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THE IMPACT OF MINING
ON
THE SOUTH AFRICAN ECONOMY

AN EMPIRICAL REVIEW

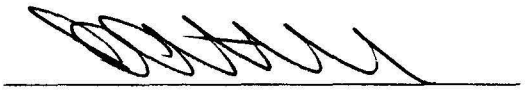
Lancelot Charles Stilwell

A Thesis submitted to the Department of Mining Engineering in the Faculty of Engineering at the University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the degree of Doctor of Philosophy.

Johannesburg 1999

DECLARATION

I declare that this thesis is my own unaided work. It is being submitted for the degree of Doctor of Philosophy in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any other degree or examination in any other University.



Lancelot Charles Stilwell

This 21st day of May 1999

ABSTRACT

Many people and organisations, including the government, claim that mining is the cornerstone of the South African economy. However, no documentation of either the inter-sector or the intra-sector relationship of the mining industry with the rest of the economy exists to support this claim.

The purpose of the research undertaken in this thesis is to evaluate and quantify these relationships, during the period 1971 to 1993, using input-output multipliers.

The conclusions reached are that:

(i) Increased output from mining activities did not have the greatest mean impact on GDP.

(ii) Income generated in mining activities had a significantly less mean impact on GDP than did income generated in the majority of other sectors.

(iii) Increased output from the mining activities did not have the greatest mean impact on employment.

(iv) Increased employment in the mining industries had a significantly less mean impact on employment than did employment in the majority of other sectors.

(v) The sector that consistently benefited the most from increased mining output was "wholesale and retail trade and motor trade". None of the

heavy manufacturing industries benefited significantly from increased mining output.

(vi) The impact, of increased mining output and increased employment in the mining activities, on suppliers of intermediate input was less than the mean impact of the whole economy.

The mining industry does generate large flows of income, but this income does not benefit the economy to the same extent as several other sectors. The thesis supports a previous study which found that the forward linkages between mining and the rest of the economy are indirect and through the world economy. Finished products are imported to facilitate the export of raw mineral resources, which is the driving activity of the economy.

It is not possible to determine the individual importance of minerals other than coal and gold. "Other minerals" should be segregated in future Tables.

Neither GDP nor input-output tables take any account of the depletion of natural reserves. This is an important limitation on their use as an indicator of income in a minerals abundant economy, and is an area for further research.

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CHAPTER ONE

GENERAL INTRODUCTION

1.1 Lost Opportunities

The Republic of South Africa possesses one of the world's great mineral endowments. It has the largest reserves of gold, platinum, titanium, chromium, manganese and vanadium, the second largest reserves of zirconium, and significant reserves of phosphates, antimony, coal and nickel. Table 1.1 describes South Africa's position in world production for its major mineral products.

Table 1.1 Major South African Mineral Reserves

Mineral	Reserves	World Rank Reserves	Annual Production	World Rank Production
Gold	40154t	1	496.9t	1
Platinum Group	62816t	1	188.6t	1
Titanium	146Mt	1	930Kt	2
Chromium	3100Mt	1	4971Kt	1
Manganese	4000Mt	1	3240Kt	3
Vanadium	12500Kt	1	14.8Kt	1
Zirconium	14300Kt	2	260Kt	2
Phosphate Rock	2500Mt	3	2790kt	3
Antimony	250Kt	4	5137t	4
Coal	55333Mt	5	206.3Mt	5
Nickel	11800Kt	5	33.9Kt	8

Source: R.S.A., 1997a

South Africa has produced more than 44000 metric tons of gold during the past one

hundred and twelve years. Its production represents about 40% of all the gold produced throughout history. Its remaining "identified gold resources", defined as resources whose location, grade and quality are known or have been calculated from specific geological evidence, are assessed at 40154 metric tons. These resources include economic, marginally economic and sub-economic components, as well as demonstrated and inferred sub-divisions (R.S.A., 1997a). Their existence means that there is still as much gold left in the ground as has been removed, but not all of this is recoverable due to either economic or technical constraints, or both of these. In spite of this enormous natural endowment, South Africa remains, after more than seventy years of government planning, a third world country, and its economic situation has been described as a crisis (Davis, 1994, page 24).

There is an extensive literature on this mineral wealth, and the benefits that should derive from it. At one extreme Davis (1994) believes that economies richly endowed with mineral resources should use their endowments to fuel economic growth through the export of the raw minerals. At the other end of the debate, Gelb (1988) views mineral endowments as a curse, and states that economies with large mineral endowments have had lower rates of economic growth when compared with countries that have relied on imported raw minerals.

Gelb (1988) and Auty (1990) suggest that economic and political factors caused many of these failures to benefit from large mineral endowments. Sachs & Warner (1995) investigated the negative association between resource abundance and growth. They found that very few resource-abundant countries (2 out of the 18 studied) sustained a growth rate greater than 2% during the period of their study, from 1970 to 1989. Factors such as initial GDP, trade policy, investment rates, terms of trade volatility, inequality and bureaucratic inefficiency played important roles in the lack of growth.

Edwards (1985) advocates another option; the development of domestic secondary industries to beneficiate, or add value to, the minerals of South Africa, instead of exporting them. He suggests that South Africa could become a rich nation by using

its mineral wealth as intermediate input to develop a strong manufacturing sector. So the debate goes on and on.

A more basic reason for the failure of mineral rich developing countries to match the growth of the more mature but mineral deficient countries is becoming apparent in contemporary economic literature. Lane & Tornell (1995) quoted in Sachs & Warner (1995, page 4), contend that "resource-rich economies are subject to more extreme rent[1] seeking behaviour than resource-poor economies, as national politics (in the resource-rich countries) is oriented to grabbing the rents earned by the natural resource endowments". New discoveries of mineral deposits lead to "feeding frenzies" in a fight for the natural resource rents, which only serve to harm the public good. Hotelling (1931, page 144) summarizes these opinions succinctly: "Great wastes arise from the suddenness and unexpectedness of mineral discoveries, leading to wild rushes, immensely wasteful socially, to get hold of valuable property".

Other parties to the debate, albeit in a vaguely defined form, are the major industrialised nations of the world, who regard South Africa's large and comprehensive mineral reserves to be strategically important to their own economies. In a throwback to the days of colonial rule, and even mercantilism, these nations seek to secure sources of raw mineral input for their own manufacturing industries. The prime role of South Africa is today seen by some as an exporter of raw minerals, and its industrialization policies are regarded as "tools of *apartheid*" and dismissed as "absurd" (Davis, 1994, pages 3, 127).

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[1]The debate on "rent" is hundreds of years old. According to Smith (1776, page 332) it is "that part of the annual produce of the land which pays the land-lord for the use of his land". Ricardo (1817, page 33) defines rent as "That portion of the produce of the earth which is paid to the landlord for the original and indestructible powers of the soil". Hotelling (1931, page 139) poses the question "How much of the proceeds of a mine should be reckoned as income, and how much as return on capital?" Davis (1994, page 25) states that "rents represent the true value of a mineral endowment, contained in the revenue received when the mineral is extracted and sold" Current usage means a payment beyond that necessary to maintain current supplies of a resource.

1.2 A Brief Description of the South African Economy

The primary industries produce unbeneficiated products from a nation's natural resources. In South Africa, these primary industries are agriculture, forestry, fishing and mining (C.S.S, 1998, page 7). Secondary industries are those that add value to these raw products, and include the manufacturing, electricity, gas and water and construction sectors. Tertiary industries exist to manage and consume the income flowing from the primary and secondary industries, and include trade and catering, transport and communication, finance and real estate, community services, general government, other producers, and imputed financial services. Table 1.2 shows the composition of South Africa's GDP in 1998 in terms of these sectors.

Table 1.2 Contribution by different sectors to real GDP at factor incomes in 1998. (Base year 1990).

Economic Sector	% Contribution to Total GDP	Real Annual % change compared to 1997
Agriculture, Forestry, Fishing	5.28	-1.2
Mining, Quarrying	9.72	-0.4
Manufacturing	25.50	-1.7
Electricity, Gas, Water	4.37	0.7
Construction	3.48	0.2
Trade, Catering	15.04	0.3
Transport, Communication	7.43	2.2
Finance, Real Estate	14.49	2.3
Community Services	1.82	1.8
General Government	13.83	-0.3
Other Producers	2.18	1.8
Imputed Financial Services	-3.14	5.1
TOTAL	100.00	

Source: CSS 1999

In relative size, South Africa's national income is roughly one seventh that of the United Kingdom, but South Africa is by far the most industrialized nation in Africa (Encyclopaedia Britannica, vol. 17). Table 1.3 shows data from the national accounts, and some economic indicators issued in the fourth quarter of 1998 (S.A. Reserve Bank, 1999).

Table 1.3 National Accounts and Economic Indicators

Data Category	Data
Private consumption expenditure	R 405095 million
Consumption expenditure by general government	R 145687 million
Gross domestic fixed investment	R 125017 million
Change in inventories	- R10888 million
Gross domestic expenditure	R 661510 million
Export of goods and non factor services	R 185420 million
Imports of goods and non factor services	R 188049 million
Expenditure on Gross Domestic Product	R 658881 million
Manufacturing Production Index	103.6 (1995=100)
Leading Indicator	94.9 (1990=100)
Employment Index	84.6 (1990=100)
Wages & Earnings Index	280.9 (1990=100)
Consumer Price Index	130.3 (1995=100)
Production Price Index	121.0 (June 1995=100)
General government revenue	R 50811 million
General government expenditure	R 55307 million
Central government revenue	R 15078 million
Central government expenditure	R 14114 million
Central government total debt	R363701 million
Population (estimate at 30 June 1998)	42 869 000

Source: S.A. Reserve Bank, 1999

Table 1.4 shows some aspects of the South African economic infrastructure relative to the rest of Africa. It produces nearly 40% more electrical power than the rest of Africa, has almost half the total amount of railway track and more than four times as much paved road.

Table 1.4 A Comparison of South African Economic Infrastructure

	South Africa	Rest of Africa	World
Electricity output (GWh)	168937	125563	11017000
Railways (km)	36621	46379	1146500
Paved roads (km)	117000	27487	
Motor vehicles (000's)	5527	8773	550000
Telephones (000's)	5441	6559	454622
Port tonnage (000 tons)	115000		
Million passenger air km	83000		

Source: du Toit and Falkena, 1995

There is a well-developed, sophisticated financial system that operates in the first world, but South Africa has a typical third nation income distribution profile (duToit and Falkena, 1995, page 10). The ratio of incomes received by the top 20% and bottom 20% of the income distribution is about 20:1, i.e. the top 20 % of the distribution has an income 20 times greater than the bottom 20%. By way of comparison, this ratio is about 26:1 in Tanzania, one of the poorest countries in the world, and about 4:1 in Japan, one of the richest.

The disparity of income, due largely to the racial policies of the past, has resulted in a very narrow fiscal base. In 1997, personal taxes contributed about 38% of total tax revenue, corporate taxes contributed about 17%, and indirect taxes (mainly levied on consumer goods and services) contributed the final 45%. However, a sparse 1.5% of the population accounted for 51.7% of personal taxes (S.A. Reserve Bank, 1999).

The huge demands made by the poor for social expenditure, the high government wage bill, and large interest and debt repayment obligations of the government all seriously constrain fiscal policy (duToit and Falkena, 1995, page 28).

1.3 Contribution of Mining to Gross Domestic Product

Annualised decreases of 4.7%, 0.5%, 3.0% and 0.9% in the seasonally adjusted real mining output during the four quarters of 1998 were mainly due to a sharp decline in the production of gold and the continued decline in international commodity prices (CSS, 1999).

The GDP, at factor incomes and current prices in 1998 was R573.039 billion. The contribution of the mining industries was R45.000 billion, or 7.85% (compared to the 9.72% share of real GDP, expressed in 1990 terms, shown in Table 1.2)

Table 1.5 shows that in 1993, the last year for which input-output tables are available, GDP amounted to R325.031 billion and that the direct shares of gold mining, other mining and coal mining in GDP were 5.62%, 2.97% and 1.24%, respectively. According to their direct contribution, gold mining, other mining and coal mining ranked fourth, twelfth and twenty-second in relative importance in an aggregated 35-sector distribution of GDP.

Direct, indirect and induced contribution of the gold mining, other mining and coal mining sectors (i.e., after application of total GDP multipliers) of the gold mining, other mining and coal mining sectors were 6.03%, 2.81% and 1.17%, respectively. The ranking of gold mining and other mining sectors remained unchanged, while coal mining dropped to twenty fifth place.

By the first half of 1997 the contribution of gold mining to the gross domestic product was only 2.5% (S.A. Reserve Bank, 1999). The mining of ore with a lower gold content, and the lower volumes mined, were the main reasons for the decline in gold mining's contribution to the gross domestic product. In contrast, output from the non-gold sectors grew by about 2% between 1995 and 1996 on account of strong world demand, but during the second half of 1996 weakened commodity prices and strained industrial relations impacted adversely on non-gold output.

Table 1.5 Ranking of Sectors by Direct, Indirect and Induced Share of GDP in 1993

Sector	Direct Share	Total GDP multiplier	Direct Indirect Induced	Direct %	Direct Indirect Induced
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	52456	1.660	87053	16.14	18.20
TRANSPORT AND STORAGE	20385	1.575	32116	6.27	6.71
REM	23451	1.354	31754	7.22	6.64
REAL ESTATE	26727	1.112	29718	8.22	6.21
GOLD MINING.	18253	1.581	28856	5.62	6.03
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	13685	2.013	27550	4.21	5.76
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	17913	1.177	21085	5.51	4.41
AGRICULTURE, FORESTRY AND FISHING.	15629	1.306	20410	4.81	4.27
ELECTRICITY, GAS AND STEAM	13150	1.376	18095	4.05	3.78
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	11458	1.378	15790	3.53	3.30
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	9773	1.383	13516	3.01	2.83
OTHER MINING.	9651	1.392	13437	2.97	2.81
BUSINESS SERVICES	8137	1.612	13121	2.50	2.74
COMMUNICATION	7473	1.574	11760	2.30	2.46
BUILDING CONSTRUCTION	7123	1.590	11327	2.19	2.37
PAPER, PRINTING AND PUBLISHING.	6950	1.452	10090	2.14	2.11
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	7100	1.396	9909	2.18	2.07
FABRICATED METAL PRODUCTS.	5801	1.481	8591	1.78	1.80
ENGINES,MACHINERY AND EQUIPMENT.	5054	1.467	7413	1.55	1.55
MOTOR VEHICLES, PARTS AND ACCESSORIES.	5424	1.329	7210	1.67	1.51
CIVIL ENGINEERING AND OTHER CONSTRUCTION	4554	1.564	7124	1.40	1.49
OTHER SERVICES, NON-PROFIT SEEKING	3718	1.826	6788	1.14	1.42
ELECTRICAL MACHINERY AND APPLIANCES.	4018	1.447	5814	1.24	1.22
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALI	3949	1.442	5697	1.22	1.19
COAL MINING.	4025	1.388	5585	1.24	1.17
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY	3889	1.420	5523	1.20	1.15
OTHER SERVICES, PROFIT SEEKING	3044	1.641	4994	0.94	1.04
CATERING AND ACCOMODATION SERVICES	3077	1.539	4735	0.95	0.99
WOOD AND FURNITURE.	2492	1.498	3732	0.77	0.78
OTHERS,SCRAP AND GOVERNMENT SERVICES	2015	1.543	3110	0.62	0.65
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	1390	1.596	2218	0.43	0.46
OTHER MANUFACTURING INDUSTRIES	1084	1.414	1533	0.33	0.32
WATER SUPPLY	1043	1.346	1404	0.32	0.29
MACHINERY AND EQUIPMENT RENTING AND LEASING	899	1.170	1052	0.28	0.22
JEWELLERY AND RELATED ARTICLES	242	0.937	227	0.07	0.05
Totals	325031		478336	100.00	100.00

1.4 The Problem Defined.

The South African government recognises that:

"South Africa's mining industry is supported by an extensive and diversified resource base, and has since its inception been a cornerstone of the South African economy. The changes which have come about in our country make it necessary to prepare the industry for the challenges which are facing all South Africans as we approach the twenty first century" (R.S.A., 1998, page 1).

Despite the mass of statistical information that is available on almost every aspect of the mining industry in South Africa, the economic inter-dependence of the mining industry and the rest of the economy is not generally well understood.

The large mining houses produce detailed information on their operations every three months. Various government departments (Mineral and Energy, Trade and Industry, Customs and Excise, the Reserve Bank, the Receiver of Revenue and the Central Statistical Service) produce a continuous plethora of data. Very often these data do not cross check, and vary in format from year to year.

However, even with this abundance of data there is very little interpretation and analysis of inter-industry dependencies. According to Ally (1993), "much has been written on the role that gold played in the emergence of an industrialised national economy, but surprisingly little has been written on the implications that the mineral revolution had for South Africa."

Nowhere does there exist a concise, comprehensive account of the relationships and inter-dependencies of the mining sectors with the rest of the economy. This deficiency is perhaps due to the size and complexity of the industry, which in 1997 produced over 56 different minerals, employed close to half a million people, and has an intricately interwoven relationship with the rest of the economy. This problem is a serious shortcoming if mining is to be the base of future economic development,

as set out in the Minerals Policy White Paper (R.S.A., 1998).

1.5 Previous Investigations

In 1980, Lombard & Stadler completed a study, commissioned by the Chamber of Mines of South Africa, "to discover economically significant links between mining and the rest of the economy of South Africa". They focused on the macro-economic dimensions of the industry, such as production, investment, employment, determination of prices and costs, distribution of the operating surplus, savings and investment, and the balance of payments. Their emphasis was on the external relationships of the mining industry with the economy in general. They describe the relationship between the mining industry and the rest of the economy through backward and forward multipliers, and use the system of national accounts as a framework to examine the role of the mining industry through Input-Output Tables.

Lombard and Stadler (1980, page 15) calculate direct and indirect multipliers for the three mining sectors. They use intermediate inputs, direct coefficients and inverse coefficients from input-output tables published by what was then the Department of Statistics, and is now the Central Statistical Service, for the year 1971. Their method is briefly summarised thus:

A value added coefficient, α_j [2], is found from the input-output table. The value, V, added directly and indirectly to GDP through an output of R1000 from the gold mining sector, V, will be:

$$V = [\alpha_j + (1 - \alpha_j) \times \lambda \times \gamma] \times \Delta Q_j \qquad (1.1)$$

Where ΔQ_j is the change in output of a sector,

[2]Author's Note: This is assumed to be the technical coefficient from the CSS table II, although the value used by Lombard and Stadler, 0.697, could not be reconciled with the 1971 CSS table.

λ is an intermediate transactions multiplier, derived from inverse coefficients obtained from the CSS tables, and

γ is a summed weighted average of the value added coefficients of individual industries.

By substituting the values $\alpha_j = 0.697$, $\lambda = 1.789$ and $\gamma = 0.443$ in (1.1), the direct and indirect value added was thus found to be R937 per R1000 of output. A similar calculation produces values of R908 and R918 for the coal and other mining sectors, respectively.

These values mean that direct and indirect GDP multipliers, i.e. GDP multipliers calculated from a transaction table closed with respect to households, will be 1.937, 1.908 and 1.918 for the coal, gold and other mining sectors, respectively, in 1971.

Lombard and Stadler (1980) found that the direct forward linkages of the mining industry with the rest of the domestic economy were much weaker than its direct forward linkages with the world economy. They concluded that:

(i) The extent to which manufacturing in South Africa depended directly upon inputs from domestic mining was low.

(ii) The forward linkages between mining and the rest of the South African economy were indirect and through the world economy.

In other words, the South African economy consumed imported foreign goods manufactured from exported domestic raw minerals. Mining, as an earner of foreign exchange, made international purchasing power available to domestic industries with which to buy their inputs from other countries.

They also found that:

(i) The income terms of trade established by the mining industry provided real

scope for domestic economic development in general, and industrial development in particular;

(ii) The distribution of operating surplus[3] from the mining industry and the rest of the economy is the link between real flows and money flows in three economic processes, i.e. production, capital formation and employment;

(iii) More than 85% of net income[4] of the mining companies consisted of operating surplus, and savings from this surplus were not invested in assets outside the mining companies, but were invested in the expansion of mining activities

(iv) There had been a radical change in the economic significance of mining since 1972 as shown by the surplus (profits) retained by the industry, which rose from practically nothing in the 1960's to over R1 billion in 1978. This excess of internal savings over capital formation produced a "real payment surplus", and led to the conclusion that the mining industry has under-utilised the real resources[5] of the domestic economy.

(v) There were exceedingly large improvements in the unit values of mining equity, which benefited the owners of the mining activity.

