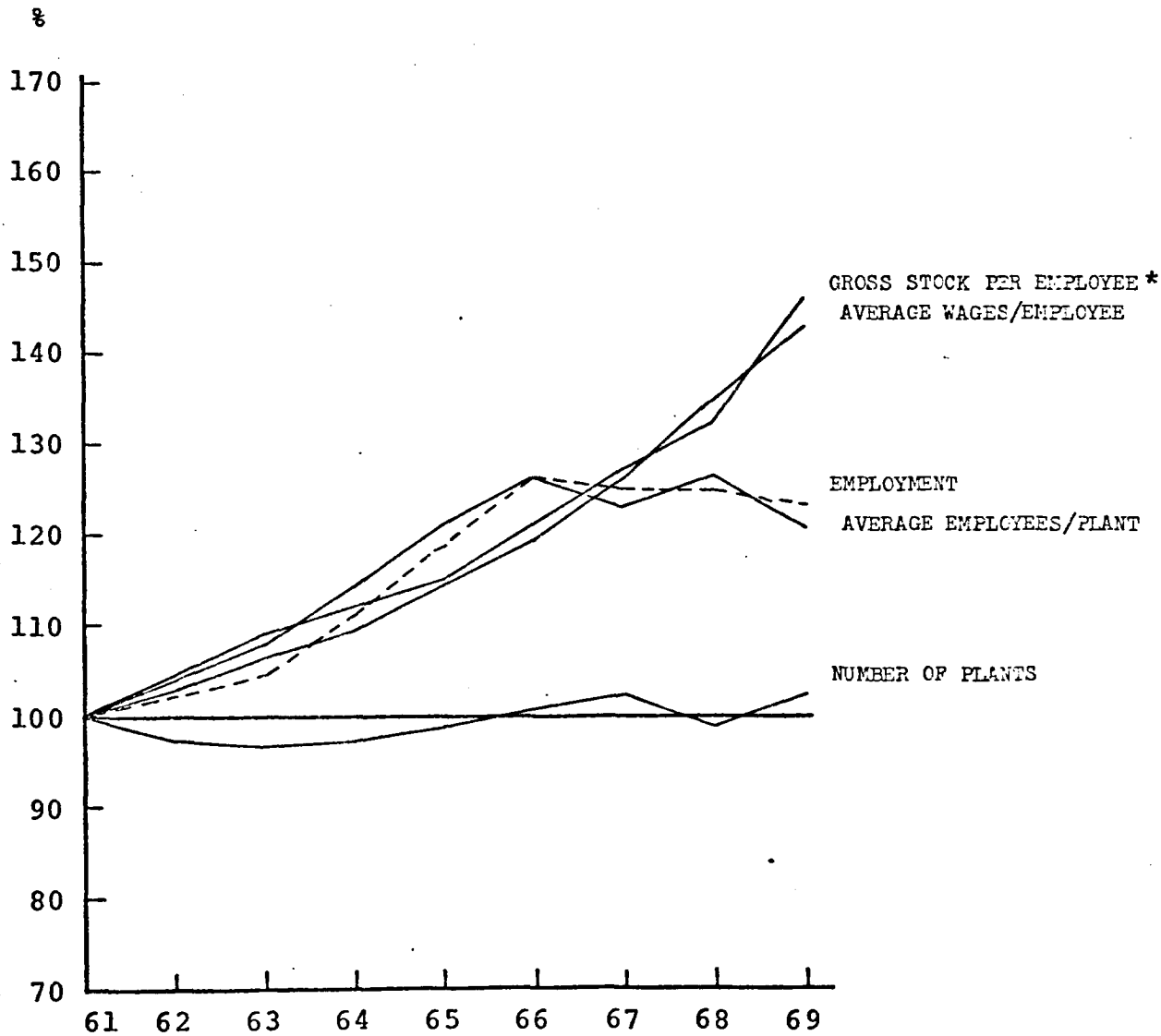
Printing & Publishing and Allied Industries

	1961 Values	1969 Values
Total No. of Employees	75,193	84,656
Total No. of Plants	3,450	3,652
Average No. of Employees/ Plant	22	23
Average Wages Per Employee $	4,570	6,816
Gross Stock Per Employee* $	8,977	13,821

* Capital & Labour Ratio

Source: DBS - Catalogue No. 31-201 and 13-543

PRIMARY METAL INDUSTRIES



*Capital/Labour ratio (K/L).