(v) The output of the mining industry mostly was exported. There was minor use of minerals as an intermediate good, i.e., as input for the manufacture of final

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[3]Operating surplus is the measure, in monetary terms, of the contribution to the value added in mining, of all non-labour functions of production. These surpluses are not normally held as inventories (unless this is forced by a recession in prices) but take the form of financial flows into the accounts of the owners of the activity.

[4]Net Income is the net operating surplus added to income from assets in the portfolio companies in the form of interest and dividends.

[5]Note:The term "real resources", as used by Lombard and Stadler, relates to capital and labour rather than ore reserves. They did not address the matter of depleting non-renewable mineral resources.

products by other domestic industries, and the direct use of minerals for consumption and capital formation was negligible.

Reliance on a single input-output table for 1971, placed serious limits on the value of the calculations of Lombard and Stadler (1980, page 15, footnote).

Nevertheless, the methodology, developed without the computing power that has evolved since 1980, illustrated the use of inverse coefficients to analyse the impact of mining on the economy.

1.6 Objectives of the Thesis

The objectives of this thesis are therefore:

(i) To quantify the economic interdependence of the mining industry and the rest of the economy.

(ii) To examine the relationship of the component sectors to each other.

(iii) To examine the impact that increased production from the mining industry has had on these other sectors over a period from 1971 to 1993.

(iv) To determine whether there has been any strengthening of the secondary industries.

(v) To evaluate the Government's proposed minerals policy.

Edwards (1985), and Davis (1994), examined the underlying structure of the minerals industry, and arrived at opposing proposals for the development of the

South African economy, each with its own compelling rationale. Between these two standpoints there is a need to quantify the inter-sectoral relationships between the mining industry and the rest of the economy, and the intra-sectoral relationships that exist between the mining industry and its suppliers of intermediate input. The thesis addresses these issues.

1.7 Importance of the Research

The development of the mining industry, and the use of the mineral resources for the benefit of all the people, are primary goals of the government's mineral policy. A clear understanding of the relationships between the mining industry and the rest of the economy is therefore essential to fulfil these goals.

Output multipliers measure the impact that a change in final demand from the mining industry will have on all the other sectors of the economy. This reveals the inter-dependencies between these other sectors and the mining industry.

The model developed in the thesis produces four different output multipliers. The model, based on existing models, is nothing new, but the manner in which it is used is unique. The multipliers quantify the linkages between the mining industry and the rest of the economy, and facilitate measurement of the degree by which the economy benefits from production of minerals. The results challenge the generally accepted concept of a South African economy soundly based on the mining industry.

South Africa still has an extensive mineral endowment, despite the criticism of Davis (1994). The methods developed in the thesis provide a fresh perspective on the relative importance of the mining sector in the economy. They can be a powerful method for setting an economic policy to ensure that the remaining mineral endowments enrich the whole economy. By identifying those industries most sensitive to the output from the mining industry, it will be easier to meet the challenge of depleting these remaining resources for the greatest common good.

1.8 Plan of the Work

Chapters Two and Three survey the literature. Chapter Two contains a brief history of South Africa's mining industry. Chapter Three discusses the development and limitations of input-output tables, and their application to economic impact analysis. Input-output tables, first published in South Africa in 1967, are an integral part of the system of national accounts[6] and provide a comprehensive statement of the economic system of a country. They have only been continuously available in their present format, i.e. with imports shown separately, since 1971.

For this reason, the period covered by the thesis is from 1971 to 1993, the last year for which the tables are available.

Economic impact analysis measures the effects a change in final demand of one production unit has on the whole economic system. Output multipliers measure these effects, and a series of output multipliers over a reasonable period will therefore establish the relationships of the mining industries with the rest of the economy.

Chapter Four discusses output multipliers. The model used in this study produces four multipliers, namely total GDP multipliers, type II total GDP multipliers, total employment multipliers and type II total employment multipliers. Chapter Four defines these terms, as used by Miller and Blair (1985).

A basic knowledge of matrix algebra is required to manipulate data contained in the Input-Output Tables. An explanation of these basics, presented in Appendix II, will allow the reader to follow the derivation of Leontief inverses and output multipliers. Chiang (1984) was the main source of this information.

Chapter Five describes the model, developed from standard models used by the Central Statistical Service[7] (CSS) and the Industrial Development Corporation of South Africa, Ltd,[8] (IDC).

Using factual, historic data as the input, the model establishes the relative value of the mining industry in the South African economy over a reasonable period in unambiguous, objective terms, without the corrupting subjective influence of socio-political matters.

The complete model is contained on the attached computer discs, and a printout of the 1993 results in included in Appendix III.

The results present firstly, in Chapter Six, the inter-sector impact of increased output from the three mining sectors (coal mining, gold mining and other mining) on GDP and employment in the rest of the economy. Secondly, in Chapter Seven, they quantify the impact that increased output from the mining industries has on the output from, and employment by, their suppliers of intermediate input, i.e., the intra-sector impact.

Finally, Chapter Eight presents the conclusions.

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[6]Appendix I contains a description of the system of national accounts, the source being a publication from the United Nations (1993).

[7]The Central Statistical Service is the central government agency in the Republic of South Africa authorised to compile and publish official statistics in terms of the Statistics Act of 19976

[8]The Industrial Development Corporation is a state owned development finance institution, whose primary objectives are to contribute to the generation of balanced sustainable economic growth, and the economic empowerment of the population.

CHAPTER TWO

DEVELOPMENT OF THE SOUTH AFRICAN MINING INDUSTRIES

2.1 A Brief History of Mining in South Africa

In 1867, prospectors found "a fine diamond" near the border between the Cape Colony and the Orange Free State. This led the British Colonial Secretary of the time to prophesy "This is the rock on which the future success of South Africa will be built"(Welsh, 1998, page 235). That event, and the great gold discoveries on the Witwatersrand in 1886, changed the course of South African history. From the end of the nineteenth century, the mining industry has been the mainspring of South Africa's economic development (Nattrass, 1981). Gold and diamonds provided the wealth that transformed South Africa from an undeveloped, largely subsistence economy into the most industrialized, modern state in Africa.

The mining industry had a profound effect on the social organizations that emerged (Lipton, 1986). "Many features which were to become characteristic of South Africa developed around the mines: the deployment for the first time of large-scale international capital; the introduction of modern industrial techniques; the employment of immigrant black labour on short term contracts and their segregation into confined locations, with their movement controlled by complex pass laws; all contributed to radically changed attitudes" (Welsh, 1998, page 235)

The early history of the mining industry in South Africa is a litany of conflict over land and mineral ownership; between mine owners and mine workers; and between the immigrant "White" workers and the indigenous "Black" workers. Many of the beginnings of *apartheid* can be traced to these conflicts, as the authorities sought to prevent the emergence of a multi-racial working class, and to undermine the status of

the "Black" workers (Coleman, 1983).

A number of authors, for instance Nattrass (1981), Coleman (1983), Lipton (1986), Jones and Müller (1990), and James (1992, documented these conflicts and numerous crises which confronted the mining industry in South Africa. Welsh (1998) describes the complex, bloody history of South Africa from the time Europeans first set foot on its shores on the third day of February 1488. The Dutch East India Company reluctantly established a fortified settlement in 1652, administered according to parsimonious and rigid Company rules until annexation by the British on 17 June 1795. There followed more than a century of muddled colonialism, diffident development and savage wars (Welsh, 1998).

It is beyond the scope of this study to provide a detailed discussion of this history. That the mining industry has had a profound effect on the development of South African society, including the apartheid ideology, is beyond doubt. Throughout, the mining industry has been a source of employment, a generator of wealth and a cornucopia of endless bounty. The sheer magnitude of the ore reserves has obscured the reality that prosperity based on wasting non-renewable assets such as mineral deposits, will only last as long as do the reserves themselves.

2.2 The Mining Industry in the New South Africa

International attention focused sharply on the country when the previous racially exclusive economy collapsed, and a totally inclusive democratic political system was established. This is not only because of its mineral wealth, but also because of its failure to create a prosperous, industrialised nation from that wealth.

Davis (1994, pages 13 and 24) traced the reasons for this failure to "obsessive" interventionist policies employed by successive governments to "engineer the industrialization of the economy ". These were:

(i) Management of trade through import restrictions and import tariffs, which began soon after the election of a Nationalist-Socialist government in 1924. This later combined with promotion of exports during the apartheid paranoia, from 1948 to about 1990;

(ii) Direct government intervention in the industrialization process through the creation of its own public sector industries, such as the Iron and Steel Corporation (Iscor) in 1928 and *Die Suid Afrikaanse Steenkool en Olie Maatskappy*[7] (Sasol) in 1950;

(iii) Intervention in the labour market through various Acts of Parliament, of which the Colour Bar Act of 1926 and the 1925 Wage Act were the most notorious, and both of which were designed to protect the interests of White workers;

(iii) Encouragement of industries, through various tax and other incentive schemes, to establish themselves in areas set aside for the Black populace, in what became known as the policy of separate development, or *apartheid*;

(v) The use of exchange rate controls to manage problems in the balance of payments caused by the industrialization policy, which had largely been financed by foreign loans, import tariffs and exports promotion schemes.

Despite the claims made by Davis (1994) that South Africa has wasted its mineral assets, the mining industry remains a vital element in the future wealth and development of the national economy. He maintains that before 1924 industrialization in South Africa was rapid and largely due to private enterprise. From 1924 to 1994, the successive governments of the Union of South Africa, and later the Republic, were committed to racially exclusive economic and social policies. In statements like those below, he expresses his belief that these governments used the

[7] English translation: The South African Coal and Oil Company. Established to offset the oil embargo.

mineral wealth to subsidise industries intended to provide employment to the enfranchised section of the population.

"Extended periods of heavy handed trade management is a solid contributor to the country's economic and social problems" (Davis, 1994, page 1)... "The South African economy is now suffering from the historic wasting of the revenues from its huge mineral endowment, a wasting encouraged through unfortunate industrial and trade policies" (Davis, 1994, page 3)... "South Africa has been a mixed economy for almost seventy years. Private enterprise plays a major role in the structural development of the economy, but it operates in an environment managed by the state" (Davis, 1994, page 13).

The focus, however, must be on the future. If South Africa is to become a wealthy nation, its remaining mineral endowment must be the basis of that wealth. Since South Africa adopted a totally inclusive democratic system, there has been considerable debate on the issue of distributing the income flowing from its mineral endowment. Continued dependence on foreign capital to develop the endowment, and creation of more linkages between minerals and industry in South Africa are also contentious matters.

The African National Congress, which now forms the government of the Republic, has high on its agenda the question of redressing imbalances in the distribution of the income from the mining industry. Indeed, the ANC owes its 1994 election success in no small measure to the promises it made, during the election campaign, to address these imbalances.

In November 1994 the African National Congress issued a *Draft Mineral and Energy Policy* as a discussion document (A.N.C., 1994). This document established a policy framework that remained essentially intact in both the subsequent Green Paper (R.S.A., 1997b) and White Paper (R.S.A., 1998), with the notable reversal of policy on nationalization of the mining industry.

Nevertheless, a fundamental long term objective of the government's proposed Mineral and Energy Policy is "for all mineral rights to vest in the State for the benefit of and on behalf of all the people of South Africa"(R.S.A., 1998, page 16). The intended policy, as set out in the White Paper, enables the government to:

(i) Allow market forces to control the marketing of South African minerals, but the government reserves the right to intervene in the case of market failure.

(ii) Use incentives to promote the establishment of secondary and tertiary industries aimed at adding maximum value to raw materials. These incentives will include lower royalty rates, stable and competitive costs of public services, electricity and transport, and state supported research and training programmes.

(iv) Encourage and facilitate the sustainable development of a small-scale mining sector to ensure optimal exploitation of small mineral deposits. The government's definition of small-scale mining ranges from artisanal miners to junior mining companies.

In the face of opposition from mine owners, the government decided not to nationalise, or reverse ownership patterns in the mining industry as originally proposed in the Green Paper on mineral policy. However, it remains unshakeable in its commitment to remove racial discrimination, and to encourage changes leading to equity of opportunity in the access to ownership and management of the industry.

The Chamber of Mines, a representative mine-owner's organisation formed soon after the discovery of gold on the Witwatersrand, reacted to the White Paper in a carefully worded media release (Chamber of Mines, 1998). The Chamber endorsed "some of the key objectives" and agreed that, in the sense that "the state is the custodian of the nation's mineral resources" the mineral resources "belong to all the people of South Africa". However, the Chamber qualified its endorsement with three riders:

(i) For the people to realise the benefits that can flow from the mineral resources, the system of state regulation must ensure security of tenure.

(ii) The system of state regulation cannot infringe on the property rights of holders of private mineral rights.

(iii) The system of state regulation must ensure the stability and continuity of current prospecting and mining operations.

The media release did not change any of the "eleven fundamental premises" originally established (Chamber of Mines, 1995), in response to the draft proposals articulated by the African National Congress in 1994 (A.N.C., 1994).

These eleven premises are summarized thus:

(i) Metals and minerals in the ground do not constitute wealth. A real profit on capital invested in a mine creates wealth.

(ii) The depths to which gold and platinum mines extend adds significantly to the risks faced by mine owners, who invest huge amounts of capital

(iii) The fiscal and legislative environment in which the industry operates must be attractive to both foreign and domestic investors.

(iv) The role of the state in the mining industry must be to create an economic environment that will attract the necessary capital, technology and human resources. The state should not risk public money in ventures that only the private sector should undertake.

(v) Mine owners must have absolute security regarding tenure of mineral resources.

(vi) Mineral and metal prices are determined by world markets, and the pre-production cost of developing a mine's infrastructure cannot be recovered from consumers of the mine's output.

(vii) Mines cannot simply increase the price of their output in order to offset rising costs. Unit cost of production must be less than revenue received per unit of output, otherwise reserves will be left *in situ*, and no benefits will be derived from them.

(viii) Rising costs adversely affect the mines profitability and its operating life.

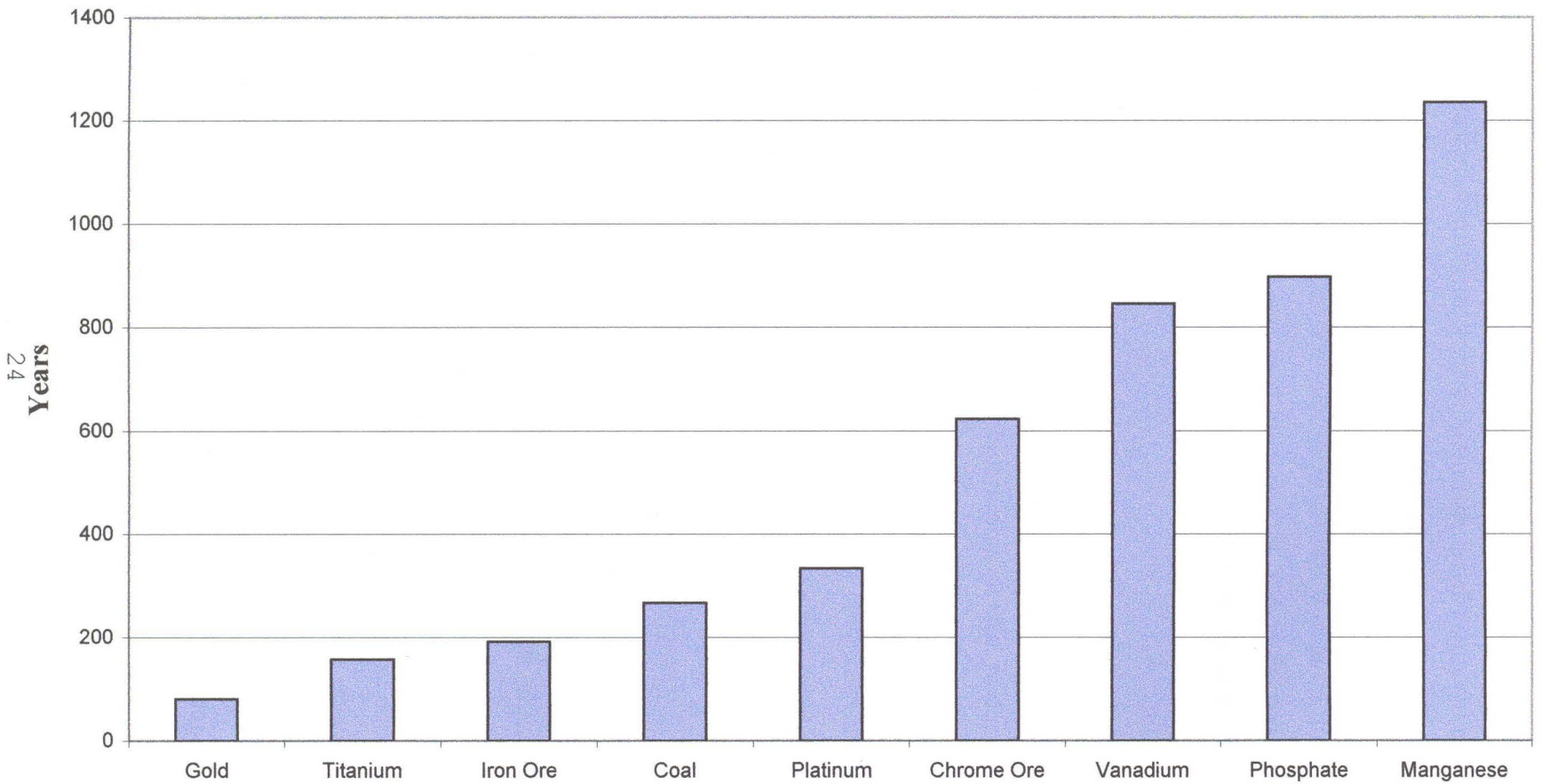
(ix) Competitors for South Africa's shares of world markets, operating in less developed nations and environments that give them a competitive edge, are increasing.

(x) Uncontrolled over-supply of minerals of which South Africa has large reserves (see Table 1.1) can severely disrupt world markets, with consequent damage to the South African economy.

(xi) South African mining companies are accelerating their efforts to find mineral deposits in other countries

Figure 2.1 shows how long reserves of South Africa's major minerals will last, at 1996 production levels.

Figure 2.1 Lives of Major Mineral Reserves



2.3 Shaping the Future by Remembering the Past

The differences of opinion between mine owners and the state evoke grim echoes of events that eventually led to the Anglo-Boer War, which lasted from 1899 to 1902, and altered the course of African history (Welsh, 1998, page 321).

Great Britain was then the world's premier trading and industrial nation. The City of London was firmly established as the centre of the world's gold market and British sterling, based on the Gold Standard, was unrivalled as an international currency (Ally, 1994).

A continual supply of new gold was crucial to maintaining this system, which allowed conversion of sterling at any time into its equivalent value in gold. This was £3 17s 10½d per standard ounce, set in 1717 by Sir Isaac Newton, Master of the Mint (Ally, 1994).

The discovery of gold in such vast quantities in a country not particularly well diposed towards the British posed a serious threat to Britain's position, unless it could maintain control over the South African gold. The British played an increasingly interventionist role in the affairs of the *Zuid Afrikaanshe Republiek*, the ZAR, and in the final analysis the war that followed was "brought by gold" (Ally, 1994).

After the war control of the gold was achieved through a number of agreements between the mine owners and the Bank of England, whereby all South African gold was sold through the London market (Ally, 1994).

Almost all the capital needed for the development of the South African mines was raised in London, and all the leading mining houses had their registered offices there (Ally, 1994). The employment of British capital to develop the gold mines *ipso facto* gave the owners of the capital total ownership of the product. All the disputes over its disposal were between the owners, in the form of the London Gold Producers Committee, and the Bank of England. The only time the South African Government

entered the fray was at the behest of the owners.

The Bank of England effectively controlled the fortunes of the South African gold industry, and the legacy which condemned the South African gold mining industry to be a price-taker for its product has endured for over one hundred years. The introduction, in 1971, of a two-tier price for gold had a limited effect on South Africa as all the gold continued to be sold to central banks at the official price of $35 per fine ounce (Jones & Müller, 1990). The two-tier system, inherently unstable, was abandoned in 1972, the same year South Africa decided to shift the market for its gold from London to Zurich. Although the South African gold mines were still price takers, market forces now dictated the price of their product.

The concept that the people of the State in which the gold had been found had any right to that gold, or to any other mineral for that matter, was completely absent from the British mindset. The interests of the Empire were paramount; any thoughts of conserving the resource, or using the wealth, generated by the extraction and sale of the gold, for the benefit of future generations of those people were never even discussed.

The way the industry operated in the past, either by design or as a matter of convenience, has hardly been in the best interests of all the people of the South African society. The participation of the so-called Blacks, or non-whites, was in a subordinate and degraded role from the very beginning of the mining industry in South Africa (Welsh, 1998, page 235).

Initially the diamond mines, and then the gold mines, required huge amounts of two commodities, capital and cheap labour. The British supplied the former, and the Black tribes of all Southern Africa, seen as nothing more than a vast, convenient and cheap labour pool, supplied the latter. For more than one hundred years millions of black men streamed into the mines, and were housed in single sex, crowded compounds with the most basic of amenities. They left behind their wives and children, who were totally dependent on the meagre earnings of their menfolk.

The going wage in 1872 was twenty-five shillings per week (Welsh, 1998, page 241). As recently as 1965 the average black wage was barely R200 per annum, while the average wage paid to the whites was over R3000 per annum. The average wages paid to whites accounted for 95% of the total average black and white wage, although whites constituted little more than 10% of the total labour force. This situation began to change in 1973, and by 1983 the disparity had narrowed significantly. The average black wage had risen to just under R4000 per annum, a forty-fold increase, and the average white wage had risen to over R19000 per annum, a six-fold increase. However, it was not until 1997 that the government stated its intent to "address past racial inequities by ensuring that those previously excluded from participating in the mining industry gain access to mineral resources or benefit from the exploitation thereof"(RSA, 1997b, page 12).

2.4 The Growth of Secondary Industries.

Primary industries exploit the natural resources of a country. South Africa classifies agriculture, forestry, fishing and mining as primary industries (CSS, 1999, page 7). Secondary industries use output from the primary industries as input for production of their own output. In South Africa, secondary industries include the manufacturing, electricity, gas and water and construction sectors (CSS 1999, page 7). A number of reasons explain why secondary industries in South Africa have not developed to their full potential. Among others, these reasons include the government's trade and race policies, abundance of raw resources, reliance on foreign capital markets and sanctions against the *apartheid* governments. Consequently, secondary industries in other countries use South African minerals to generate wealth in their own economies.

Linking growth in the manufacturing sector to the exploitation of mineral resources is a contentious matter. Although industrialization is seen as a key to economic growth (Auty, 1993) almost all attempts to subsidise the growth of industries through import substitution have ended in failure (Davis 1994). Maintaining the flow of raw minerals

to the industrialised countries seems to be one route to prosperity for mineral rich countries (Davis, 1995). This is one extreme of the argument discussed in Chapter One. The other extreme is to ignore mineral endowments altogether. Of course, many nations chose neither extreme, and used their mineral endowments to create great wealth. Of these, the United States is perhaps the best example.

Mineral endowments are assets that generate income only as they are extracted and sold. However, the income flowing from these assets will decline, and eventually stop, as the mineral deposits are depleted. To offset this depletion, the rent portion of the revenues must be used to purchase other assets, with the same or a higher ability to generate income (Davis, 1994)

There is general agreement that capital spent on depleting a non-renewable asset is wasted, unless some of the income is used to maintain and augment the economy's resources. Adam Smith's (1776) statement that the sole purpose of capital is to maintain and augment stock reserved for consumption remains as true today as it did over 200 years ago. A nation's resources reserved for consumption include its mineral reserves. Capital can never maintain these mineral resources once depletion has begun. It can only augment these resources as fresh reserves are located and developed for exploitation. However, income generated from depletion of mineral resources may be better used to acquire capital for use in other industries.

A possible use for the rents earned from depletion of South Africa's mineral resources is to develop mineral beneficiation industries in South Africa. There is an almost total lack of mineral beneficiation in the South Africa, relative to the value of exported raw minerals. Over eighty percent of the value of all minerals produced in South Africa have been exported (R.S.A., 1910-1994), i.e. the mining industry's final demand is overwhelmingly in the form of exports. These exports have removed a great deal of the country's resources with minimal benefits in the form of secondary industries that further process these minerals. However, the situation is changing. There are numerous projects, underway or completed, that add value to raw minerals. Examples are plants to produce ferrochrome, ferrosilicon and platinum catalysts, new

steel mills and aluminium smelters, although South Africa has no reserves of aluminium ore.

A purpose of this thesis is to determine the magnitude of forward linkages between the mining industry and the rest of the economy. This is done by using input-output analysis and output multipliers. The following Chapters discuss these concepts.

CHAPTER THREE

INPUT-OUTPUT TABLES

3.1 Introduction

"Input-output economics is that *rara avis* in economics, a genuinely new and original idea.....The fundamental discovery that distinguishes Leontief's work from that of all his predecessors is that it was practical to calculate the input-output coefficients from recorded data, to perform the necessary algebraic manipulations, and to use the results to answer a wide variety of practical economic questions" (Dorfman, 1973, quoted in Rose & Miernyk, 1989).

Input-output tables, first published by Leontief (1936) are regarded as one of the twentieth century's major advances in economics. They allow an economic system to be analysed using real numbers instead of complicated algebraic formulae, and are numerical models of the relationships between the production sectors of an economic system. By showing details of the flow of goods and services between industries they provide an analysis of the process of production, the use of goods and services, and the income generated in production.

The essence of input-output analysis is the compromise between elaborate theoretical structures and over-simplified descriptions of an economy. Leontief's input-output method had, by 1963, been developed to represent "a great simplification of theoretical models but a considerable elaboration and refinement of statistical data, to the point where theory and empirical implementation meet" (Barna, 1961, page 3).

Leontief (1966, page v) describes input-output analysis as:

".....a practical extension of the classical theory of general interdependence, which views the whole economy of a region, a country or even of the entire world, as a single system, and sets out to interpret all of its functions in terms of the specific measurable properties of its structure."

Since its introduction, input-output analysis has gained widespread acceptance and has become a major branch of quantitative economics. The publication of the first large scale input-output tables came in 1947 when the United States Bureau of Labour Statistics applied input-output analysis to prevent large scale unemployment at the end of World War II (Rose and Miernyk, 1989, page 229).

Input-Output tables now occupy a central position in the United Nations system of National Accounts, and virtually all the developed countries in the world, as well as many developing countries, use them. However, compilation of Input-Output Tables requires sophisticated data collection and processing resources, which are normally not found in developing economies, and exceptionally high demands are placed on the organisation that compiles the tables. In South Africa this task is carried out by the Central Statistical Service (CSS), the central government agency in the Republic of South Africa authorised to compile and publish official statistics in terms of the Statistics Act of 1976.

3.2 Limitations and Key Assumptions.

Rose and Miernyk (1989) reviewed the development of input-output analysis from its inception, and identified the fixed coefficients of production, i.e. the assumption that the demand for intermediate input changes in direct proportion to output, as a major shortcoming. Their criticism centred on the inability of fixed coefficients of production to account for either input substitution or the formulation of new methods of production, i.e. technological change.

Leontief (1941, page 37) defined the term fixed *coefficients of production* to mean

"that the amount of each cost element is assumed to be strictly proportional to the quantity of output". He argued that, unlike early macro-economic empirical studies, where the economy was aggregated into a small number of sectors, and in neo-classical production functions of the entire economy which were based on two or three primary factors, input-output analysis allowed a much lower level of aggregation. The lower this level, i.e. greater the number of sectors into which the economy was aggregated, the less likely would technological changes affect the product mix.

Rose (1995) discusses fixed coefficients further, and explains that these pertain only to intermediate sectors. Tables expressed in value terms require only fixed value shares, which, in input-output analysis, can change over time. He also identifies several more "misunderstandings", or "myths", surrounding input-output analysis, which, he believes, arise because most economists seem to be unaware of the methodological advances which have taken place during the sixty years since Leontief's work first appeared. These "myths" are that:

(i) Prices play no role in input-output analysis.

The most familiar input-output model is based on the quantity-balance equation, but it does not appear to be widely known that there is a separate, dual price balance equation, which represents the price of a good as the sum of intermediate input cost plus returns to primary factors. Price multiplier analysis makes it possible to determine the cost-push inflation of exogenous changes in input cost.

(ii) The input-output model is static.

This misconception is based on the simplest form of the model and ignores Leontief's dynamic input-output formulation and the models of Duchin and Szyld (1985).

(iii) The input-output model is mainly a production model.

Rose points out that an enormous amount of work has been done since 1975

on extending input-output models into the realms of household and institutional analysis. This work is almost as extensive as that done on social accounting matrices (SAMS), and includes such issues as; distribution of personal incomes, racial/ethnic impacts, migration and public participation in economic decisions.

(iv) Input-output multipliers can be readily generalized.

Rose blames this misconception on the ignorance of some input-output analysts, rather than those who mistrust input-output analysis altogether. He traces the cause of the problem to misuse of multiplier tables published by the U.S. Bureau of Economic Analysis and the U.S. Water Resources Council, despite the fact that detailed instruction manuals were issued with the tables. The errors included application of multipliers for large regions to smaller ones, misapplying multipliers to output levels instead of final demand levels, failing to adjust for leakage and failing to include offsetting displacement effects. Rose states that this problem has been aggravated by politicians, consultants, public-interest groups, labour unions and the business community, who have manipulated multipliers to suit their own needs. Miller and Blair (1985) describe the legitimate interpretation of multipliers, and this thesis uses these interpretations.

Rose (1995) believes the under-utilisation of input-output analysis by many present-day economists is due to their pre-occupation with computable general equilibrium models. There is also a reluctance to acknowledge that these general equilibrium models are based on more restrictive assumptions than input-output models, and that without empirical input-output core tables these CGE models would not be operational.

The United Nations admits to two further limitations in the use of Input-Output tables. Firstly, the adequacy of the data, which reflects average values of large numbers of transactions over periods of three or four years, and secondly, the legitimacy of using these average transaction values as indicators of social welfare.

Input-Output Tables are also criticised for being static models, but in recent years a broadening of Leontief's influence is being found in newer models, such as Computable General Equilibrium, or CGE, and Social Accounting Matrices, or SAM (Rose, 1995).

A further limitation is that Gross Domestic Product takes no account of natural resource depletion, and consequently tends to exaggerate the wealth of an economy in wh ich resource extraction plays a large part (Winter-Nelson, 1995).

Any indicator of growth in an economy that produces significant amounts of raw minerals must take account of reductions in the reserves of these minerals. Lindhal (1933) and Hicks (1946) realised many years ago that an indicator of income should measure the value of goods and services consumed in a given period without reducing future consumption opportunities.

It is vital to understand the extent to which growth of the economy is due to productive investment of the mineral rent, or only to the growth in revenues from extracting the minerals. Discrepancies between growth in mineral production and Gross Domestic Product can be substantial in African countries that depend heavily on extractive industries. Growth strategies based on expansion of mineral exports are wrongly associated with growth in GDP, because no account is taken of the reduction in the national stock (Winter-Nelson, 1995).

In the system of National Accounts there is no attempt to measure depreciation of natural capital, and revenues from activities that reduce this stock, such as mining, are treated as income without considering the impact of lost stock on future consumption. Attempts have been recently been made to develop practical solutions to this problem, but these are regarded as controversial in many respects.

The loss of value in the mineral reserve of a country should be subtracted from the national production accounts. Since future market values of mineral reserves are not generally available, the use of Hotelling's Rent (1931) is accepted as the most

accurate method of allowing for the loss (Winter-Nelson, 1995).

Questions posed by Hotelling (1931, page 138) sixty-eight years ago remain unanswered, virtually ignored by governments and other policy makers in the minerals industry:

(i) How much of the proceeds of a mine should be reckoned as income, and how much as return of capital?

(ii) Suppose a mine is publicly owned. How should exploitation take place for the greatest pubic good?

(iii) What of the plight of labourers and of subsidiary industries when a mine is exhausted?

These questions are as relevant now as they were then, particularly, when formulating a new minerals policy for a minerals exporting country such as South Africa. Any measure of economic growth, such as GDP, must include an account of the diminished national stock of resources, in much the same way that any business would report a loss of its productive capacity, for whatever reason.

This is an important field for further research in South Africa.

3.3 Practical Applications of Input-Output Analysis.

The establishment of new industries, adoption of new production techniques and a rapid change in the composition of output all seriously affect the stability of input coefficients. Nevertheless, the need for inter-industry analysis, particularly in developing countries, is widely recognised (Chenery, 1963).

Chenery (1963) states that the establishment of new industries, the adoption of new

techniques and rapid change in the composition of output within sectors will seriously affect the stability of input coefficients. To cope with these structural changes, linear programming would be a better way to study the allocation of investment and other resources in a developing economy. However, Chenery (1963) recognises that it would be misleading to suggest that mathematical programming can be applied directly to most of the developing countries, an opinion supported by Mycielski (1963).

Rose and Miernyk (1989) characterised the input-output model by its versatility, and identified it as probably the most widely used method of regional analysis. In particular, this flexibility is ideally suited for the simulation of economic development, and, where data permitted, the construction of tables for the measurement of income and employment multipliers. The input–output model has also, in recent years, proved to be a flexible and versatile tool when examining the environmental and ecological aspects of economic development. For example, Rose (1995) identifies several distinguishing features of input-output analysis, which continue to be of lasting value.

These are:

(i) It is firmly grounded in the technological, measurable relationships of production which are empirically verifiable.

(ii) It bridges the gap between economists, managers and engineers.

(iii) The sectoral layout facilitates data collection and data organisation.

(iv) Input-output tables, and Leontief multipliers, greatly facilitate the analysis the impact of private-sector decisions and public-sector policies.

(v) Input-output models are the major tool of regional impact analysis in the United States. The US government, through the efforts of Leontief, is

committed to massive data collection for this purpose.

(vi) Because the basic formulation of Input-output tables is politically neutral, it is a popular modelling tool, especially in developing countries, and can be applied to different economic systems.

(vii) It provides a full accounting for all inputs into production, unlike typical approaches, which express quantities only in terms of primary factors of production.

Input-output analysis is ideally suited to the purpose of analysing the complicated process of adopting a new technology, a task which hardly any theoretical economists have attempted (Mathur, 1963).

Economic progress is defined as an increase in *per capita* income which comes about as a result of structural and or technological transformation of the economy. Structural changes are defined as changes to the proportionate shares of various sectors of an economy, and technological change is defined as a change in the input-output relationships of various activities (Mathur, 1963).

It is very apparent that the South African economy is being changed both structurally and technologically. The structural changes have come about as the artificial economic barriers imposed by the *apartheid* ideology are removed, and the technological changes have resulted from the consequent changes to many input-output relationships in the economy.

As *per capita* income rises these structural changes increase the demand for manufactured goods very rapidly, the proportion of primary goods in the total production falls and the proportion of total intermediate input in total production rises.

Delange (1963) describes the use made of input-output analysis in planning the

French economy. The French, who implicitly accepted Leontief's theoretical bases, from the outset intended to integrate their input-output tables in a system of national accounts. This is also the case in South Africa. The French input-output table, which is decidedly utilitarian, was developed as a tool for studying the past. The arrangement and specifications used were chosen to provide the government with the best possible guidance for making both short and long term forecasts and decisions.

3.4 The RAS Procedure

The difficulty of gathering sufficient accurate data to construct a transaction matrix, and the stability of the derived technical coefficients, is one of the most widely held criticisms of input-output analysis. Even in developing economies, consisting of perhaps a few dozen sectors, considerable resources are required to collect and process data, and the demands increase as the size of the economy increases.

Since the late 1960's methods and techniques to construct complete tables from scarce and often incomplete data have been developed. These are called non-survey or semi-survey procedures, and are regarded in many cases as the only alternative to expensive and time-consuming full surveys (Szyrmer, 1989)

One of most commonly used of these techniques is called the RAS method, and was developed by R. A. Stone and his associates at the University of Cambridge between 1954 and 1966. The essence of these non-survey techniques can be found in numerous textbooks. The following description of the RAS method is taken from O'Connor and Henry (1975).

Two sets of data, a pre-existing input-output table and the results of a conventional census of production and national income data, from the national accounts, is used to prepare a third set of data, the required projections.

The method used by Stone is to find two diagonal matrices

$$R = \begin{vmatrix} r_1 & 0 & .... & 0 \\ 0 & r_2 & .... & 0 \\ ... & ... & ... & ... \\ 0 & 0 & ... & r_n \end{vmatrix} \qquad S = \begin{vmatrix} s_1 & 0 & ... & 0 \\ 0 & s_2 & ... & 0 \\ ... & ... & ... & ... \\ 0 & 0 & ... & 0 \end{vmatrix} \qquad (3.1)$$

Such that:

$$({}_1A) = R({}_0A)\, S \qquad (3.2)$$

Where $({}_1A)$ is the matrix of technical coefficients for year 1

And $({}_0A)$ is the matrix of technical coefficients for year 0.

The matrix of technical coefficients from year 0 can be shown as:

$$({}_0A) = \begin{vmatrix} {}_0a_{11} & {}_0a_{12} & .... & {}_0a_{1n} \\ {}_0a_{21} & {}_0a_{22} & .... & {}_0a_{2n} \\ .... & .... & .... & .... \\ {}_0a_{n1} & {}_0a_{n2} & .... & {}_0a_{nn} \end{vmatrix} \qquad (3.3)$$

The matrix of technical coefficients from year 1 can be shown as:

$$({}_1A) = \begin{vmatrix} {}_1a_{11} & {}_1a_{12} & \ldots\ldots & {}_1a_{1n} \\ {}_1a_{21} & {}_1a_{22} & \ldots\ldots & {}_1a_{2n} \\ \ldots\ldots & \ldots\ldots & \ldots\ldots & \ldots\ldots \\ {}_1a_{n1} & {}_1a_{n2} & \ldots\ldots & {}_1a_{nn} \end{vmatrix} \qquad (3.4)$$

Therefore, from (3.1):

$$\begin{vmatrix} {}_1a_{11} & {}_1a_{12} & .. & {}_1a_{1n} \\ {}_1a_{21} & {}_1a_{22} & .. & {}_1a_{2n} \\ \ldots\ldots & \ldots\ldots & .. & \ldots\ldots \\ {}_1a_{n1} & {}_1a_{n2} & .. & {}_1a_{nn} \end{vmatrix} = \begin{vmatrix} r_1 & 0 & \ldots & 0 \\ 0 & r_2 & \ldots & 0 \\ \ldots & \ldots & \ldots & \ldots \\ & & & r_n \end{vmatrix} \begin{vmatrix} {}_0a_{11} & {}_0a_{12} & .. & {}_0a_{1n} \\ {}_0a_{21} & {}_0a_{22} & .. & {}_0a_{2n} \\ \ldots & \ldots & .. & \ldots \\ {}_0a_{n1} & {}_0a_{n2} & .. & {}_0a_{nn} \end{vmatrix} \begin{vmatrix} s_1 & 0 & \ldots & 0 \\ 0 & 0 & \ldots & s_2 \\ \ldots & .. & \ldots & .. \\ 0 & .. & \ldots & s_n \end{vmatrix} \qquad (3.5)$$

This becomes:

$$\begin{vmatrix} r_1({}_0a_{11})s_1 & r_1({}_0a_{12})s_2 & .. & r_1({}_0a_{1n})s_n \\ r_2({}_0a_{21})s_1 & r_2({}_0a_{22})s_2 & .. & r_2({}_0a_{2n})s_n \\ \ldots\ldots & \ldots\ldots & \ldots & \ldots\ldots \\ r_n({}_0a_{n1})s_1 & r_n({}_0a_{n2})s_2 & .. & r_n({}_0a_{nn})s_n \end{vmatrix} = \begin{vmatrix} {}_1a_{11} & {}_1a_{12} & \ldots & {}_1a_{1n} \\ {}_1a_{21} & {}_1a_{22} & \ldots & {}_1a_{2n} \\ \ldots & \ldots & \ldots & \ldots \\ {}_1a_{n1} & {}_1a_{n2} & \ldots & {}_1a_{nn} \end{vmatrix} \qquad (3.6)$$

So that:

$$r1({}_0a_{11})s_1 = {}_1a_{11} \qquad (3.7)$$

$$r_1({}_0a_{12})s_2 = {}_1a_{12} \qquad (3.8)$$

$$r_1(0a_{1n})s_n = {}_1a_{1n} \qquad (3.9)$$

And so on for each element.

Each row of the matrix in (3.6) has $r_1 \ldots r_n$ as a common factor, and each column has $s_1 \ldots\ldots s_n$ as a common factor. The *r* factors are called substitution factors and the *s* factors are called fabrication factors.

Different substitution factors are applied to each coefficient in a column, and bring about changes in the proportions in which the different inputs are used. The fabrication factors change the proportions in which intermediate and primary inputs (the factors of production) are used.

The equations in (3.5) can be solved for r and s although a unique solution is not possible, the ratios of the different *r*'s and *s*'s to each other are unique, and the products $r_i s_j$ are constant.

By substituting technical coefficients from year 0 and year 1 into (2.6) it is possible to calculate R and S, and then project the technical coefficients from years 0 and 1 forward.

Use of the RAS method is justified by its ability to produce an input-output table within a year of inter-industry flows becoming available through the system of national accounts. Although tables derived from the RAS method are approximations, and need to be fully revised every three to five years, the short time required for their production is considered justification for their use.