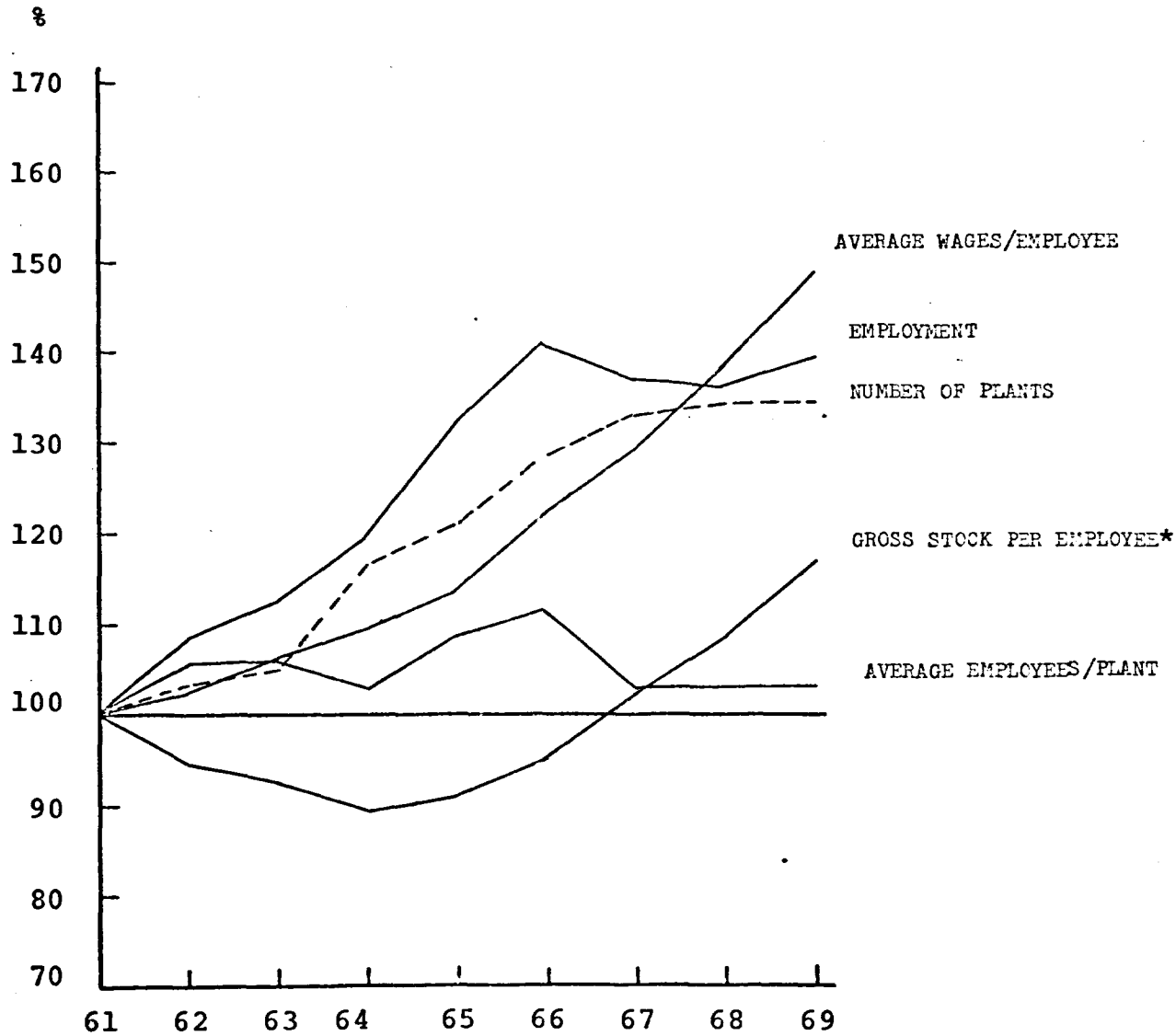
Primary Metal Industries

	1961 Values	1969 Values
Total No. of Employees	89,956	110,953
Total No. of Plants	407	417
Average No. of Employees/ Plant	221	266
Average Wages Per Employee $	5,284	7,562
Gross Stock Per Employee* $	33;894	49,525

* Capital & Labour Ratio

Source: DBS - Catalogue No. 31-201 and 13-543

METAL FABRICATING INDUSTRIES



*Capital/Labour ratio (K/L).