3.5 The South African Input-Output Tables

South African input-output tables were first published in 1967. Subsequent versions appeared in 1971, 1975, 1978, 1981, 1984, 1988, 1989 and 1993, which showed imports separately.

The tables for the years from 1967 to 1989 are final tables. The table for 1993 is a preliminary table, i.e. it is compiled according to the RAS method from production and expenditure data in the system of national accounts.

These tables are used in this thesis, except those for 1967, because imports are not shown separately, and those for 1988, because they were not available from the CSS. The South African input-output model is a static economic model capable of analysing relationships between industries. It is subject to a number of assumptions, which are that:

(i) The models are demand driven and rely entirely on final demand for their functioning.

(ii) It is possible to group the different production activities into homogenous industries.

(iii) The demand for intermediate input by a particular sector will change in direct proportion to that sector's output.

(iv) No substitution of intermediate input occurs.

(v) No technological change takes place.

(vi) Each sector produces only one primary product.
(Kuhn, 1997)

The Input-Output tables, and the System of National Accounts, of which they are a part, are subject to a continual improvement in the quality and extent of the database. For these reasons, and also to the huge advances made in the power and accessibility of computers, the tables produced in 1993 are a considerable improvement on those published in 1971,

The limitations of input-output analysis notwithstanding, the South African tables are nevertheless a continuous commentary on the South African economy over a period of 22 years. They are the best available reference to trace the contribution of the various sectors to Gross Domestic Product during that time.

3.6 The Basic Model

The basic Leontief input-output model is expressed as a series of accounting identities, i.e.,

$$X_i = X_{i1} + X_{i2} + ...+X_{in} + Y_i \quad (i = 1....n) \tag{3.10}$$

where:

X_i = total gross output of sector i

Y_i = the autonomous final demand for the products of sector *i*

X_{ij} = the sales by sector i to each of the endogenous sectors j

(Rose & Miernyk 1989)

Leontief's analysis dealt with the question:

> "What level of output should each of the *n* industries in an economy produce in order that it will just be sufficient to satisfy the total demand for that product?" (Chiang, 1990, p.115).

The input-output tables are centred on the transaction table, which is a square matrix with *n* rows and *n* columns, where *n* is the number of sectors into which the economy has been segregated. The United Nations' International Standard Industrial Classification, ISIC, recommends that, at a minimum, an economy be segregated into nine basic groups or sectors, i.e.;

(i) Agriculture, Forestry & Fishing.

(ii) Mining.

(iii) Manufacturing.

(iv) Electricity and Water supply.

(v) Construction.

(vi) Wholesale & Retail Trade.

(vii) Transport, Storage & Communication.

(viii) Financial & Business Services

.

(ix) Community, Social & Personal Services.

The 1993 South African input-output table disaggregates the South African economy into 90 sectors. The amount of disaggregation depends on the purpose for which the tables are to be used, and on the resources available to capture and process the raw data. The greater the resources available and the greater the detail required, so will the degree of disaggregation increase.

3.7 Structure of the I-O Tables

Output from each economic sector is either used by other sectors as intermediate input for their own output, or is consumed as final demand by domestic and foreign buyers. Final output of a sector is thus the sum of intermediate inputs to other sectors and consumption by final buyers. Input-output tables record this

flow of goods and services between sectors (Clements & Greig, 1994).

The values of these transactions are shown in a matrix of n rows and columns, and are denoted by a_{ij}, where both i and j range from 1 to n.

The Handbook on National Accounting: Input-Output Tables (1993) recommends that input-output tables should be compiled at both current and constant prices, and should consist of:

(i) An absorption or transaction matrix.

(ii) A make matrix.

(iii) An imports table.

(iv) A trade margin table.

(v) A row percentage distribution table.

(vi) A direct input coefficient matrix.

(vii) An inverse coefficient matrix.

In South Africa input-output tables are presently only compiled at current prices. They consist of a transaction matrix, a direct coefficient matrix and an inverse coefficient matrix, i.e. only three of the seven current price tables recommended by the United Nations, and none at constant price.

Table 3.1 A Simplified Transaction Table.

	Intermediate Demand	Final Demand	TOTAL OUTPUT
Intermediate Inputs	**Quadrant I** Intermediate Production & Consumption	**Quadrant II** Final Output of Production Sectors	Sum of; Intermediate Input And Final Demand
Value adding Primary Inputs + Imports	**Quadrant III** Primary Inputs to Production	**Quadrant IV** Primary Inputs to Final Demand	
Total Input			

(Source; Clements and Greig, 1996)

The format above is essentially the same as that used by the Central Statistical Service. The CSS table shows, in quadrant 1, the value of transactions between the various industrial sectors of the economy. The rows in quadrant I show the distribution of the output of a particular industry to other industries, and each column shows the value of each industry's usage of raw materials, semi-finished goods and services.

Quadrant II shows the various components of final demand, i.e.:

(i) Consumption expenditure by general government.

(ii) Gross domestic fixed capital formation.

(iii) Change to inventories.

(iv) Exports.

The rows in quadrant II show the distribution of intermediate output to these final demand sectors, and the columns show the value consumed by each final demand sector.

Value added to output from the various industrial sectors, and value added in the consumption of intermediate output by the various final demand sectors, in shown in sectors III and IV, respectively.

Direct coefficients are calculated from quadrants I and III, and these in turn produce the Leontief inverses and the output multipliers. Calculation of multipliers and inverses is discussed in section 3.7.3 and Chapter Four, respectively.

Input-output analysis is not, strictly speaking, a form of general equilibrium analysis. Although input-output analysis emphasises the interdependence of the industries in an economy, the output levels used are those which satisfy technical input-output relationships, rather than market equilibrium conditions. Nevertheless, the end problem is one of using matrix algebra to solve a system of simultaneous equations (Chiang, 1990, page 116).

Input-output tables also contain the three elements of gross domestic product, i.e. remuneration of employees, gross operating surplus and net indirect taxes. When households (or remuneration of employees) are excluded from the transaction table, these three elements are all found in Quadrant III, and the model is said to be Open with respect to households. When households are included in the transaction table, i.e. quadrant I, and gross operating surplus and net indirect taxes are in Quadrant III, the model is said to be Closed with respect to households.

Direct, indirect and induced effects are discussed in more detail in Chapter Four.

3.7.1 Absorption or Transaction Matrices

Transaction matrices contain values based on the year of publication, i.e the 1971 tables contain values with a base year of 1971, the 1975 tables have a base year of 1975, and so on. They are also known as flow tables. They show the value, in current money terms, of transactions between the various industries in an economic system.

If all the industries shown at the beginning of each row are generally denoted by the subscript *i*, and all the industries at the head of each column are generally denoted by the subscript *j*, then the absorption of goods from *i* to *j*, i.e., the input to *j* from *i*, or the output from *i* to *j*, is given by:

$$x_{ij}$$

The total absorption of good and services by *j* from all the industries in the economy, i.e., all the industries shown at the beginning of the rows (in other words, all the *i* industries), is given by the sum of all the inputs to a given "column" industry from all the "row" industries, i.e.;

$$\Sigma_i x_{ij}$$

The Total Input or Total Cost of an industrial sector is given by the sum of all the inputs to the industry, i.e.;

$$X_j = \Sigma_i x_{ij} + V_j + M_j \qquad (3.11)$$

where V_j and M_j are the value added and imports to sector *j*, respectively.

Similarly, the sum of any row, *i*, is given by;

$$X_i = \Sigma_j x_{ij} + F_i \quad (3.12)$$

which is the total use made of the output of a sector *i* industry (a "row" industry) by all the other productive sectors, $\Sigma_j x_{ij}$, (the column industries) plus the final demand for that sector, F_i.

Because each row is a linear balance equation, the total outputs from all the row industries must equal the total inputs to all the column industries, so that;

$$X_j = X_i \quad (3.13)$$

3.7.2 Direct Coefficient Matrices

Direct coefficient matrices are derived from absorption matrices, and show the input coefficients, or direct requirements of each industry in relation to the output of the industry. Direct coefficients are the ratio of each basic value in the absorption matrix to the total output of each industry. They show the inputs necessary to a given industry required to produce one unit of final demand from that industry, and are generally denoted thus;

$$a_{ij} = x_{ij}/X_j \quad (3.14)$$

or,

$$x_{ij} = a_{ij}.X_j \quad (3.15)$$

therefore, from (3.12):

$$X_i = \Sigma_j a_{ij}.X_j + F_i \quad (3.16)$$

This is the linear balance equation to which reference has already been made. The set of all the linear balance equations in the direct coefficient matrix is written as;

$$X = A_{NN} + F \qquad (3.18)$$

Where

A_{NN} is the matrix of the technical coefficients derived from the basic absorption matrix, and F is the final demand of each industry.

Because technical coefficients are dimensionless, they allow comparisons between different economies, and, more importantly, allow the derivation of inverse coefficients.

3.7.3 Inverse Coefficients

The third matrix produced by the CSS contains inverse coefficients. Inverse coefficients are the direct and indirect requirements (in the case of an open model), and direct, indirect and induced requirements (in the case of a closed model) per money unit of final demand. They trace the impact of one extra unit of demand, from any particular industry, back through the whole economy.

This thesis uses a model closed with respect to households. For each unit of goods and services delivered to final demand by the industry named at the top of a column, each entry shows the direct, indirect and induced output required from the industry named at the beginning of each row.

Inverse coefficients allow the impact of a change in final demand from each industry to be calculated, and to analyze the inter-dependence of the production system.

The Direct Coefficient Matrix consists of simultaneous linear balance equations derived from the Absorption Matrix. Matrix algebra facilitates solution of these equations.

Inverse coefficients can be defined as the inverse of the difference between the Identity Matrix and the matrix of direct coefficients, A, and are known as Leontief Inverses, i.e.;

$$[I-A]^{-1}$$

Kuhn (1997) illustrates this linkage effect as follows:

If final demand for output from, say, the agricultural sector increased by R1 million, then in addition to this amount agricultural output would increase by the technical coefficient, say 0.06, so that the output would need to be R1.06 million. Each other sector in the economy would in turn be affected by the requirement to increase intermediate input to the agricultural sector according to their own technical coefficients.

This is a tedious reiterative process using only technical coefficients, but a far more efficient method is to use the inverse coefficient matrix, which contains all the inter-industry linkage effects. This will show the total effect that an increase in demand for any one sector's output will have on the all the other sectors.

3.8 Money Units

Values, shown in the transaction table, are the product of scalar, quantity, and a vector, price. Quantity remains constant, i.e. a kilogram of gold produces in any year would physically be exactly the same as a kilogram of gold produced in any other year. Prices, on the other hand, do change over time. The real value of a commodity is thus the product of a scalar quantity and a vector of inflation-

adjusted prices, and is itself a vector, having both a magnitude and a direction in time. Hence the time value of money is a vector quantity, i.e., it has both a magnitude and a direction in time.

Table 3.2 shows how the value of 100 South African cents changed between 1910 and 1993s. These changes, caused by inflationary pressures, do not reflect the time value of money, a matter not discussed in this thesis.

Table 3.2 Purchasing power of the Rand (Based on Consumer Price Index)

Year	Decreasing Purchasing Power to Different Base Years											
1910	100											
1930	72	100										
1950	47	65	100									
1970	25	35	54	100								
1975	16	23	34	64	100							
1980	9	13	19	36	57	100						
1985	5	7	10	19	29	52	100					
1989	5	4	6	10	16	29	56	100				
1990	3	3	5	9	14	25	49	87	100			
1991	2	3	4	7	12	22	42	75	86	100		
1992	2	2	4	7	11	19	37	67	76	88	100	
1993	2	2	3	6	10	18	34	61	69	80	91	100

Source: Central Statistical Service

The values shown in the Transaction table will change from year to year due to a change in either the quantity or the price, or both quantity and price. A change in the quantity can be accepted *prima facie*, but the value of a commodity produced, i.e. the product of quantity and price, in any one year cannot be compared to the value produced in any other year without considering the changing time value of money.

Because it is necessary that input-output coefficients used for economic forecasting should be available in physical, quantitative terms rather than current money values, the CSS (R.S.A.1996) acknowledges an urgent need for input-output tables at constant prices. This requires conversion of the nominal price component of the value shown in the transaction table into constant prices, so that any change in the value of the transaction is attributed to a change in quantity alone.

To convert values to real terms, the two elements of the transaction value (price and quantity), as well as annual rates of inflation, are required. The information published by the CSS does not segregate these two elements, and although annual inflation rates are available from the South African Reserve Bank, these alone are not sufficient to make the conversion.

Because the direct coefficients are ratios, it would appear at first that the application of a factor to convert current money values to real money values would have no effect on them. However, the factor applies to only one of the two components of the transaction value. Application of a price conversion factor to the product of price and quantity would be incorrect.

The CSS does, however, re-base the values used in the Transaction table from time to time. This to allows for what the CSS calls "structural changes" in the economy because any element in the transaction table, a_{ij}, may change in response to changes in relative prices. Recalculating the Transaction table in real terms requires access to the complete transaction table database. Such an exercise is beyond the scope of this thesis. All calculations in this thesis therefore use the current values published by the CSS.

CHAPTER FOUR

OUTPUT MULTIPLIERS

4.1 Introduction

The relationship between an increase in output from a sector (which implies increased in spending on intermediate input) and the effects generated on the economy is the multiplier effect of the sector. This effect is also known as the impact of the sector, and the study of multipliers is generally called impact analysis (Kuhn, 1997).

The notion of multipliers rests upon the difference between the initial effect of an exogenous (final demand) change and the total effects of that change. Miller and Blair (1985, page 102), define these total effects as either:

(i) D*irect and indirect effects,* calculated from an OPEN Leontief model, i.e. the inter-sector transactions exclude households.

(ii) *Direct, indirect and induced effects,* calculated from a CLOSED Leontief model, i.e. the inter-sector transactions include households.

4.1.2 *Direct and Indirect* effects are obtained by multiplying the OPEN direct coefficient output vector of the sector in which the change in demand for output occurs by the Leontief inverses obtained from the model of [A] which is OPEN with respect to households, i.e. households are excluded from [A]. These are also known as **Simple Multipliers** (Miller and Blair, 1985,page 102).

4.1.3 *Direct, Indirect and Induced* effects are obtained by multiplying the CLOSED direct coefficient output vector of the sector in which the change in demand for output occurs by the Leontief inverses obtained from the model of [A] which is CLOSED with respect to households, i.e. households are included in [A]. These are also known as **Total Multipliers** (Miller and Blair, 1985,page 102).

Simple Type II Multipliers are the ratio of the *direct and indirect* effects to the *direct* effects, i.e. **the ratio of simple multipliers to the direct effects.**

Total Type II Multipliers are the ratio of the *direct, indirect and induced* effects to the *direct* effects, i.e. **the ratio of total multipliers to the direct effects**.

4.2 Calculation of Multipliers

A system of simultaneous linear equations represents the flow of goods and services in an economy (Kuhn, 1998, page 9):

$$\begin{array}{lllllllllll} X_1 & = & x_{11} & + & x_{12} & + & \ldots\ldots & + & x_{1n} & + & F_1 \\ X_2 & = & x_{21} & + & x_{22} & + & \ldots\ldots & + & x_{2n} & + & F_2 \\ \ldots\ldots & & \ldots\ldots & & \ldots\ldots & & \ldots\ldots & & \ldots\ldots & & \ldots\ldots \\ X_n & = & x_{n1} & + & x_{n2} & + & \ldots\ldots & + & x_{nn} & + & F_n \end{array} \qquad (4.1)$$

x_{ij} is the value of the flow of goods and services between sector *i* and sector *j*. As shown in equation (3.14) the technical coefficient a_{ij} is found by:

$$a_{ij} = x_{ij}/X_j \qquad (4.2)$$

or;

$$x_{ij} = a_{ij}.X_j \qquad (4.3)$$

Substituting equation (4.3) into equation (4.1) gives:

$$\begin{array}{lllllllllll} X_1 & = & a_{11}X_1 & + & a_{12}X_2 & + & \ldots\ldots & + & a_{1n}X_n & + & F_1 \\ X_2 & = & a_{21}X_1 & + & a_{22}X_2 & + & \ldots\ldots & + & a_{2n}X_n & + & F_2 \\ \ldots & & \ldots\ldots & & \ldots\ldots & & \ldots\ldots & & \ldots\ldots & & \ldots \\ X_1 & = & a_{n1}X_1 & + & a_{n2}X_2 & + & \ldots\ldots & + & a_{nn}X_n & + & F_n \end{array} \qquad (4.4)$$

This is re-written as:

$$\begin{array}{llllllll} F_1 & = & (1-a_{11})X_1 & - & a_{12}X_2 & - & \ldots. & -a_{1n}X_n \\ F_2 & = & -a_{21}X_1 & + & (1-a_{22})X_2 & - & \ldots. & -a_{2n}X_n \\ \ldots. & & \ldots\ldots & & \ldots\ldots & & \ldots. & \ldots\ldots \\ F_n & = & -a_{n1}X_1 & - & a_{n2}X_2 & - & \ldots. & (1-a_{nn})X_n \end{array} \qquad (4.5)$$

The whole system is a general equation, i.e:

$$F = (I - A).X \qquad (4.6)$$

Where:

I is an identity matrix, i.e. a square null matrix with 1's on the principal axis.

A is the technical coefficient matrix.

Therefore:

$$X = (I - A)^{-1}.F \qquad (4.7)$$

Where $(I - A)^{-1}$ is the Leontief Inverse. Section 5.6 discusses the derivation of the Leontief Inverse.

4.3 Applications

Multipliers can be calculated for economic variables, such as Gross Domestic Product (GDP) and Employment, from (4.7) where:

X = the relevant output multiplier

and

Y = either the vector or the diagonal matrix of the variable of which the multiplier is required, e.g. GDP or employment

X has the same dimensions as *Y*, because according to the rules of matrix algebra, discussed in Appendix III, the *multiplying* vector must have the same number of *columns* as there are *rows* in the *multiplied* vector (Chiang, 1987)

If, therefore, *A* is a matrix with dimensions (*m*, *n*), i.e. *m* rows and *n* columns, and *B* is a second matrix, but with dimensions (*p*, *q*), i.e. *p* rows and *q* columns, then it is possible to obtain the product, *AB*, if, and only if, *n=p* and the product will have the dimensions (*m*, *q*), i.e. the same number of rows as *A* and the same number of columns as *B*.

If the vector matrix of the variable *Y*, which has dimensions (1, *j*) i.e. one row and *j* columns, is used to multiply $(I-A)^{-1}$, the Leontief Inverse, which by definition has the dimension (*i*, *j*) where *i* must equal *j*, the resulting matrix, *V*, will have dimensions (1, *j*).

This vector will show the total multiplying effect of an increase in final demand from each column sector on the variable, but not the effects on each sector supplying intermediate input to the column sector. This is accomplished by constructing a diagonal matrix for the variable, by which the Leontief Inverse is multiplied. The sum of the separate multipliers in each column will equal the multipliers shown in the vector matrix *V*.

The condition for existence of both products is met because the number of columns in the vector matrix V and the diagonal matrix equals the number of rows in the Leontief Inverse. The product in both cases, the output multiplier, will have the same number of rows as the vector matrix V and the diagonal matrix, and the same number of columns as the Leontief Inverse, i.e., either 1 or i rows, and j columns. The dimension of the output multiplier will therefore be either $(1,j)$, the same as the vector matrix, or (i,j), the same as the diagonal matrix.

The value of the multiplier, X, obviously depends on the correctness of the two components, Y and $[I - A]^{-1}$ and these in turn depend on the accuracy with which the Transaction table has been compiled. Chapter Three discusses the limitations of input-output analysis in this respect.

Accuracy decreases the further into the future that predictions are made. If a current transaction table is accepted as an accurate record of an economy and if assumed or projected changes to a Y vector are completely specified, which can only be done over short periods of time, X is said to define the short term effect of changes in final demand in the Y sector, and the term *Impact Analysis* relates more to this short term analysis.

If longer term and less accurate changes are made, either to a Y sector or to the whole economy, (and hence to $[I - A]^{-1}$), then X is said to *forecast* the future of the economy. However, this thesis does not use input-output tables to predict the future, but to review the past.

The three most frequently used multipliers are;

(i) Gross Domestic Product multipliers.

(ii) Income multipliers

(iii) Employment multipliers

4.3.1 Gross Domestic Product Multipliers

GDP Multipliers are the factor by which the total GDP of the economy increases due to a R1 increase in final demand for a specific sector's product (Kuhn, 1997).

GDP multipliers are found by multiplying the Leontief Inverse by either the GDP vector or the GDP Diagonal matrix, depending on whether only the total multipliers are required, or the sectoral input multipliers, respectively.

Simple GDP multipliers are found by using an Open Leontief model, and **total GDP multipliers** are found by using a Closed Leontief model.

Simple and total type II multipliers are calculated as before, i.e.the ratio of direct and indirect effects to direct effects, and the ratio of direct, indirect and induced effects to direct effects, respectively.

4.3.2 Income Multipliers.

Income multipliers attempt to translate the impacts of final demand spending changes into changes in the income received by households, the suppliers of labour (Miller & Blair, 1985).

This is done by either converting each element in a Leontief model (either open or closed) into monetary units of household income by using the household coefficient vector from [A].

The direct effects, i.e the ratio of input to final demand, will be in terms of a monetary unit's worth of final demand. When an open model is used the direct and indirect effects for any sector *j* will be in terms of a monetary units worth of new household income. When a closed model is used, the direct, indirect and induced effects for any sector *j* will also be in terms of monetary units of new household

income, but will include the total worth of labour services needed to produce a monetary unit's worth of new final demand for the goods of sector *j*.

Simple and Total Type II multipliers are calculated as before.

4.3.3 Employment Multipliers

Employment multipliers are similar to Income multipliers, except that the relationship between the value of output of a sector and employment in that sector is measured in *physical*, and not *monetary*, terms. They represent the number of jobs created per monetary unit of new sectoral output, which arises because of an additional monetary unit's worth of demand from the sector.

Simple and Total Type II multipliers are calculated as before.

Income multipliers are similar to employment multipliers, and are not used in this study.

CHAPTER FIVE

THE MODEL

5.1 Introduction

The model developed in this thesis is based on models and data made available for general use by the Central Statistical Service and the Industrial Development Corporation. The supporting material on matrix algebra is from Chiang (1987).

The model has as its base equation (4.7), i.e.:

$$X = Y.(I - A)^{-1} \qquad (5.1)$$

It produces four results, i.e.:

(i) Total GDP Multipliers,
(ii) Total Type II GDP Multipliers,
(iii) Total Employment Multipliers,
(iv) Total Type II Employment Multipliers,

Definitions of these four multipliers are:

5.1.1 Total GDP Multipliers.

Total GDP multipliers show the multiplying effect that a R1 increase in output from any one sector will have on the GDP. Comparison of GDP multipliers for each sector will allow the sectors of the economy to be ranked in the order by which the national GDP benefits from an increase in output from each sector.

The multipliers have been derived from a closed technical coefficient matrix, in which household income is regarded as spent within the economic system, thereby capturing the induced effects of this income (Kuhn, 1997).

5.1.2 Total Type II GDP Multipliers.

Total type II GDP multipliers are defined as total GDP multipliers divided by direct GDP coefficients, and show the multiplying effect that a R1 increase in the GDP generated within a sector will have on the national GDP.

An example, using the manufacturing sector from 1993, illustrates this concept. R1 increase in manufacturing output has a direct, indirect and induced effect of 1.3679 on the economy. However, if the GDP generated within the manufacturing sector increased by R1, the national GDP will increase by 3.9714 (see Step 8 and 9 in Annexure III), i.e.:

Total Type II GDPM = Total GDP Multiplier/Direct coefficients

5.1.3 Total Employment Multipliers

Total employment multipliers show the multiplying effect that a R1 million increase in output from a sector will have on total employment throughout the economy.

5.1.4 Total Type II Employment Multipliers.

Total type II employment multipliers show the number of jobs created in the whole economy for each new job in a sector. They are derived in the same way as total type II GDP multipliers, i.e. by dividing total employment multipliers by the direct employment coefficients.

The model calculates a set of these multipliers for each of the thirty-five sectors of the aggregated South African economy (see Section 5.2). It does this, in twelve sequential operations, for each of the seven input-output tables with imports shown separately, namely, 1971, 1975, 1978, 1981, 1984, 1989 and 1993. These twelve operations are:

(i) Aggregation of transaction tables.
(ii) Calculation of direct coefficient tables.
(iii) Construction of an identity matrix.
(iv) Calculation of a technology matrix.
(v) Calculation of the Leontief inverse.
(vi) Construction of a GDP diagonal matrix.
(vii) Calculation of first round impacts.
(viii) Calculation of total GDP multipliers.
(ix) Calculation of total type II GDP Multipliers.
(x) Construction of employment diagonals.
(xi) Calculation of total employment multipliers.
(xii) Calculation of total type II employment multipliers.

5.2 Aggregated Transaction Tables

In 1993, the latest year of issue, the CSS identified ninety sectors in the South African economy, and consequently the basic transaction table formed a square matrix of ninety columns by ninety rows.

The software used in this thesis does not process such large matrices. Consequently, aggregation of the CSS transaction table and recalculation of the direct coefficients and Leontief inverses is necessary.

The manufacturing industries contained in the CSS tables, sector numbers 3111 to 3869, were therefore grouped into 12 sectors containing industries of a generally

similar nature and having the same first two digits of the SIC code. Table 5.1 shows the aggregated 35 sectors.

5.2.1 The aggregated sector "food, liquor, beverages and tobacco" contains the sectors:

SIC Code	Description
3111	Slaughtering, preparing and preserving meat
3112	Dairy products
3113	Canning and preserving of fruit and vegetables
3114	Canning, preserving, processing of fish, manufacture of fish oil and meal
3115	Vegetable and animal oils and fats, including whale oil
3116	Grain mill products
3117	Bakery products
3118	Sugar factories and refineries
3119	Cocoa, chocolate and sugar confectionery
3121	Other food products
3122	Prepared animal feeds
3131	Distilleries and wineries
3133	Malt liquors and malt
3134	Soft drinks and carbonated water industries
3140	Tobacco products

5.2.2 The aggregated sector "textiles, clothing, beverages and tobacco" contains the sectors:

SIC Code	Description
3211	Spinning, weaving and finishing of textiles
3212	Made-up textile goods, except wearing apparel
32130	Garment and hosiery knitting mills
32139	Other knitting mills
3214	Carpets and rugs, mats and matting
3215	Cordage, rope and twine industries

3219	Textiles, not elsewhere classified
3220	Wearing apparel except footwear
3231	Tanneries and leather finishing
3232	Leather products and leather substitutes
3240	Footwear

5.2.3 The aggregated sector "wood and furniture" contains the sectors:

SIC Code	Description
3310	Wood and wood products, except furniture
3320	Furniture

5.2.4 The aggregated sector "paper, printing and publishing" contains the sectors:

SIC Code	Description
3411	Pulp, paper and paperboard
3412	Paper containers
3419	Other pulp, paper and paperboard articles
3420	Printing and publishing

5.2.5 The aggregated sector "chemicals, plastics, petroleum and rubber" contains the sectors:

SIC Code	Description
3511	Industrial chemicals
3512	Fertilizers and pesticides
3513	Synthetic resins, plastic materials and man made fibres, except glass
3521	Paints, varnishes and lacquers
3522	Medicinal and pharmaceutical preparations
3523	Soap, cleaning compounds, perfumes, cosmetics and toilet preparations
3529	Other chemical products
353/4	Petroleum refineries and products of petroleum/coal
3551	Tyres and tubes
3559	Other rubber products

3560	Other plastic products

5.2.6 The aggregated sector "pottery, glass, refractory and other non-metallic minerals" contains the sectors:

SIC Code	Description
3610	Pottery, china and earthware
3620	Glass and glass products
3691	Bricks, tiles, refractories, etc.
3692	Cement
3699	Other non-metallic products

5.2.7 The aggregated sector "iron, steel and non-ferrous basic industries" contains the sectors:

SIC Code	Description
3710	Iron and steel basic industries
3720	Non-ferrous basic industries

5.2.8 The aggregated sector "fabricated metal products" contains the sectors:

SIC Code	Description
3811	Cutlery, handtools and general hardware
3812	Furniture and fixtures primarily of metal
3813	Structural metal products
3819	Other fabricated metal products, except machinery and equipment

5.2.9 The aggregated sector "engines, machinery and equipment" contains the sectors:

SIC Code	Description
3821	Engines and turbines
3822	Agricultural machinery and equipment
3823	Metal and woodworking machinery
3824	Special industrial machinery and equipment
3825	Office, computing and accounting machinery

3829	Other machinery and equipment, except electrics

5.2.10 The aggregated sector "electrical machinery and appliances" contains the sectors:

SIC Code	Description
3831	Electrical industrial machinery and apparatus
3832	Radio, television and communication equipment and apparatus
3833	Electrical appliances and housewares
3839	Other electrical apparatus and supplies

5.2.11 The aggregated sector "motor vehicles, parts and accessories" contains the sectors:

SIC Code	Description
38400/01	Motor vehicles
38402/3/9	Motor vehicle parts and accessories

5.2.12 The aggregated sector "railway and transport equipment" contains the sectors:

SIC Code	Description
3852	Railway equipment
3851/4/5/9	Other transport

All the other sectors shown in Table 5.1 are as they appear in the CSS input-output table, and were not aggregated.

The level of aggregation will not generally affect the relative positions of the mining multipliers, because in a previous unpublished investigation a twelve-sector matrix these relative positions were not substantially different from those found in this thesis.

All the transaction tables prepared by the CSS exclude households, i.e. they are open

with respect to households. The published CSS transaction table only allows calculation of direct and indirect effects, i.e. simple multipliers. The CSS tables have therefore been adjusted to include households, i.e. the tables used in this thesis are closed with respect to households, allowing calculation of direct, indirect and induced effects, i.e. total multipliers.

Table 5.1 Aggregated Sectors

Sector	Description
1100	Agriculture, forestry and fishing
2100	Coal mining
2400	Gold mining
2800	Other mining
3111-3140	Food, liquor, beverages and tobacco
3211-3240	Textiles, clothing, cordage and leather
3310-3320	Wood and furniture
3411-3420	Paper, printing and publishing
3511-3560	Chemicals, plastics, petroleum and rubber
3610-3699	Pottery, glass, refractory and other non-metallic minerals
3710-3720	Iron, steel and non-ferrous basic industries
3811-3819	Fabricated metal products
3821-3829	Engines, machinery and equipment
3831-3839	Electrical machinery and appliances
38400-38403	Motor vehicles, parts and accessories
3852-3859	Railway and other transport equipment
3901	Jewellery and related articles
386,3902/3/9	Other manufacturing industries
4100	Electricity, gas and steam
4200	Water supply
5100	Building construction
5200	Civil engineering and other construction
61,62	Wholesale and retail trade and motor trade
6300	Catering and accommodation services
7100	Transport and storage
7200	Communication
81,82	Financial institutions and insurance services
8310	Real estate
8320	Business services
8330	Machinery and equipment renting and leasing
9330	Medical, dental and other health and veterinary services
9700	Other services-profit seeking
9800	Other services-non profit seeking
9900	Others, scrap and government services
REM	Remuneration of employees

5.3 Direct Coefficients, denoted by [A]

Direct coefficients show the direct intermediate input requirements of each sector in relation to the total output of that sector.

The model uses data from the aggregated transaction tables to produce direct coefficients. Section 4.3 describes this operation.

The rows "Transfers to other industries" and "Transfers from other industries" are exogenous to the primary inputs and are not included in the calculation of direct coefficients. The divisor is the total input (excluding transfers) to each sector.

5.4 The Identity Matrix, denoted by [I]

The identity matrix for each set of aggregated tables is simply a 35 x 35 null matrix with 1's on the principal diagonal axis. Appendix II contains an example of an identity matrix.

5.5 The Technology Matrix, denoted by [I-A].

[I-A] is constructed by subtracting each element in [A] from its corresponding element in [I].
If an industry is to produce an output sufficient to meet the input requirements of the *n* industries in an economy, as well as the final demand of the open sector, its output level must satisfy the set of equations in (4.4) and (4.5).

X_1 is the required output from industry 1, X_2 is the output from industry 2, and so on to industry *n*. a_{ij} is the coefficient applied to each input. Notice that industry 1 supplies input to itself, and this is shown by applying the coefficient a_{11} to the total output from industry 1, i.e. $a_{11}x_1$ (Chiang, 1987).

If this process is carried on for each of the *n* rows the "correct" output levels can be summarized in a matrix as:

$$\begin{vmatrix} (1-a_{11}) & -a_{12} & .... & -a_{1n} \\ -a_{21} & (1-a_{22}) & .... & -a_{2n} \\ .... & .... & .... & .... \\ -a_{n1} & -a_{n2} & .... & (1-a_{nn}) \end{vmatrix} \begin{vmatrix} x_1 \\ x_2 \\ .. \\ x_n \end{vmatrix} = \begin{vmatrix} f_1 \\ f_2 \\ ... \\ f_n \end{vmatrix} \qquad (5.2)$$

If the 1's in the principal diagonal of the left hand of this matrix are ignored, then it becomes -[A], or a negative of the direct coefficient matrix, [A]. In other words, the left-hand matrix is the *sum* of the Identity matrix, [I], and the negative Direct Coefficient matrix, -[A].

This matrix is re-written as:

$$[I-A]X = F \qquad (5.3)$$

This is the same as equation (4.7)

5.6 The Leontief Inverse $[I-A]^{-1}$

Equation (5.3), or equation (4.7), becomes:

$$[I-A]^{-1}.F = X \qquad (5.4)$$

$[I-A]^{-1}$ is the Leontief Inverse of the matrix [I-A].

The general procedure for finding the inverse of a matrix, which must be square and non-singular, is to find the co-factors of all the elements of the matrix and to

arrange them as a co-factor matrix, [C]. The transpose of [C], in which rows and columns are transposed, is called the adjoint of [A] and denoted by adj A.

The inverse of [A] is then found by dividing adj [A] by [A], i.e:

$$[A]^{-1} = \text{adj } A/[A] \tag{5.5}$$

Similarly, for the Leontief Inverse:

$$[I-A]^{-1} = \text{adj } [I-A]/[I-A] \tag{5.6}$$

Matrix Inversion by manual methods is a complicated process, not attempted here. However, it is easy to accomplish on readily available software.

The model calculates Leontief Inverses for each of the seven aggregated sets of data.

5.7 Gross Domestic Product Diagonal Matrix

A GDP diagonal matrix is similar in construction to an Identity matrix, except that, instead of 1's in the principal diagonal, Direct GDP coefficients are inserted.

The CSS defines GDP as:

$$GDP = ROE + GOS + NIT \tag{5.7}$$

Where

ROE = Remuneration of Employees, or Households,
GOS = Gross Operating Surplus, and

NIT = Net Indirect Taxes.

The model sums these three elements for each sector in the direct coefficient matrix, and produces Direct GDP coefficients.

5.8 Total GDP Multipliers

The model multiplies the GDP diagonal matrix and the Leontief inverse matrix to produce total GDP Multipliers, i.e:

$$X = Y.[I - A]^{-1} \qquad (5.8$$

Where:

X	=	The total GDP multiplier
$[I-A]^{-1}$	=	The Leontief inverse matrix
Y	=	The GDP diagonal matrix

It is important to place the GDP Diagonal *before* the Leontief Inverse, because multiplication of the Leontief matrix by the GDP coefficients, which lie on the principal diagonal of the GDP Diagonal Matrix, must be in the proper order.

5.9 Total Type II GDP Multipliers

These are direct, indirect and induced coefficients divided by direct GDP coefficients.

The significance of total type II GDP multipliers is that they show the multiplying effect that each R1 increase in the GDP of a sector will have on the total economy

Total GDP multipliers show the effect that an increase in output from a sector will have on GDP, whereas the total type II GDP multipliers show the effect that an increase the three components of GDP within a sector will have on the total economy.

5.10 Employment Diagonal Matrix

The Employment diagonal matrix is constructed in the same manner as the GDP Diagonal and the Identity matrix, except that Direct Employment coefficients are inserted on the principal diagonal.

Direct Employment Coefficients are the ratio of an absolute quantity, the number of employees in a given year, to a quantity affected by time; the money value of the output. Application of a Producer Price Index, or PPI to the money values makes the required adjustment.

The Producer Price Indices published by the CSS have a base of June 1995. In order to adjust these indices to a base of December 1993, the last year input-output tables were published, the index for 1993, 84.1, is divided by each of the indices for the other years. This references each year to 1993.

Table 5.2 Adjusted Producer Price Index

	1971	1975	1978	1981	1984	1989	1993
CSS Index Base 1995	5.6	9.4	13.5	20.6	28.1	58.4	84.1
Adj.Index Base 1993	15.02	8.95	6.23	4.08	2.99	1.44	1.00

Source: Central Statistical Service.

The determination of this sector specific PPI would require access to the mainframe resources of the CSS, and would itself be a major study.

Application of a single PPI value for each year to all sectors is not an ideal method but it does take cognisance of the difference in employment multipliers for different years. A completely accurate adjustment requires a PPI specific for each sector. Although the CSS publishes monthly PPIs, these are not readily available. Aggregation of the monthly data into the 35 sectors used will itself be a major study. This shortcoming is identified as an area for future research.

5.11 Total Employment Multipliers

Total employment multipliers are calculated in a similar manner to total GDP multipliers, i.e. the Leontief inverse matrix is multiplied by the Employment Diagonal matrix. Again, it is important that the Employment Diagonal is the multiplier and the Leontief Inverse is the multiplicand. The Employment Multipliers in a column show the multiplying effect that a R1 increase in output from the sector in question will have on employment in each of the sectors from whence intermediate input is obtained. The sum of these intermediate effects will be the effect on the whole economy of a R1 increase in output from the column sector.

5.12 Type II Total Employment Multipliers.

Type II total employment multipliers are found by dividing the total employment Multipliers by the direct employment coefficients, which in turn must be adjusted as described in 4.10. Type II total employment multipliers show the effect that an increase of 1 employee will have on the total economy.

CHAPTER SIX

INTER-SECTOR IMPACT OF INCREASED MINING OUTPUT

6.1 Introduction

Inter-sector impact is the effect that an increase in output from, or employment in, a sector generates on the rest of the economy. This chapter establishes the impact of the three mining sectors in terms of the multipliers produced by the model. These multipliers are:

(i) Total GDP multipliers.
(ii) Type II total GDP multipliers.
(iii) Total employment multipliers.
(iv) Type II employment multipliers.

The multipliers are defined in section 5.1 of Chapter Five.

The discs attached to this thesis contain the models that produce seven sets of these multipliers for 1971, 1975, 1978, 1981, 1984, 1989 and 1993. For convenience, Appendix III contains a hard copy of the 1993 set.

There are twenty-eight sets of multipliers derived from these data, one per multiplier per year. Sections 6.2, 6.3, 6.4, and 6.5 tabulate the extracted data for each of the four multipliers, and describe the impact of each mining sector as follows:

(i) Tables rank the all thirty-five sectors in descending order, according to

each multiplier. These rankings show the relative importance of the sectors.

(ii) Time paths graphically show the relationship of the three mining multipliers and the arithmetic mean to each other.

(iii) Arithmetic means and standard deviations of each set of multipliers qualify the position of the mining sectors in the ranking table.

(iv) A graphic display shows the distance from the mean, expressed in standard deviations, to the largest and smallest multiplier in each set, as well as that for the three mining sectors.

(v) Frequency distributions, of each multiplier around the mean in each set of data, are calculated and displayed graphically.

Section 6.6 tests the null hypothesis that there is no significant difference between the impact of mining sector output and the output from each other sector on either GDP or employment.

6.2 Total GDP Multipliers

6.2.1 Relative importance

Table 6.1 summarises the relative positions of the three mining sectors among the 35 sectors in the input-output model. Tables 6.2 to 6.8 show the relative positions of all thirty-five total GDP multipliers in the economy for each year, i.e., from 1971 to 1993. Figure 6.1 shows the time paths of total GDP multipliers for the mining sectors, as well as the mean.

Table 6.1 Ranking According to Total GDP Multipliers

(1 = most important; 35 = least important)

	1971	1975	1978	1981	1984	1989	1993
Coal	7	8	18	18	20	16	24
Gold	14	21	19	23	19	9	8
Other	25	22	28	20	18	17	23

The results, displayed graphically in Figure 6.1, show that at no time, during the period under review, has increased output from any of the three mining sectors had the most important impact on GDP.

Table 6.8 shows that in 1993 gold mining was the most important of the mining sectors (ranked as eighth most important). The sectors whose output had a greater impact on GDP than gold mining all produce services, including building construction, because buildings and houses do not, on their own, produce an output of any use. This pattern repeats in the other years, except that the ranking of the mining sectors varies, as shown in Tables 6.2 to 6.7.

Services are different from goods because, according to the United Nations (1993), they are not separate entities, and do not have established ownership rights. The outputs of service industries are activities carried out by one sector for the benefit of another. Services typically consist of changes in the condition of the consuming units who demand the service. These changes can take a variety of forms, for instance:

(i) Changes in the condition of the consumer's goods: the producer of the service works directly on goods owned by the consumer of the service by transporting, cleaning, repairing or otherwise transforming them,

(ii) Changes in the physical condition of persons: the producer of the service transports persons, provides them with accommodation, provides medical treatments, provides them with goods, etc.