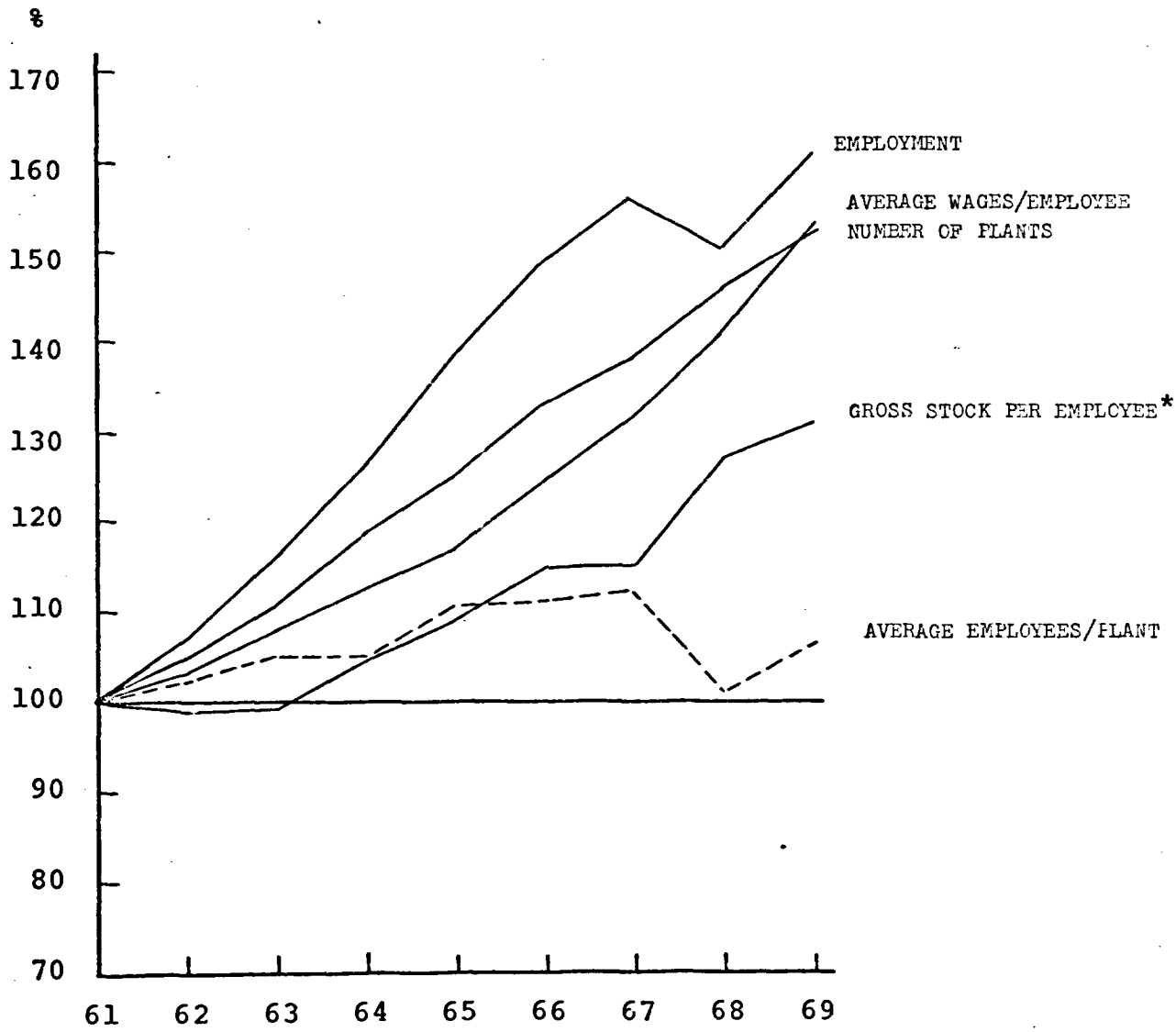
Metal Fabricating Industries

	1961 Values	1969 Values
Total No. of Employees	101,054	141,416
Total No. of Plants	2,964	3,991
Average No. of Employees/ Plant	34	35
Average Wages Per Employee $	4,531	6,780
Gross Stock Per Employee* $	11,360	13,337

* Capital & Labour Ratio

Source: DBS - Catalogue No. 31-201 and 13-543

MACHINERY INDUSTRIES



*Capital/Labour ratio (K/L).