There are, however, certain services with establish ownership rights. These have many of the characteristics of goods. Examples are the production, storage, communication and dissemination of information, advice and entertainment. The output of these service industries is stored on or in physical objects such as compact discs, magnetic tapes and books, that are often traded as ordinary goods (United Nations, 1993).

Their purpose service industries, also called tertiary industries, is to provide services to primary or secondary industries, and function only if these industries produce output and generate income.

6.2.2 Arithmetic means and standard deviations of total GDP multipliers.

Table 6.9 shows the arithmetic means and standard deviations of each set of total GDP multipliers. It shows that not once, between 1971 and 1993, has the total GDP multiplier of any mining sector deviated by more than one standard deviation from the mean, either positively or negatively. This indicates that there has been no significant change in the impact of mining output on GDP.

In contrast, the largest multipliers in each year deviated positively from the mean by between 2.56 and 3.39 standard deviations. The smallest multiplier deviated by between -1.72 and -2.70 standard deviations.

The coal mining deviation ranged between +0.77 and –0.36 standard deviations, gold mining between ++0.65 and –0.26, and other mining between –0.18 and –0.59 standard deviations.

In 1971, when gold production in South Africa reached record levels and gold accounted for 58.7% of the value of all mineral exports (R.S.A. 1910-1993), the gold mining total GDP multiplier was only 1.53% greater than the mean.

Figure 6.1 shows that, beginning in 1984, the gold mining total multiplier began to diverge positively from the mean. In 1993, it was 8.5% greater than the mean, although the divergence was only 0.65 standard deviations. In 1993 gold accounted for 49.2% of the value of mineral exports (R.S.A., 1910-1993). This implies that the gold mining industry has developed greater linkages with the rest of the economy at the same time that its relative importance as a producer of mineral income has fallen. Additionally, gold mining's contribution to GDP rose between 1989 and 1993, which indicates a greater reliance on a shrinking gold output.

Figure 6.2 is an "envelope" of maximum and minimum deviations from the mean, and shows the position of the mining sectors within this envelope. The divergence of the gold mining total GDP multiplier from the mean since 1984 is evident, and also the small deviation of the coal mining and other mining total GDP multipliers.

Figure 6.3 is a graphic display showing the frequency of distribution around the mean of total GDP multipliers for all the sectors in each year. The mining multipliers are all, as shown in Table 6.9, within one standard deviation from the mean.

TABLE 6.2

RANKING OF SECTORS BY TOTAL GDP MULTIPLIERS	1971 Multiplier	Standard Deviations
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	2.2424	3.3887
OTHER SERVICES, NON-PROFIT SEEKING	2.0431	2.4687
COMMUNICATION	1.8404	1.5329
TRANSPORT AND STORAGE	1.7907	1.3035
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	1.6639	0.7182
OTHER SERVICES, PROFIT SEEKING	1.6046	0.4444
COAL MINING.	1.5781	0.3221
BUILDING CONSTRUCTION	1.5735	0.3008
BUSINESS SERVICES	1.5711	0.2898
FABRICATED METAL PRODUCTS.	1.5534	0.2081
CIVIL ENGINEERING AND OTHER CONSTRUCTION	1.5534	0.2081
JEWELLERY AND RELATED ARTICLES	1.5432	0.1610
OTHERS,SCRAP AND GOVERNMENT SERVICES	1.5328	0.1130
GOLD MINING.	1.5304	0.1019
WOOD AND FURNITURE.	1.5265	0.0839
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	1.5121	0.0174
CATERING AND ACCOMODATION SERVICES	1.5029	-0.0251
OTHER MANUFACTURING INDUSTRIES	1.4896	-0.0865
ENGINES,MACHINERY AND EQUIPMENT.	1.4854	-0.1058
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	1.4781	-0.1395
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	1.4772	-0.1437
PAPER, PRINTING AND PUBLISHING.	1.4749	-0.1543
MACHINERY AND EQUIPMENT RENTING AND LEASING	1.4565	-0.2393
ELECTRICITY, GAS AND STEAM	1.4216	-0.4004
OTHER MINING.	1.4204	-0.4059
ELECTRICAL MACHINERY AND APPLIANCES.	1.4069	-0.4682
REMUNERATION OF EMPLOYEES	1.3743	-0.6187
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	1.3719	-0.6298
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	1.3538	-0.7133
WATER SUPPLY	1.3489	-0.7360
AGRICULTURE, FORESTRY AND FISHING.	1.2791	-1.0582
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	1.2734	-1.0845
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	1.2471	-1.2059
REAL ESTATE	1.1626	-1.5960
MOTOR VEHICLES, PARTS AND ACCESSORIES.	1.1073	-1.8513

Arithmetic Mean (A.M.)	1.5083
Standard Deviation (S.D.)	0.2166

TABLE 6.3

RANKING OF SECTORS BY TOTAL GDP MULTIPLIERS	1975	Standard Deviations
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	1.8893	2.5478
OTHER SERVICES, NON-PROFIT SEEKING	1.8776	2.4856
COMMUNICATION	1.6657	1.3594
BUSINESS SERVICES	1.6201	1.1170
TRANSPORT AND STORAGE	1.6034	1.0283
OTHER SERVICES, PROFIT SEEKING	1.6001	1.0107
BUILDING CONSTRUCTION	1.5558	0.7753
COAL MINING.	1.5547	0.7694
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	1.5407	0.6950
CIVIL ENGINEERING AND OTHER CONSTRUCTION	1.4957	0.4559
CATERING AND ACCOMODATION SERVICES	1.4535	0.2316
ELECTRICITY, GAS AND STEAM	1.4469	0.1965
WOOD AND FURNITURE.	1.4344	0.1301
FABRICATED METAL PRODUCTS.	1.4331	0.1232
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	1.4236	0.0727
OTHER MANUFACTURING INDUSTRIES	1.3996	-0.0549
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	1.3904	-0.1038
ENGINES,MACHINERY AND EQUIPMENT.	1.3882	-0.1155
OTHERS,SCRAP AND GOVERNMENT SERVICES	1.3867	-0.1235
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	1.3798	-0.1601
GOLD MINING.	1.3772	-0.1739
OTHER MINING.	1.3679	-0.2234
JEWELLERY AND RELATED ARTICLES	1.3612	-0.2590
PAPER, PRINTING AND PUBLISHING.	1.3196	-0.4801
WATER SUPPLY	1.3090	-0.5364
ELECTRICAL MACHINERY AND APPLIANCES.	1.3064	-0.5502
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	1.3027	-0.5699
REMUNERATION OF EMPLOYEES	1.2903	-0.6358
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	1.2757	-0.7134
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	1.2499	-0.8505
MACHINERY AND EQUIPMENT RENTING AND LEASING	1.2356	-0.9265
AGRICULTURE, FORESTRY AND FISHING.	1.2063	-1.0822
REAL ESTATE	1.1242	-1.5186
MOTOR VEHICLES, PARTS AND ACCESSORIES.	1.0880	-1.7110
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.9942	-2.2095

Arithmetic Mean (A.M.)	1.4099
Standard Deviation (S.D.)	0.1882

TABLE 6.4

RANKING OF SECTORS BY TOTAL GDP MULTIPLIERS	1978	Standard Deviations
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	1.9829	2.8748
OTHER SERVICES, NON-PROFIT SEEKING	1.8809	2.3679
COMMUNICATION	1.6917	1.4278
BUSINESS SERVICES	1.6506	1.2236
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	1.5927	0.9359
BUILDING CONSTRUCTION	1.5823	0.8842
OTHER SERVICES, PROFIT SEEKING	1.5330	0.6392
TRANSPORT AND STORAGE	1.5165	0.5572
CIVIL ENGINEERING AND OTHER CONSTRUCTION	1.5081	0.5155
FABRICATED METAL PRODUCTS.	1.4979	0.4648
WOOD AND FURNITURE.	1.4644	0.2984
CATERING AND ACCOMODATION SERVICES	1.4572	0.2626
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	1.4413	0.1836
ENGINES,MACHINERY AND EQUIPMENT.	1.4407	0.1806
ELECTRICAL MACHINERY AND APPLIANCES.	1.4009	-0.0172
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	1.3897	-0.0728
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	1.3849	-0.0967
COAL MINING.	1.3796	-0.1230
GOLD MINING.	1.3795	-0.1235
OTHER MANUFACTURING INDUSTRIES	1.3703	-0.1692
OTHERS,SCRAP AND GOVERNMENT SERVICES	1.3492	-0.2741
JEWELLERY AND RELATED ARTICLES	1.3414	-0.3128
PAPER, PRINTING AND PUBLISHING.	1.3386	-0.3267
REMUNERATION OF EMPLOYEES	1.3045	-0.4962
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	1.3031	-0.5031
ELECTRICITY, GAS AND STEAM	1.2955	-0.5409
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	1.2948	-0.5444
OTHER MINING.	1.2866	-0.5851
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	1.2694	-0.6706
WATER SUPPLY	1.2624	-0.7054
AGRICULTURE, FORESTRY AND FISHING.	1.2346	-0.8435
MACHINERY AND EQUIPMENT RENTING AND LEASING	1.2004	-1.0135
REAL ESTATE	1.1327	-1.3499
MOTOR VEHICLES, PARTS AND ACCESSORIES.	1.0207	-1.9064
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.9735	-2.1409

Arithmetic Mean (A.M.)	1.4044
Standard Deviation (S.D.)	0.2012

TABLE 6.5

RANKING OF SECTORS BY TOTAL GDP MULTIPLIERS	1981	Standard Deviations
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	1.8774	2.6529
OTHER SERVICES, NON-PROFIT SEEKING	1.8097	2.3096
BUSINESS SERVICES	1.6151	1.3228
COMMUNICATION	1.6098	1.2959
OTHER SERVICES, PROFIT SEEKING	1.5559	1.0226
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	1.4939	0.7082
TRANSPORT AND STORAGE	1.4920	0.6985
BUILDING CONSTRUCTION	1.4849	0.6625
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	1.4564	0.5180
CIVIL ENGINEERING AND OTHER CONSTRUCTION	1.4438	0.4541
ENGINES,MACHINERY AND EQUIPMENT.	1.4335	0.4019
FABRICATED METAL PRODUCTS.	1.4242	0.3547
CATERING AND ACCOMODATION SERVICES	1.3766	0.1133
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	1.3665	0.0621
WOOD AND FURNITURE.	1.3598	0.0282
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	1.3511	-0.0160
OTHERS,SCRAP AND GOVERNMENT SERVICES	1.3486	-0.0286
COAL MINING.	1.3347	-0.0991
JEWELLERY AND RELATED ARTICLES	1.3319	-0.1133
OTHER MINING.	1.3189	-0.1793
OTHER MANUFACTURING INDUSTRIES	1.3137	-0.2056
GOLD MINING.	1.3020	-0.2650
ELECTRICITY, GAS AND STEAM	1.2890	-0.3309
ELECTRICAL MACHINERY AND APPLIANCES.	1.2854	-0.3491
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	1.2688	-0.4333
PAPER, PRINTING AND PUBLISHING.	1.2620	-0.4678
WATER SUPPLY	1.2310	-0.6250
REMUNERATION OF EMPLOYEES	1.2308	-0.6260
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	1.2301	-0.6296
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	1.2253	-0.6539
MACHINERY AND EQUIPMENT RENTING AND LEASING	1.1747	-0.9105
AGRICULTURE, FORESTRY AND FISHING.	1.1283	-1.1458
REAL ESTATE	1.1211	-1.1823
MOTOR VEHICLES, PARTS AND ACCESSORIES.	1.0298	-1.6453
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.8220	-2.6991

Arithmetic Mean (A.M.)	1.3542
Standard Deviation (S.D.)	0.1972

TABLE 6.6

RANKING OF SECTORS BY TOTAL GDP MULTIPLIERS	1984	Standard Deviations
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	1.9376	2.8217
OTHER SERVICES, NON-PROFIT SEEKING	1.8448	2.2808
COMMUNICATION	1.6952	1.4089
BUSINESS SERVICES	1.6619	1.2148
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	1.6302	1.0300
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	1.6137	0.9339
BUILDING CONSTRUCTION	1.5994	0.8505
WATER SUPPLY	1.5945	0.8219
TRANSPORT AND STORAGE	1.5445	0.5305
CIVIL ENGINEERING AND OTHER CONSTRUCTION	1.5398	0.5031
OTHERS,SCRAP AND GOVERNMENT SERVICES	1.5121	0.3417
FABRICATED METAL PRODUCTS.	1.5029	0.2881
ENGINES,MACHINERY AND EQUIPMENT.	1.4895	0.2100
WOOD AND FURNITURE.	1.4770	0.1371
JEWELLERY AND RELATED ARTICLES	1.4744	0.1219
CATERING AND ACCOMODATION SERVICES	1.4588	0.0310
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	1.4236	-0.1741
OTHER MINING.	1.4177	-0.2085
GOLD MINING.	1.4150	-0.2243
COAL MINING.	1.4101	-0.2528
OTHER MANUFACTURING INDUSTRIES	1.4046	-0.2849
PAPER, PRINTING AND PUBLISHING.	1.4006	-0.3082
ELECTRICAL MACHINERY AND APPLIANCES.	1.3925	-0.3554
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	1.3902	-0.3688
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	1.3729	-0.4696
ELECTRICITY, GAS AND STEAM	1.3620	-0.5332
OTHER SERVICES, PROFIT SEEKING	1.3443	-0.6363
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	1.3259	-0.7436
REMUNERATION OF EMPLOYEES	1.3197	-0.7797
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	1.2875	-0.9674
AGRICULTURE, FORESTRY AND FISHING.	1.2500	-1.1860
MACHINERY AND EQUIPMENT RENTING AND LEASING	1.2286	-1.3107
MOTOR VEHICLES, PARTS AND ACCESSORIES.	1.2057	-1.4442
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	1.1865	-1.5561
REAL ESTATE	1.1580	-1.7222

Arithmetic Mean (A.M.)	1.4535
Standard Deviation (S.D.)	0.1716

TABLE 6.7

RANKING OF SECTORS BY TOTAL GDP MULTIPLIERS	1989	Standard Deviations
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	1.8528	2.9192
OTHER SERVICES, NON-PROFIT SEEKING	1.8389	2.8346
BUSINESS SERVICES	1.6039	1.4041
OTHER SERVICES, PROFIT SEEKING	1.5937	1.3420
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	1.5412	1.0225
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	1.5189	0.8867
COMMUNICATION	1.5061	0.8088
TRANSPORT AND STORAGE	1.4548	0.4965
GOLD MINING.	1.4397	0.4046
BUILDING CONSTRUCTION	1.4007	0.1672
CIVIL ENGINEERING AND OTHER CONSTRUCTION	1.3857	0.0759
CATERING AND ACCOMODATION SERVICES	1.3792	0.0363
OTHERS,SCRAP AND GOVERNMENT SERVICES	1.3760	0.0169
WOOD AND FURNITURE.	1.3741	0.0053
FABRICATED METAL PRODUCTS.	1.3666	-0.0403
COAL MINING.	1.3477	-0.1554
OTHER MINING.	1.3443	-0.1761
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	1.3443	-0.1761
PAPER, PRINTING AND PUBLISHING.	1.3416	-0.1925
ENGINES,MACHINERY AND EQUIPMENT.	1.3369	-0.2211
JEWELLERY AND RELATED ARTICLES	1.3292	-0.2680
ELECTRICITY, GAS AND STEAM	1.3246	-0.2960
OTHER MANUFACTURING INDUSTRIES	1.3215	-0.3149
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	1.3109	-0.3794
ELECTRICAL MACHINERY AND APPLIANCES.	1.3020	-0.4336
WATER SUPPLY	1.2841	-0.5425
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	1.2787	-0.5754
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	1.2650	-0.6588
REMUNERATION OF EMPLOYEES	1.2512	-0.7428
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	1.2500	-0.7501
MOTOR VEHICLES, PARTS AND ACCESSORIES.	1.2070	-1.0119
AGRICULTURE, FORESTRY AND FISHING.	1.2004	-1.0520
MACHINERY AND EQUIPMENT RENTING AND LEASING	1.1686	-1.2456
REAL ESTATE	1.1334	-1.4599
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	1.0893	-1.7283

Arithmetic Mean (A.M.)	1.3732
Standard Deviation (S.D.)	0.1643

TABLE 6.8

RANKING OF SECTORS BY TOTAL GDP MULTIPLIERS	1993	Standard Deviations
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	2.0132	2.8891
OTHER SERVICES, NON-PROFIT SEEKING	1.8258	1.9164
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	1.6596	1.0538
OTHER SERVICES, PROFIT SEEKING	1.6407	0.9557
BUSINESS SERVICES	1.6124	0.8088
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	1.5961	0.7242
BUILDING CONSTRUCTION	1.5902	0.6936
GOLD MINING.	1.5809	0.6453
TRANSPORT AND STORAGE	1.5755	0.6173
COMMUNICATION	1.5737	0.6079
CIVIL ENGINEERING AND OTHER CONSTRUCTION	1.5645	0.5602
OTHERS,SCRAP AND GOVERNMENT SERVICES	1.5434	0.4506
CATERING AND ACCOMODATION SERVICES	1.5390	0.4278
WOOD AND FURNITURE.	1.4976	0.2129
FABRICATED METAL PRODUCTS.	1.4810	0.1268
ENGINES,MACHINERY AND EQUIPMENT.	1.4667	0.0525
PAPER, PRINTING AND PUBLISHING.	1.4517	-0.0253
ELECTRICAL MACHINERY AND APPLIANCES.	1.4470	-0.0497
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	1.4425	-0.0731
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	1.4201	-0.1893
OTHER MANUFACTURING INDUSTRIES	1.4144	-0.2189
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	1.3957	-0.3160
OTHER MINING.	1.3923	-0.3336
COAL MINING.	1.3877	-0.3575
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	1.3830	-0.3819
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	1.3780	-0.4078
ELECTRICITY, GAS AND STEAM	1.3760	-0.4182
REMUNERATION OF EMPLOYEES	1.3541	-0.5319
WATER SUPPLY	1.3463	-0.5724
MOTOR VEHICLES, PARTS AND ACCESSORIES.	1.3292	-0.6611
AGRICULTURE, FORESTRY AND FISHING.	1.3059	-0.7821
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	1.1771	-1.4506
MACHINERY AND EQUIPMENT RENTING AND LEASING	1.1699	-1.4880
REAL ESTATE	1.1119	-1.7890
JEWELLERY AND RELATED ARTICLES	0.9371	-2.6963

Arithmetic Mean (A.M.)	1.4566
Standard Deviation (S.D.)	0.1927

Table 6.9 Statistical Analysis - GDP Multipliers

	1971	1975	1978	1981	1984	1989	1993
Arithmetic Mean (AM)	1.5083	1.4099	1.4044	1.3542	1.4535	1.3732	1.4566
Standard Deviation (SD)	0.2166	0.1882	0.2012	0.1972	0.1716	0.1643	0.1927
Standard Deviations of largest multiplier from AM	3.3887	2.5478	2.8748	2.6529	2.8217	2.9192	2.8891
Standard Deviations of coal mining from AM.	0.3221	0.7694	-0.1230	-0.0991	-0.2528	-0.1554	-0.3575
Standard Deviations of gold mining from AM.	0.1019	-0.1739	-0.1235	-0.2650	-0.2243	0.4046	0.6453
Standard Deviations of other mining from AM.	-0.0879	-0.2234	-0.5851	-0.1793	-0.2085	-0.1761	-0.3336
Standard Deviations of smallest multiplier from AM	-1.8513	-2.2095	-2.1409	-2.6991	-1.7222	-1.7283	-2.6963
Is coal mining multiplier greater/less than AM?	greater	greater	less	greater	less	less	less
Is gold mining multiplier greater/less than AM?	greater	less	less	less	less	less	greater
Is other mining multiplier greater/less than AM?	less	less	less	less	less	less	less
Number of multipliers greater than coal mining.	6	7	17	17	19	15	23
Number of multipliers greater than gold mining.	13	20	18	21	18	8	7
Number of multipliers greater than other mining.	24	21	27	19	17	16	22