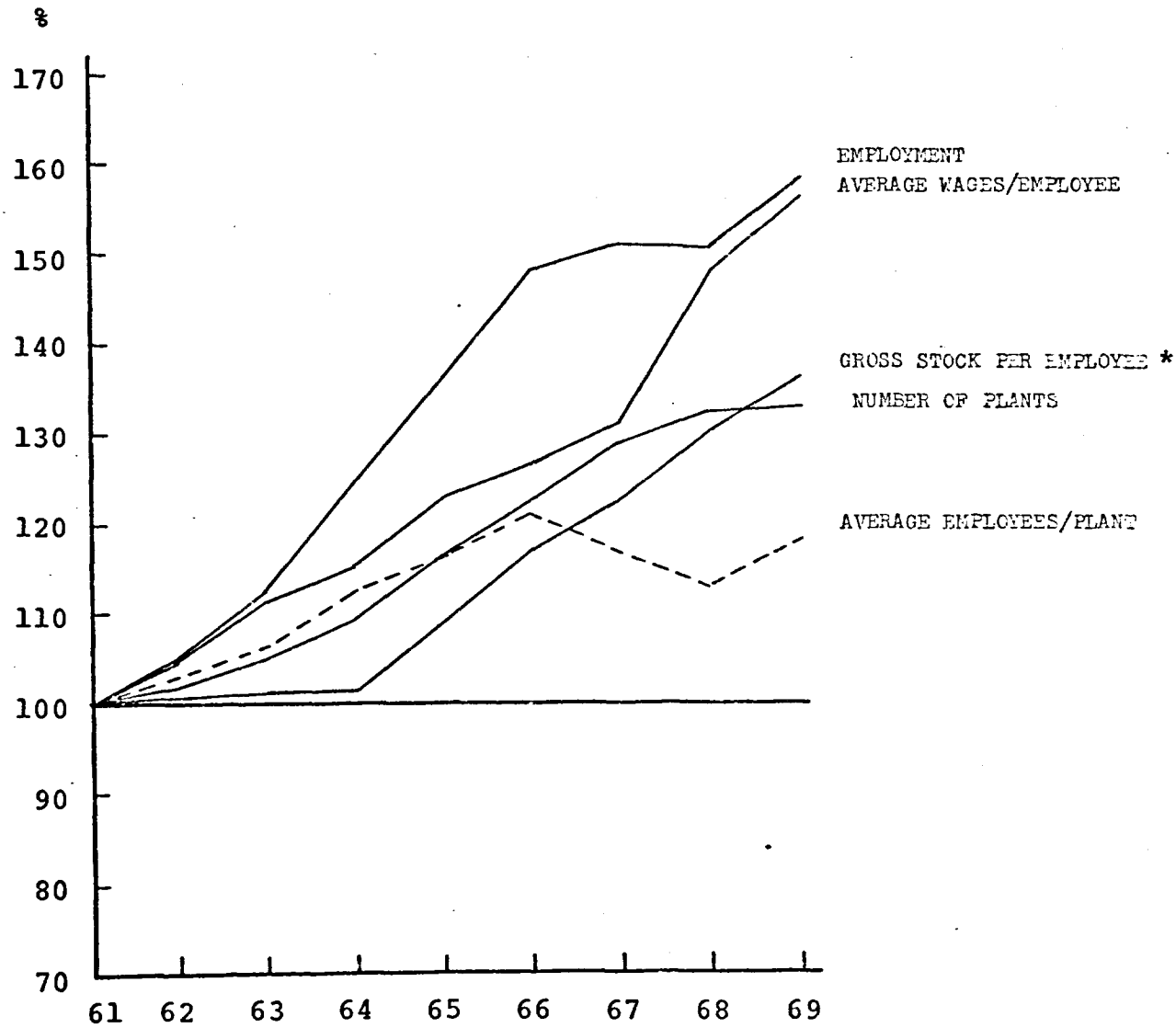
Machinery Industries

	1961 Values	1969 Values
Total No. of Employees	50,639	81,747
Total No. of Plants	544	830
Average No. of Employees/ Plant	93	99
Average Wages Per Employee $	4,807	7,375
Gross Stock Per Employee* $	8,215	10,838

* Capital & Labour Ratio

Source: DBS - Catalogue No. 31-201 and 13-543

TRANSPORTATION EQUIPMENT INDUSTRIES



*Capital/Labour ratio (K/L).