Figure 6.1 **TOTAL GDP MULTIPLIERS**

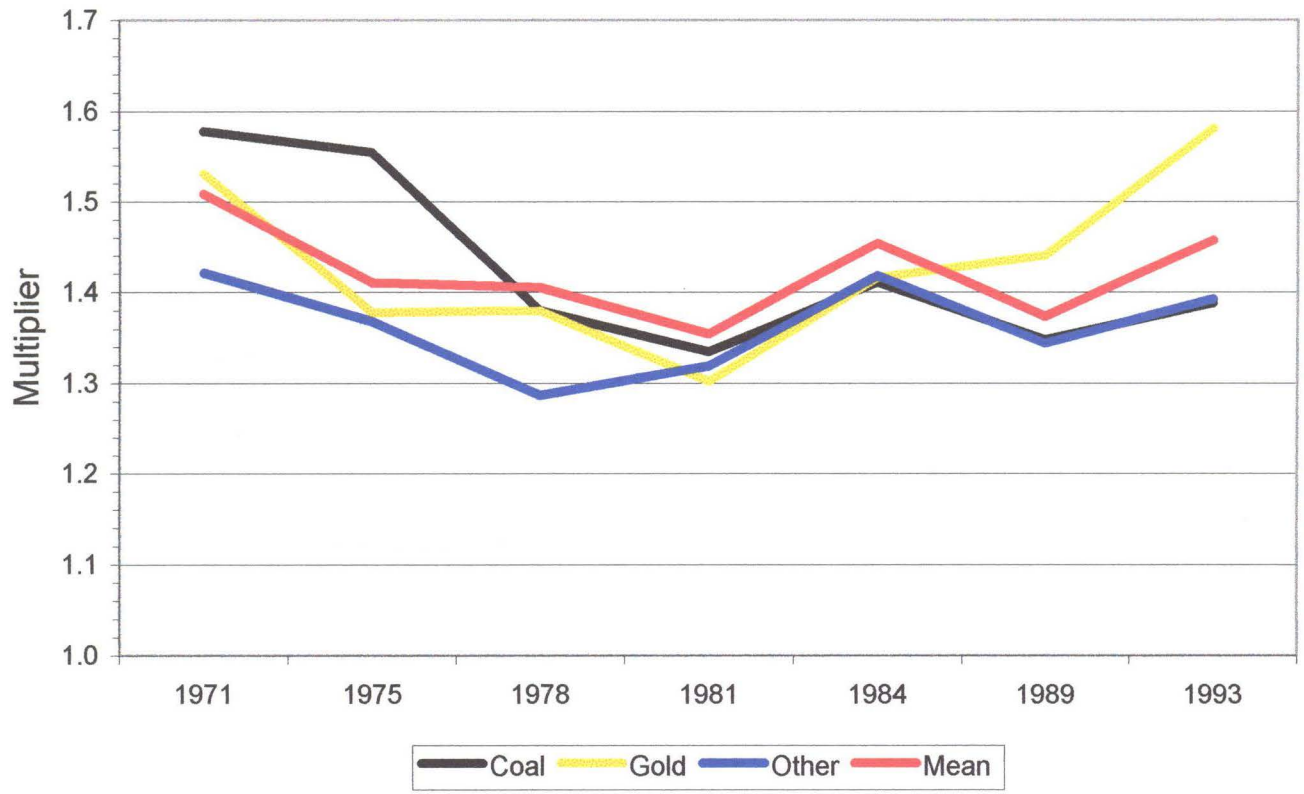


Figure 6.2 **STANDARD DEVIATIONS FROM MEAN**

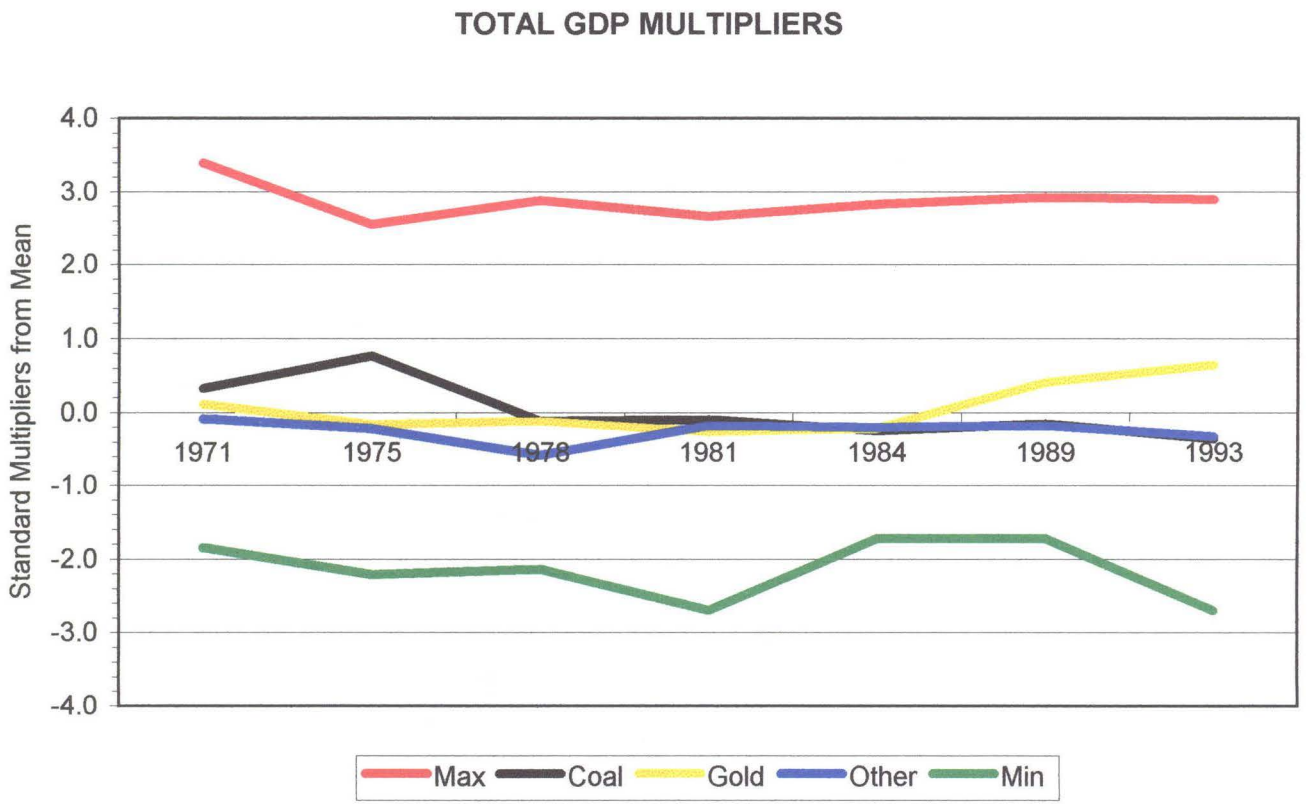
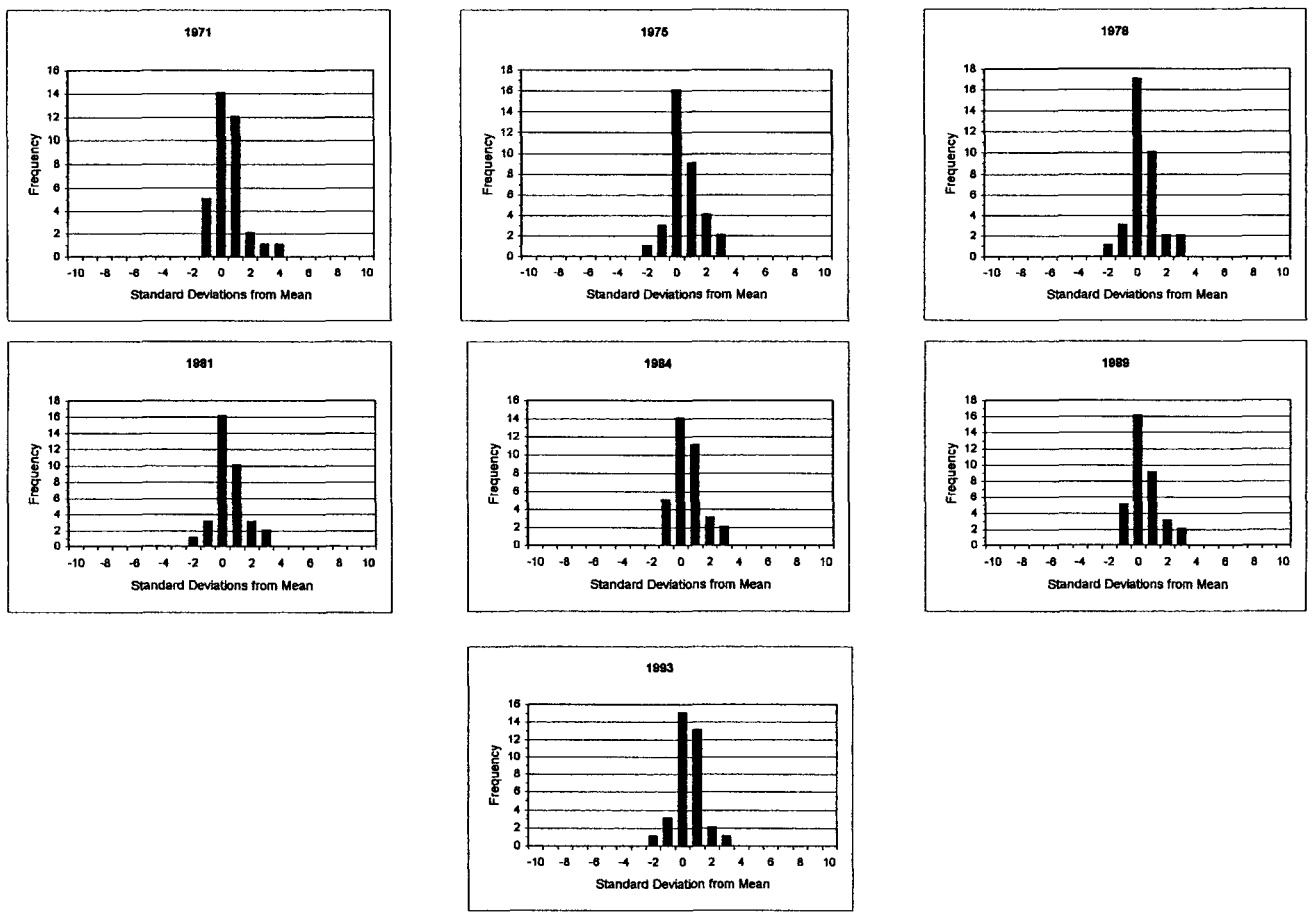


Figure 6.3 **FREQUENCY DISTRIBUTIONS TOTAL GDP MULTIPLIERS**



6.3 Type II Total GDP Multipliers

6.3.1 Relative importance

Table 6.10 summarises the relative positions of the three mining sectors. Tables 6.11 to 6.17 show the relative positions of all thirty-five type II total GDP multipliers in the economy for each year, i.e., from 1971 to 1993. Figure 6.4 shows the time paths of type II total GDP multipliers for the mining sectors, as well as the mean.

Table 6.10 Ranking According to Type II Total GDP Multipliers
(1 = most important; 35 = least important)

	1971	1975	1978	1981	1984	1989	1993
Coal	24	29	28	29	28	26	20
Gold	30	34	33	33	33	30	33
Other	29	28	30	27	25	31	27

The results, displayed graphically in figure 6.4, show that income generated in most other activities in the South African economy have had more important impacts upon GDP than incomes generated in mining activities. Section 6.6 confirms this conclusion. In particular income generated in the gold mining industry, which carries so much hope for the future, has had one of the least important impacts on GDP.

Figure 6.4 shows that all mining type II GDP multipliers were well below the mean, in some cases (gold) by more than 50%.

Table 6.17 shows that in 1993, only two tertiary industries (real estate and renting of machinery and equipment) had lower type II GDP multipliers than gold mining.

6.3.2 Arithmetic means and standard deviations of type II total GDP multipliers.

Table 6.18 shows the arithmetic means and standard deviations of each set of type II total GDP multipliers. Not once has the type II total GDP multiplier of any mining sector deviated by more than one standard deviation from the mean between 1971 and 1993 and these deviations have always been negative. This comparison indicates that there has been no significant change in the impact of mining income on GDP.

In contrast, the largest multipliers in each year deviated positively from the mean by between 3.63 and 4.98 standard deviations. The smallest multiplier deviated negatively by between 0.87 and 1.13 standard deviations.

The coal mining standard deviation ranged between –0.65 and –0.34, gold mining between –0.80 and –0.61, and other mining between –0.71 and –0.55.

Figure 6.5, as in section 6.2, is an "envelope" of maximum and minimum deviations from the mean, and shows the position of the mining sectors within this envelope. The position of the three mining sector multipliers below the mean, their distance below the maximum and their proximity to the minimum indicate that they are not significantly different from either the minimum or the mean.

Figure 6.6 is a graphic display showing the frequency of distribution around the mean of type II total GDP multipliers for all the sectors in each year. The mining multipliers are all, as shown in Table 6.18, within one standard deviation from the mean.

TABLE 6.11

RANKING OF SECTORS BY TYPE II TOTAL GDP MULTIPLIERS	1971	Standard Deviations
MACHINERY AND EQUIPMENT RENTING AND LEASING	**317.5629**	**IGNORE**
REMUNERATION OF EMPLOYEES	15.8019	3.9071
OTHERS,SCRAP AND GOVERNMENT SERVICES	13.7255	3.2116
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	6.917	0.9309
JEWELLERY AND RELATED ARTICLES	6.8037	0.8930
BUILDING CONSTRUCTION	5.717	0.5290
CIVIL ENGINEERING AND OTHER CONSTRUCTION	5.4708	0.4465
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	4.562	0.1421
MOTOR VEHICLES, PARTS AND ACCESSORIES.	4.4773	0.1137
WOOD AND FURNITURE.	4.4613	0.1083
ELECTRICAL MACHINERY AND APPLIANCES.	4.2377	0.0334
FABRICATED METAL PRODUCTS.	4.1945	0.0190
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	3.9884	-0.0501
CATERING AND ACCOMODATION SERVICES	3.9265	-0.0708
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	3.8096	-0.1100
ENGINES,MACHINERY AND EQUIPMENT.	3.8068	-0.1109
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	3.776	-0.1212
OTHER MANUFACTURING INDUSTRIES	3.6486	-0.1639
PAPER, PRINTING AND PUBLISHING.	3.6378	-0.1675
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	3.4137	-0.2426
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	3.3861	-0.2518
OTHER SERVICES, NON-PROFIT SEEKING	2.6966	-0.4828
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.6795	-0.4885
COAL MINING.	2.6354	-0.5033
OTHER SERVICES, PROFIT SEEKING	2.3845	-0.5873
ELECTRICITY, GAS AND STEAM	2.2728	-0.6248
WATER SUPPLY	2.2614	-0.6286
TRANSPORT AND STORAGE	2.2495	-0.6326
OTHER MINING.	2.1874	-0.6534
GOLD MINING.	2.1742	-0.6578
COMMUNICATION	2.1539	-0.6646
AGRICULTURE, FORESTRY AND FISHING.	1.9252	-0.7412
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	1.9221	-0.7422
BUSINESS SERVICES	1.8696	-0.7598
REAL ESTATE	1.5143	-0.8788

Arithmetic Mean (A.M.) {NB.Extreme value 317.95 for 1971 ignored}	4.1379
Standard Deviation (S.D.)	2.9853

TABLE 6.12

RANKING OF SECTORS BY TYPE II TOTAL GDP MULTIPLIERS	1975	Standard Deviations
REMUNERATION OF EMPLOYEES	16.5158	4.3599
OTHERS,SCRAP AND GOVERNMENT SERVICES	12.3959	2.9381
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	6.5524	0.9214
JEWELLERY AND RELATED ARTICLES	6.0058	0.7328
BUILDING CONSTRUCTION	4.8177	0.3228
CATERING AND ACCOMODATION SERVICES	4.6886	0.2782
MOTOR VEHICLES, PARTS AND ACCESSORIES.	4.3197	0.1509
WOOD AND FURNITURE.	4.2897	0.1405
CIVIL ENGINEERING AND OTHER CONSTRUCTION	4.2683	0.1332
ELECTRICAL MACHINERY AND APPLIANCES.	4.0780	0.0675
FABRICATED METAL PRODUCTS.	4.0383	0.0538
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	3.9485	0.0228
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	3.8219	-0.0209
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	3.7398	-0.0492
ENGINES,MACHINERY AND EQUIPMENT.	3.4581	-0.1465
PAPER, PRINTING AND PUBLISHING.	3.4258	-0.1576
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	3.3272	-0.1916
OTHER MANUFACTURING INDUSTRIES	3.2920	-0.2038
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	3.2688	-0.2118
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	3.0245	-0.2961
OTHER SERVICES, NON-PROFIT SEEKING	2.8088	-0.3705
ELECTRICITY, GAS AND STEAM	2.6264	-0.4335
MACHINERY AND EQUIPMENT RENTING AND LEASING	2.5755	-0.4511
TRANSPORT AND STORAGE	2.4467	-0.4955
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.4054	-0.5098
OTHER SERVICES, PROFIT SEEKING	2.3488	-0.5293
WATER SUPPLY	2.3191	-0.5395
OTHER MINING.	2.1583	-0.5950
COAL MINING.	2.1246	-0.6067
BUSINESS SERVICES	2.0057	-0.6477
COMMUNICATION	1.9582	-0.6641
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	1.8968	-0.6853
AGRICULTURE, FORESTRY AND FISHING.	1.8963	-0.6855
GOLD MINING.	1.6709	-0.7632
REAL ESTATE	1.3683	-0.8677

Arithmetic Mean (A.M.)	3.8825
Standard Deviation (S.D.)	2.8976

TABLE 6.13

RANKING OF SECTORS BY TYPE II TOTAL GDP MULTIPLIERS	1978	Standard Deviations
REMUNERATION OF EMPLOYEES	15.0641	4.3581
OTHERS,SCRAP AND GOVERNMENT SERVICES	10.7838	2.6996
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	6.2720	0.9514
BUILDING CONSTRUCTION	5.0224	0.4672
JEWELLERY AND RELATED ARTICLES	4.9355	0.4335
FABRICATED METAL PRODUCTS.	4.7205	0.3502
MOTOR VEHICLES, PARTS AND ACCESSORIES.	4.6800	0.3345
CATERING AND ACCOMODATION SERVICES	4.6321	0.3160
CIVIL ENGINEERING AND OTHER CONSTRUCTION	4.6060	0.3059
WOOD AND FURNITURE.	4.4367	0.2403
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	4.0209	0.0792
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	3.8762	0.0231
ENGINES,MACHINERY AND EQUIPMENT.	3.8629	0.0179
ELECTRICAL MACHINERY AND APPLIANCES.	3.8432	0.0103
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	3.8012	-0.0060
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	3.5518	-0.1026
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	3.4990	-0.1231
OTHER MANUFACTURING INDUSTRIES	3.4869	-0.1277
PAPER, PRINTING AND PUBLISHING.	3.4824	-0.1295
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	3.2668	-0.2130
OTHER SERVICES, NON-PROFIT SEEKING	2.8555	-0.3724
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.5952	-0.4732
OTHER SERVICES, PROFIT SEEKING	2.4277	-0.5381
WATER SUPPLY	2.3747	-0.5587
TRANSPORT AND STORAGE	2.2764	-0.5968
ELECTRICITY, GAS AND STEAM	2.2252	-0.6166
COMMUNICATION	2.1648	-0.6400
COAL MINING.	2.1474	-0.6468
BUSINESS SERVICES	2.0391	-0.6887
OTHER MINING.	1.9720	-0.7147
AGRICULTURE, FORESTRY AND FISHING.	1.9575	-0.7203
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	1.9019	-0.7419
GOLD MINING.	1.7826	-0.7881
MACHINERY AND EQUIPMENT RENTING AND LEASING	1.6564	-0.8370
REAL ESTATE	1.3596	-0.9520

Arithmetic Mean (A.M.)	3.8166
Standard Deviation (S.D.)	2.5809

TABLE 6.14

RANKING OF SECTORS BY TYPE II TOTAL GDP MULTIPLIERS	1981	Standard Deviations
REMUNERATION OF EMPLOYEES	16.5994	4.9837
OTHERS,SCRAP AND GOVERNMENT SERVICES	6.9767	1.2747
JEWELLERY AND RELATED ARTICLES	6.7780	1.1981
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	6.0632	0.9226
BUILDING CONSTRUCTION	4.7754	0.4262
CATERING AND ACCOMODATION SERVICES	4.2454	0.2219
MOTOR VEHICLES, PARTS AND ACCESSORIES.	4.2426	0.2208
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	4.1556	0.1873
CIVIL ENGINEERING AND OTHER CONSTRUCTION	4.0443	0.1444
FABRICATED METAL PRODUCTS.	4.0384	0.1421
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	3.8844	0.0828
WOOD AND FURNITURE.	3.7604	0.0350
OTHER MANUFACTURING INDUSTRIES	3.7517	0.0316
ENGINES,MACHINERY AND EQUIPMENT.	3.5986	-0.0274
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	3.5643	-0.0406
ELECTRICAL MACHINERY AND APPLIANCES.	3.5215	-0.0571
PAPER, PRINTING AND PUBLISHING.	3.3766	-0.1130
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	3.2842	-0.1486
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	3.1082	-0.2164
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	3.0170	-0.2516
OTHER SERVICES, NON-PROFIT SEEKING	2.7407	-0.3581
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.4993	-0.4511
OTHER SERVICES, PROFIT SEEKING	2.4944	-0.4530
WATER SUPPLY	2.4328	-0.4767
TRANSPORT AND STORAGE	2.3604	-0.5047
ELECTRICITY, GAS AND STEAM	2.3177	-0.5211
OTHER MINING.	2.2550	-0.5453
COMMUNICATION	2.1263	-0.5949
COAL MINING.	2.0877	-0.6098
BUSINESS SERVICES	2.0308	-0.6317
AGRICULTURE, FORESTRY AND FISHING.	1.8830	-0.6887
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	1.8395	-0.7054
GOLD MINING.	1.6406	-0.7821
MACHINERY AND EQUIPMENT RENTING AND LEASING	1.6084	-0.7945
REAL ESTATE	1.3362	-0.8994