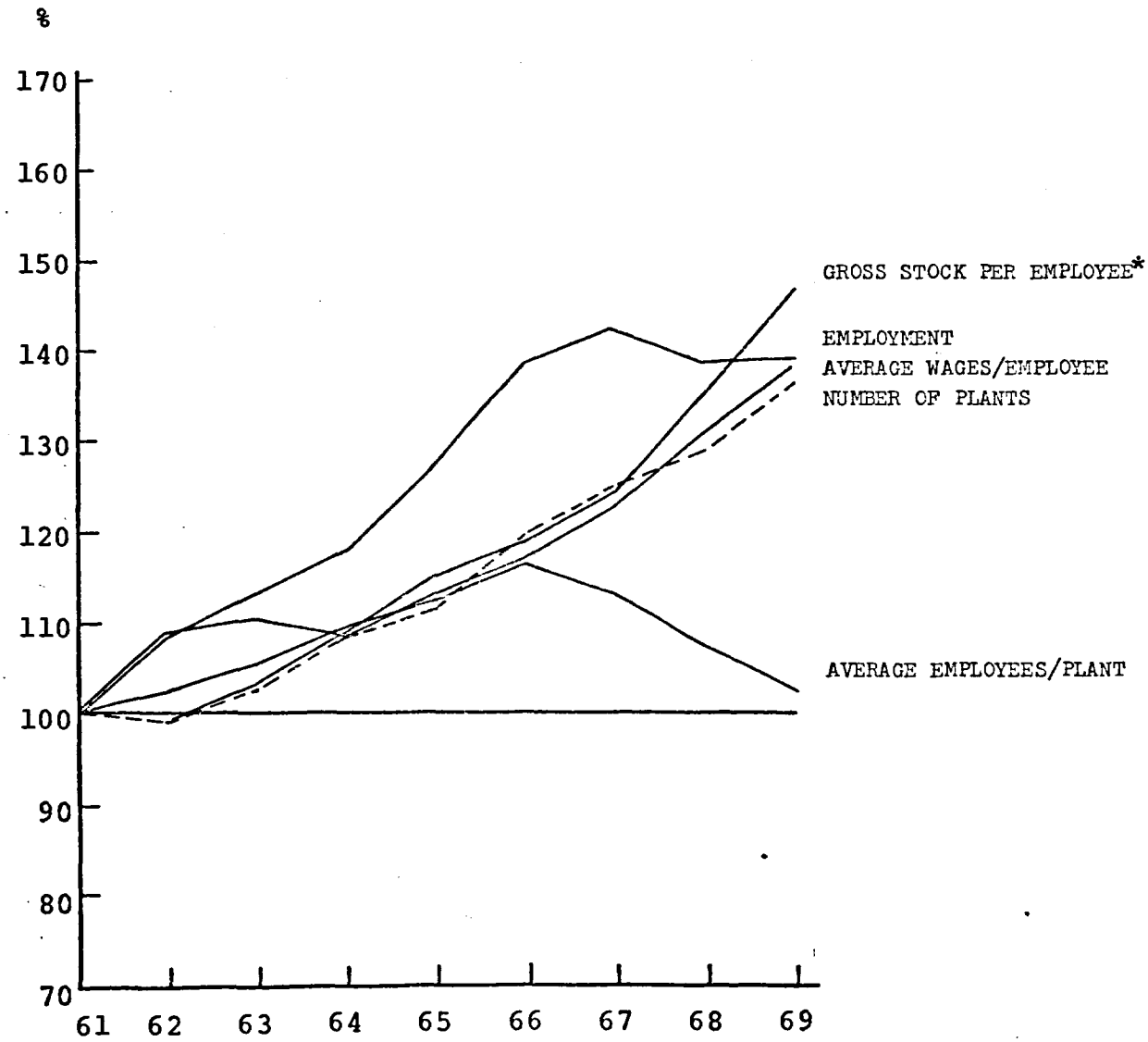
Transportation Equipment Industries

	1961 Values	1969 Values
Total No. of Employees	99,280	157,756
Total No. of Plants	659	881
Average No. of Employees/ Plant	151	179
Average Wages Per Employee $	4,976	7,785
Gross Stock Per Employee* $	13,407	18,319

* Capital & Labour Ratio

Source: DBS - Catalogue No. 31-201 and 13-543

ELECTRICAL PRODUCTS INDUSTRIES



*Capital/Labour ratio (K/L).

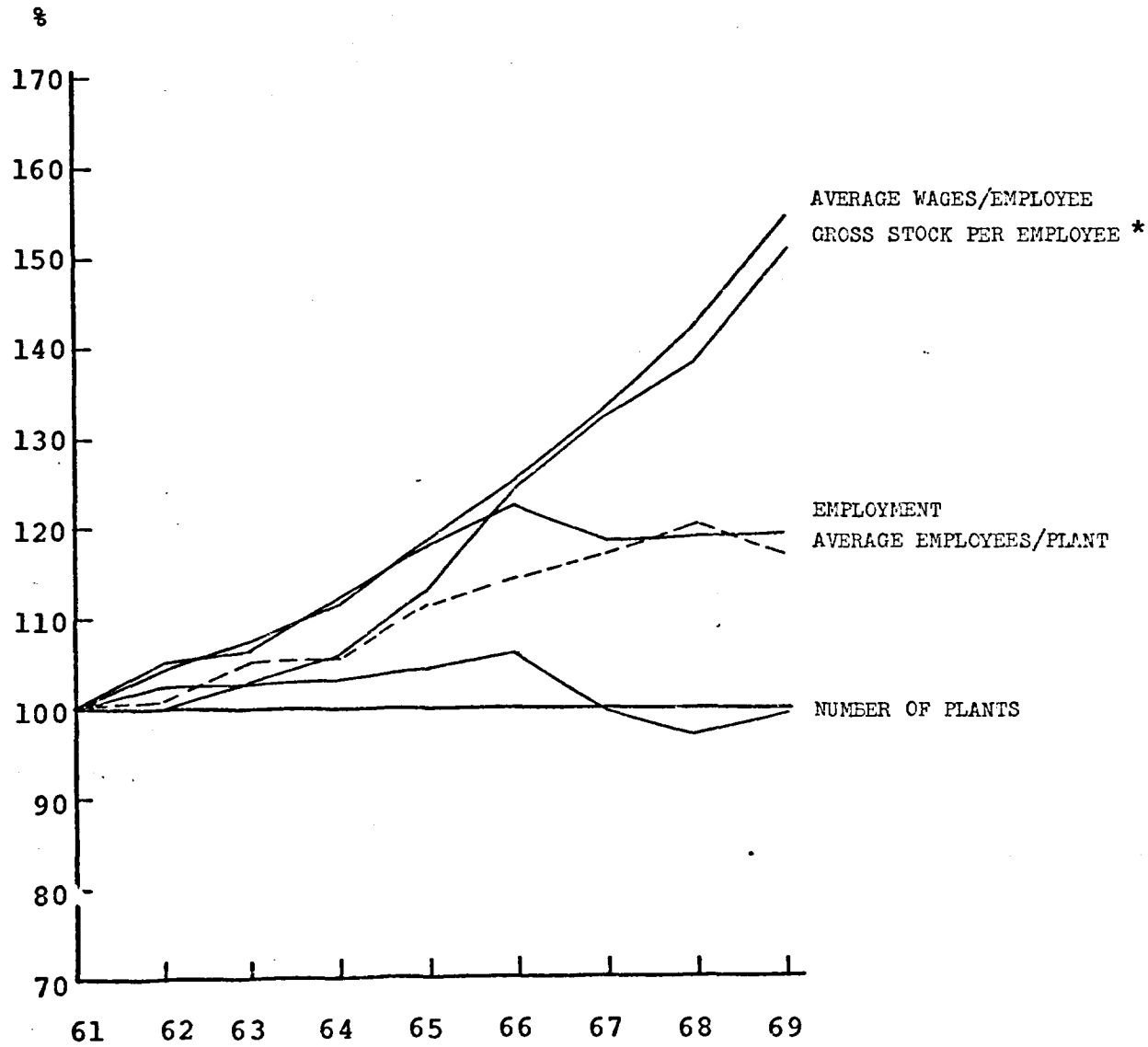
Electrical Products Industries

	1961 Values	1969 Values
Total No. of Employees	89,360	124,988
Total No. of Plants	533	726
Average No. of Employees/ Plant	168	172
Average Wages Per Employee $	4,583	6,368
Gross Stock Per Employee* $	7,162	10,553

* Capital & Labour Ratio

Source: DBS - Catalogue No. 31-201 and 13-543

NON-METALLIC MINERAL INDUSTRIES



*Capital/Labour ratio (K/L).

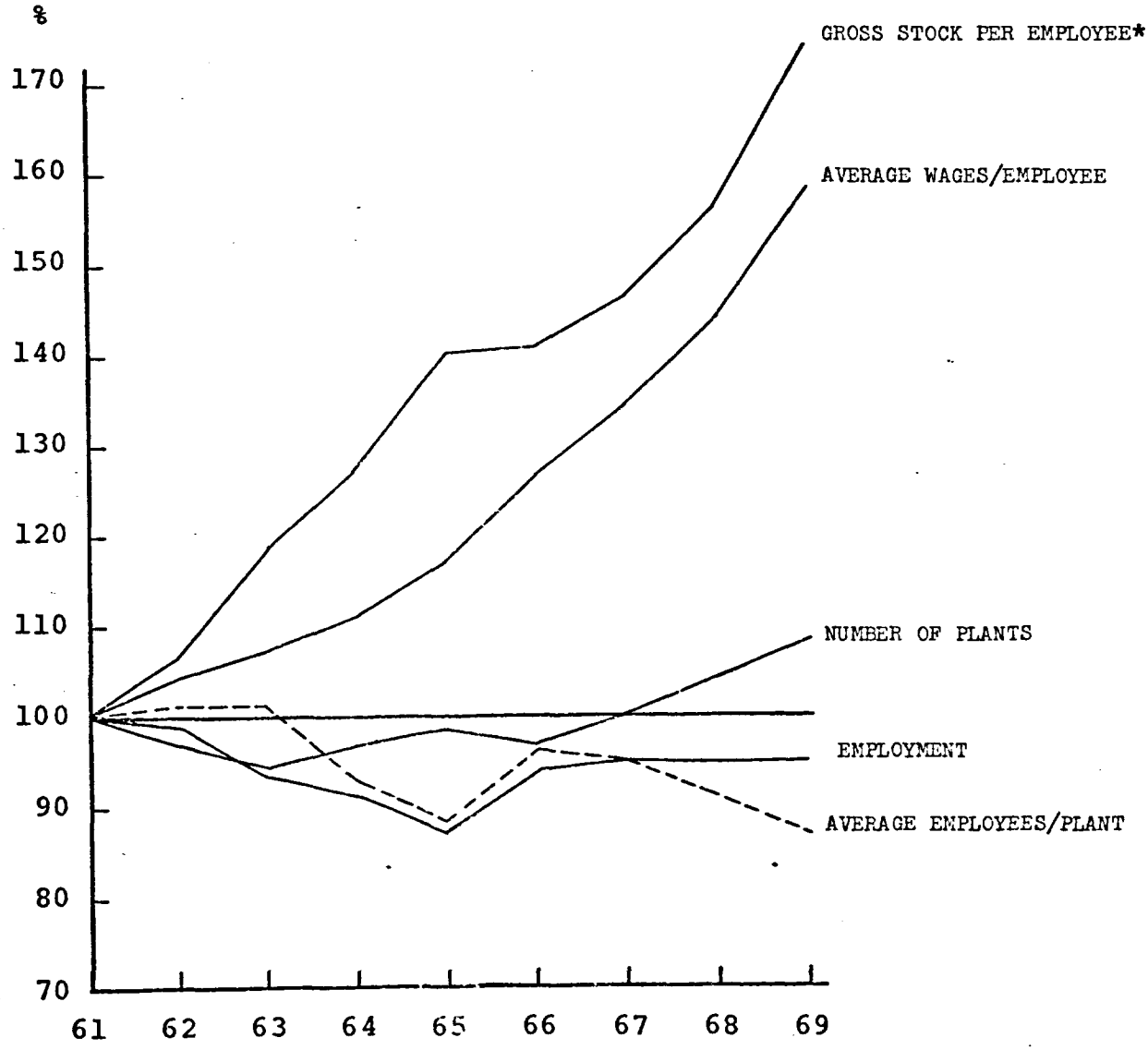
Non-Metallic Mineral Industries

	1961 Values	1969 Values
Total No. of Employees	43,320	51,890
Total No. of Plants	1,293	1,286
Average No. of Employees/ Plant	34	40
Average Wages Per Employee $	4,428	6,895
Gross Stock Per Employee* $	24,654	37,271

* Capital & Labour Ratio

Source: DBS - Catalogue No. 31-201 and 13-543

PETROLEUM AND COAL PRODUCTS INDUSTRIES



*Capital/Labour ratio (K/L).

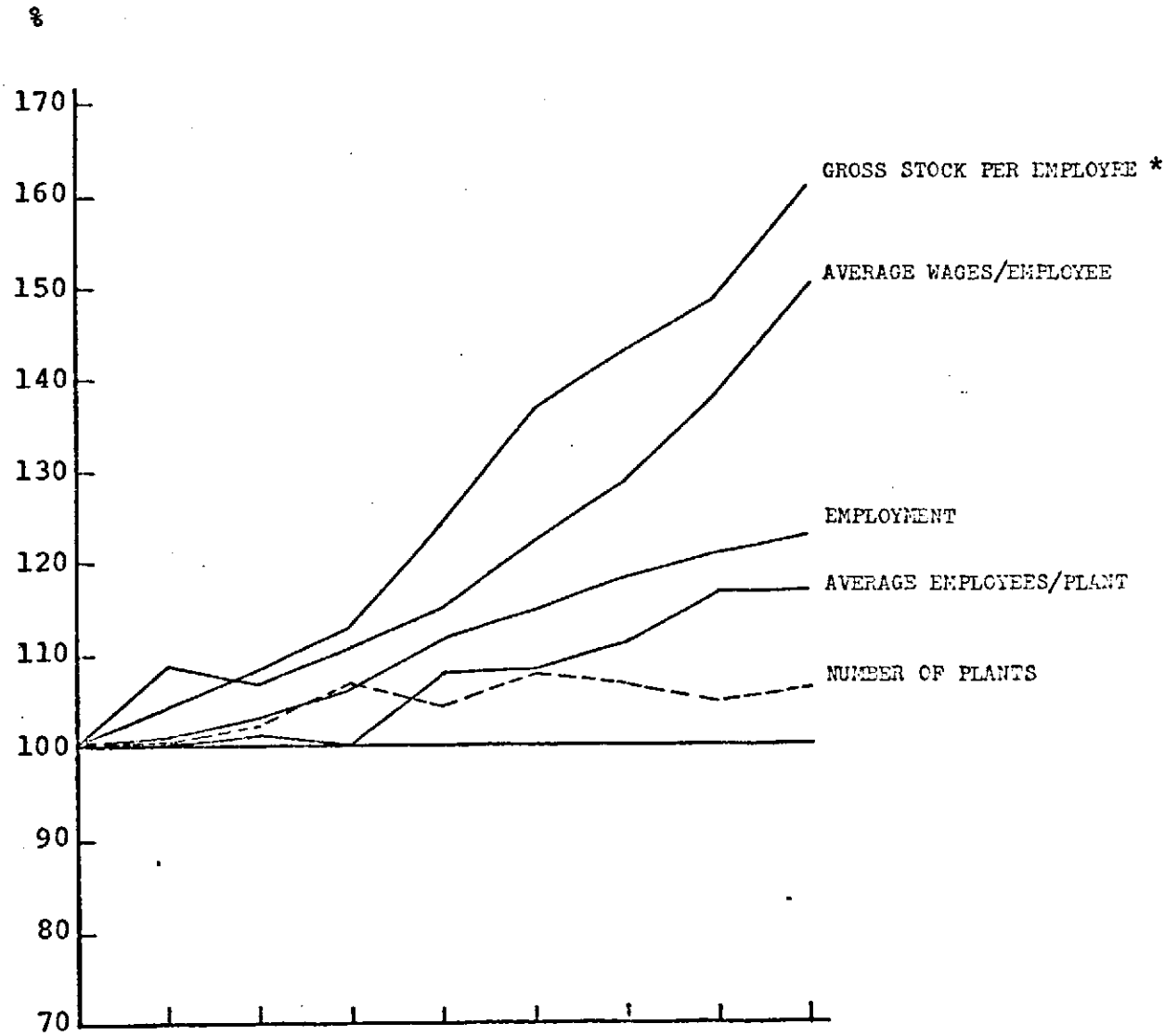
Petroleum & Coal Products Industries

	1961 Values	1969 Values
Total No. of Employees	16,393	15,658
Total No. of Plants	91	99
Average No. of Employees/ Plant	180	158
Average Wages Per Employee $	6,119	9,685
Gross Stock Per Employee* $	81,559	142,483

* Capital & Labour Ratio

Source: DBS - Catalogue No. 31-201 and 13-543

CHEMICAL AND CHEMICAL PRODUCTS INDUSTRIES



*Capital/Labour ratio (K/L).

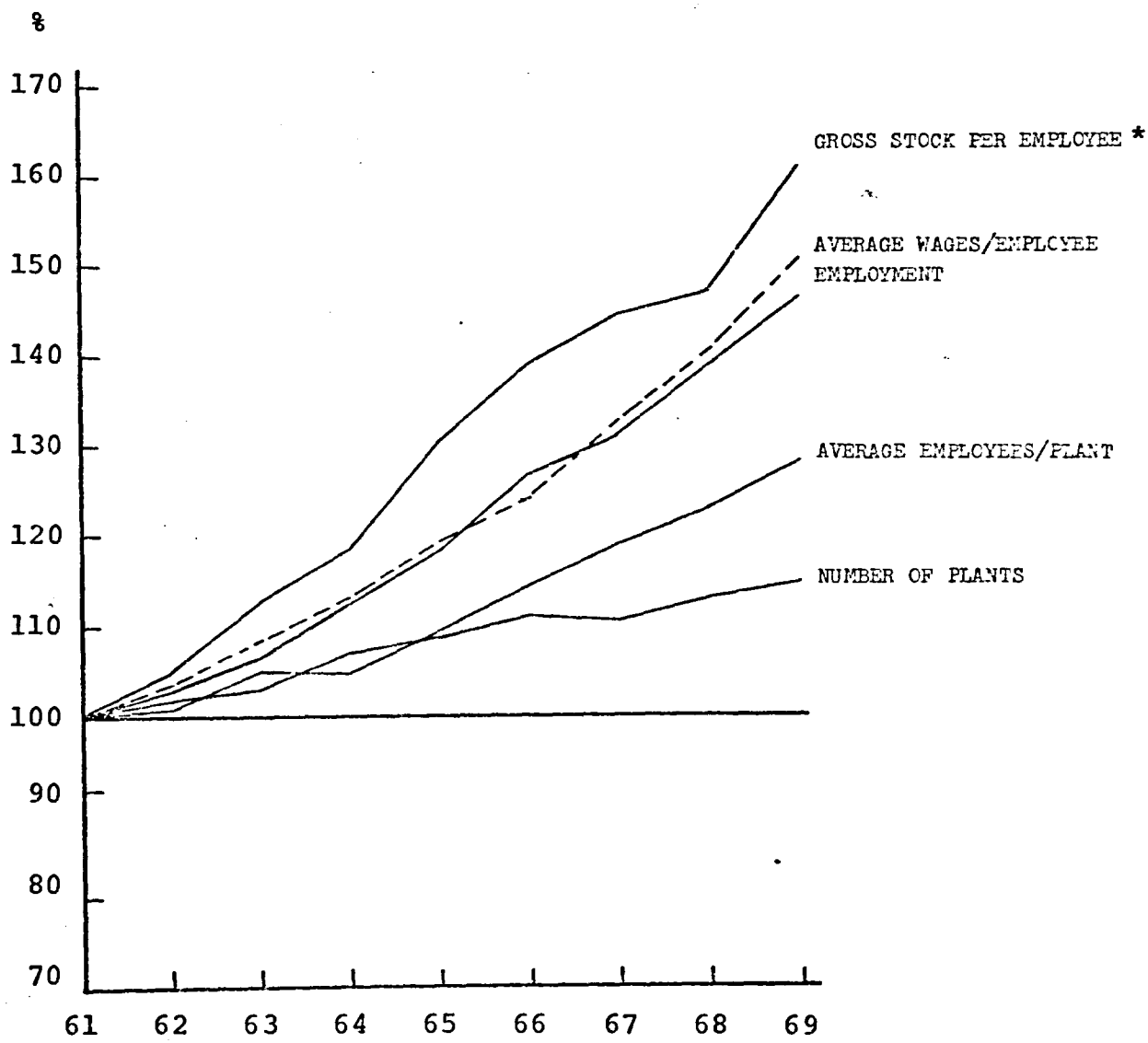
Chemical and Chemical Products Industries

	1961 Values	1969 Values
Total No. of Employees	63,357	78,418
Total No. of Plants	1,067	1,136
Average No. of Employees/ Plant	59	69
Average Wages Per Employee $	5,030	7,556
Gross Stock Per Employee* $	30,573	49,236

* Capital & Labour Ratio

Source: DBS - Catalogue No. 31-201 and 13-543

MISCELLANEOUS MANUFACTURING INDUSTRIES



*Capital/Labour ratio (K/L).

Miscellaneous Manufacturing Industries

	1961 Values	1969 Values
Total No. of Employees	52,978	77,459
Total No. of Plants	2,483	2,871
Average No. of Employees/ Plant	21	27
Average Wages Per Employee $	3,775	5,698
Gross Stock Per Employee* $	4,587	7,397

* Capital & Labour Ratio

Source: DBS - Catalogue No. 31-201 and 13-543