Arithmetic Mean (A.M.)	3.6697
Standard Deviation (S.D.)	2.5944

TABLE 6.15

RANKING OF SECTORS BY TYPE II TOTAL GDP MULTIPLIERS	1984	Standard Deviations
REMUNERATION OF EMPLOYEES	16.5845	4.9491
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	7.0277	1.2177
OTHERS,SCRAP AND GOVERNMENT SERVICES	6.6980	1.0890
MOTOR VEHICLES, PARTS AND ACCESSORIES.	5.5180	0.6283
JEWELLERY AND RELATED ARTICLES	5.4235	0.5914
BUILDING CONSTRUCTION	4.8484	0.3668
FABRICATED METAL PRODUCTS.	4.7268	0.3193
CATERING AND ACCOMODATION SERVICES	4.6237	0.2791
CIVIL ENGINEERING AND OTHER CONSTRUCTION	4.5872	0.2648
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	4.3454	0.1704
WOOD AND FURNITURE.	4.3351	0.1664
OTHER MANUFACTURING INDUSTRIES	4.1328	0.0874
ENGINES,MACHINERY AND EQUIPMENT.	4.0603	0.0591
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	4.0581	0.0583
ELECTRICAL MACHINERY AND APPLIANCES.	3.9376	0.0112
PAPER, PRINTING AND PUBLISHING.	3.9044	-0.0018
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	3.6660	-0.0948
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	3.6190	-0.1132
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	3.4008	-0.1984
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	3.1877	-0.2816
OTHER SERVICES, NON-PROFIT SEEKING	3.1022	-0.3150
WATER SUPPLY	2.8389	-0.4178
TRANSPORT AND STORAGE	2.6028	-0.5100
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.5134	-0.5449
OTHER MINING.	2.4867	-0.5553
ELECTRICITY, GAS AND STEAM	2.4333	-0.5761
AGRICULTURE, FORESTRY AND FISHING.	2.3920	-0.5923
COAL MINING.	2.3447	-0.6107
BUSINESS SERVICES	2.2019	-0.6665
COMMUNICATION	2.1073	-0.7034
OTHER SERVICES, PROFIT SEEKING	2.0977	-0.7072
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	1.9393	-0.7690
GOLD MINING.	1.8535	-0.8025
MACHINERY AND EQUIPMENT RENTING AND LEASING	1.7986	-0.8240
REAL ESTATE	1.4145	-0.9739

Arithmetic Mean (A.M.)	3.9089
Standard Deviation (S.D.)	2.5612

TABLE 6.16

RANKING OF SECTORS BY TYPE II TOTAL GDP MULTIPLIERS	1989	Standard Deviations
REMUNERATION OF EMPLOYEES	12.0933	3.6289
OTHERS,SCRAP AND GOVERNMENT SERVICES	10.4914	2.9403
JEWELLERY AND RELATED ARTICLES	9.2738	2.4169
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	5.6832	0.8735
BUILDING CONSTRUCTION	4.9280	0.5489
CIVIL ENGINEERING AND OTHER CONSTRUCTION	4.3373	0.2950
MOTOR VEHICLES, PARTS AND ACCESSORIES.	4.0185	0.1580
CATERING AND ACCOMODATION SERVICES	3.9105	0.1115
WOOD AND FURNITURE.	3.7049	0.0232
FABRICATED METAL PRODUCTS.	3.6174	-0.0145
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	3.4447	-0.0887
ENGINES,MACHINERY AND EQUIPMENT.	3.3597	-0.1252
PAPER, PRINTING AND PUBLISHING.	3.3512	-0.1289
ELECTRICAL MACHINERY AND APPLIANCES.	3.2770	-0.1608
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	3.2390	-0.1771
WATER SUPPLY	3.2005	-0.1937
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	3.1399	-0.2197
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	3.0602	-0.2540
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	2.9279	-0.3108
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	2.7565	-0.3845
OTHER SERVICES, NON-PROFIT SEEKING	2.7407	-0.3913
OTHER MANUFACTURING INDUSTRIES	2.6767	-0.4188
OTHER SERVICES, PROFIT SEEKING	2.6207	-0.4429
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.5467	-0.4747
TRANSPORT AND STORAGE	2.4572	-0.5132
COAL MINING.	2.4347	-0.5228
ELECTRICITY, GAS AND STEAM	2.3636	-0.5534
BUSINESS SERVICES	2.3016	-0.5800
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	2.2766	-0.5908
GOLD MINING.	2.2261	-0.6125
OTHER MINING.	2.1037	-0.6651
AGRICULTURE, FORESTRY AND FISHING.	2.0449	-0.6904
MACHINERY AND EQUIPMENT RENTING AND LEASING	1.9109	-0.7480
COMMUNICATION	1.8997	-0.7528
REAL ESTATE	1.3673	-0.9817

Arithmetic Mean (A.M.)	3.6510
Standard Deviation (S.D.)	2.3264

TABLE 6.17

RANKING OF SECTORS BY TYPE II TOTAL GDP MULTIPLIERS	1993	Standard Deviations
REMUNERATION OF EMPLOYEES	13.3165	4.0859
OTHERS,SCRAP AND GOVERNMENT SERVICES	10.6690	2.9435
JEWELLERY AND RELATED ARTICLES	6.9227	1.3269
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	6.3129	1.0638
BUILDING CONSTRUCTION	5.2340	0.5983
MOTOR VEHICLES, PARTS AND ACCESSORIES.	4.3312	0.2087
CIVIL ENGINEERING AND OTHER CONSTRUCTION	4.1752	0.1414
CATERING AND ACCOMODATION SERVICES	4.0600	0.0917
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	3.9407	0.0402
WOOD AND FURNITURE.	3.9162	0.0296
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	3.7681	-0.0343
FABRICATED METAL PRODUCTS.	3.7547	-0.0401
PAPER, PRINTING AND PUBLISHING.	3.6469	-0.0866
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	3.5730	-0.1185
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	3.5346	-0.1350
WATER SUPPLY	3.5215	-0.1407
OTHER SERVICES, NON-PROFIT SEEKING	3.3920	-0.1966
ENGINES,MACHINERY AND EQUIPMENT.	3.3742	-0.2042
ELECTRICAL MACHINERY AND APPLIANCES.	3.1983	-0.2801
COAL MINING.	3.0604	-0.3396
OTHER MANUFACTURING INDUSTRIES	3.0321	-0.3519
OTHER SERVICES, PROFIT SEEKING	2.8860	-0.4149
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.8851	-0.4153
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	2.8701	-0.4218
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	2.8343	-0.4372
TRANSPORT AND STORAGE	2.7668	-0.4663
OTHER MINING.	2.5727	-0.5501
AGRICULTURE, FORESTRY AND FISHING.	2.5423	-0.5632
ELECTRICITY, GAS AND STEAM	2.4927	-0.5846
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	2.4292	-0.6120
BUSINESS SERVICES	2.3712	-0.6370
COMMUNICATION	2.2975	-0.6688
GOLD MINING.	2.0551	-0.7734
MACHINERY AND EQUIPMENT RENTING AND LEASING	1.6967	-0.9281
REAL ESTATE	1.2295	-1.1297

Arithmetic Mean (A.M.)	3.8475
Standard Deviation (S.D.)	2.3175

Table 6.18 Statistical Analysis - Type II Total GDP Multipliers

	1971	1975	1978	1981	1984	1989	1993
Arithmetic Mean (A.M.)	4.1379	3.8825	3.8166	3.6697	3.9089	3.6510	3.8475
Standard Deviation (S.D.)	2.9853	2.8976	2.5809	2.5944	2.5612	2.3264	2.3175
Standard Deviations of largest multiplier from AM	3.9071	4.3599	4.3581	4.9837	4.9491	3.6289	4.0859
Standard Deviations of coal mining from AM.	-0.5033	-0.6067	-0.6468	-0.6098	-0.6107	-0.5228	-0.3396
Standard Deviations of gold mining from AM.	-0.6578	-0.7632	-0.7881	-0.7821	-0.8025	-0.6125	-0.7734
Standard Deviations of other mining from AM.	-0.6534	-0.5950	-0.7147	-0.5453	-0.5553	-0.6651	-0.5501
Standard Deviations of smallest multiplier from AM	-0.8788	-0.8677	-0.9520	-0.8994	-0.9739	-0.9817	-1.1297
Is coal mining multiplier greater/less than AM?	less	less	less	less	less	less	less
Is gold mining multiplier greater/less than AM?	less	less	less	less	less	less	less
Is other mining multiplier greater/less than AM?	less	less	less	less	less	less	less
Number of multipliers greater than coal mining.	23	28	27	28	27	25	19
Number of multipliers greater than gold mining.	29	33	32	32	32	29	32
Number of multipliers greater than other mining.	28	27	29	25	24	30	26

Figure 6.4 **TYPE II TOTAL GDP MULTIPLIERS**

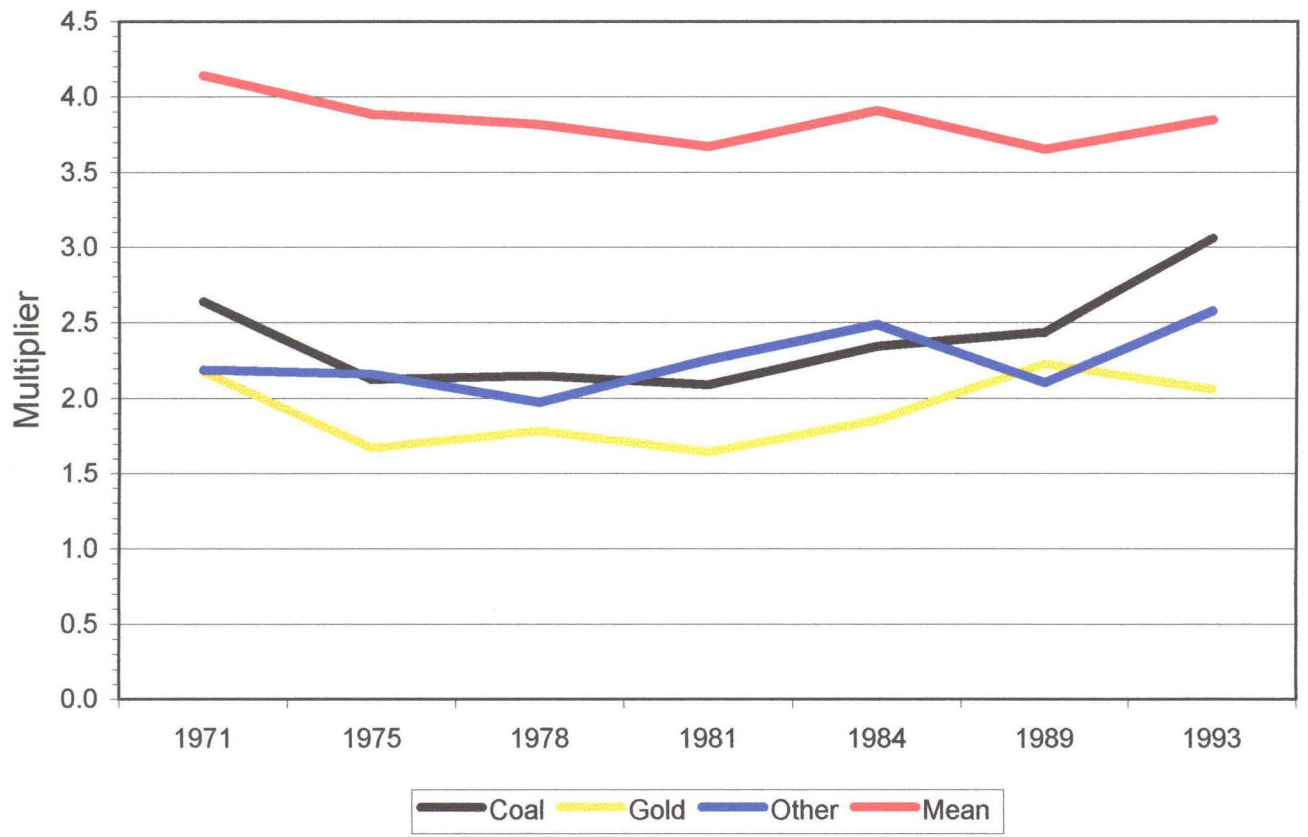


Figure 6.5 **STANDARD DEVIATIONS FROM MEAN**

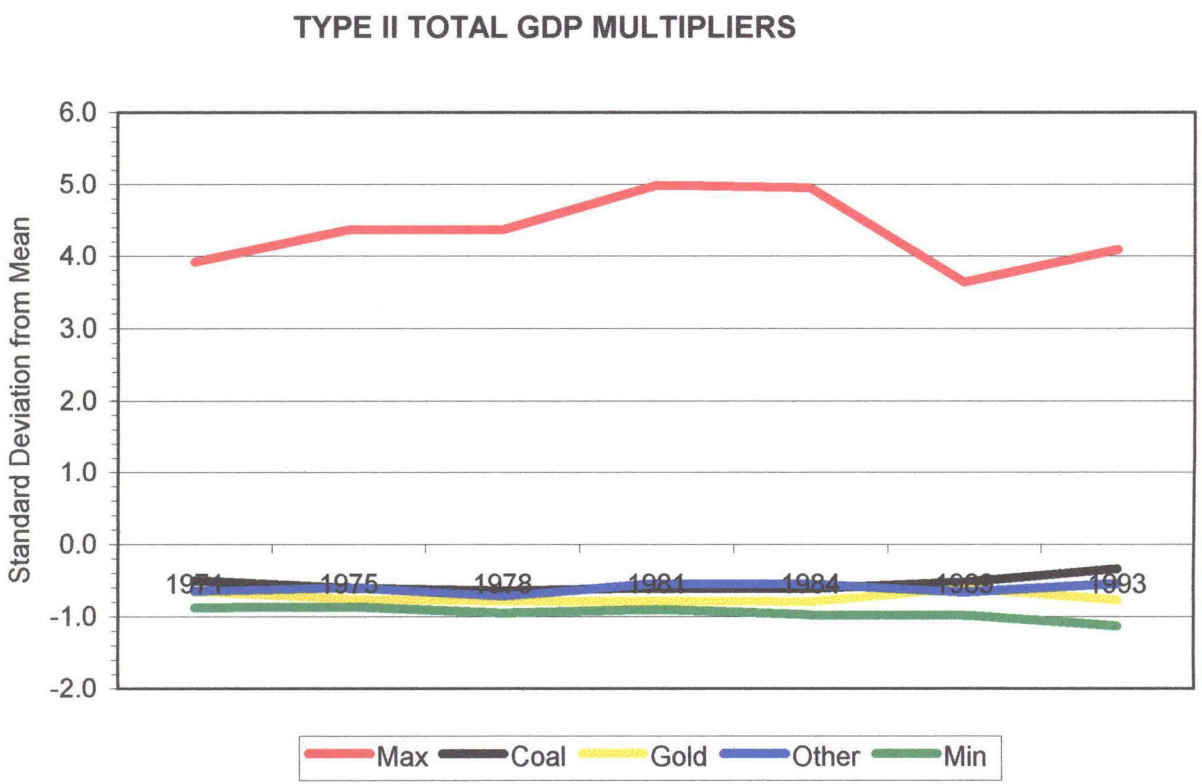
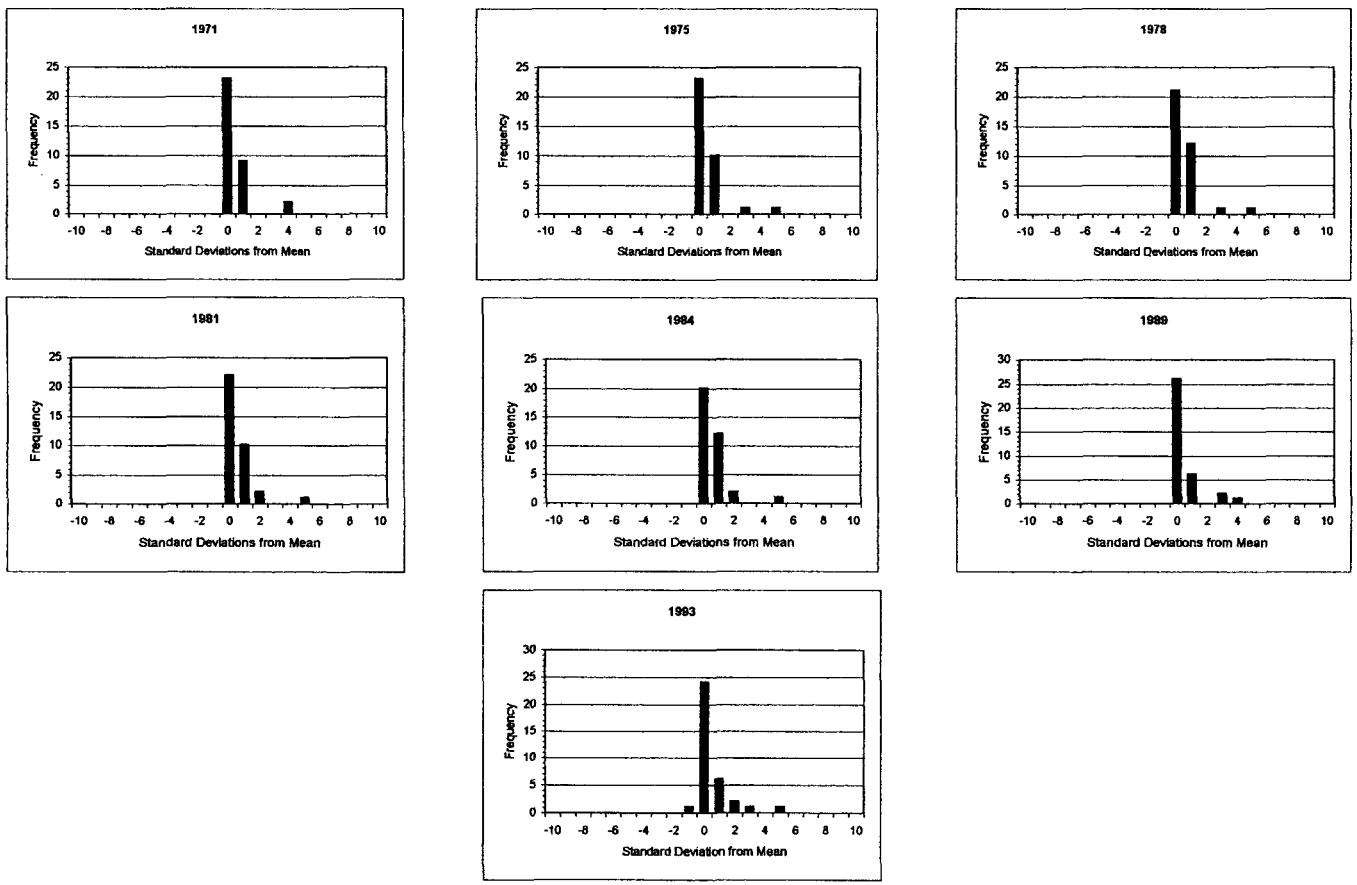


Figure 6.6 **FREQUENCY DISTRIBUTIONS TYPE II TOTAL GDP MULTIPLIERS**



6.4 Total Employment Multipliers

Total employment multipliers, calculated in step 11 of the model, establish the link between output from a sector and employment in the economy. They quantify the value, in terms of jobs created, of the sector to the economy, and account for the direct, indirect and induced effects of a R1million increase in output from a sector.

6.4.1 Relative importance

Table 6.19 summarises the relative positions of the three mining sectors. Tables 6.20 to 6.26 show the relative positions of all thirty-five employment multipliers in the economy for each year, i.e., from 1971 to 1993. Figure 6.7 shows the time paths of employment multipliers for the mining sectors, as well as the mean.

Table 6.19 Ranking According to Total Employment Multipliers
(1 = most important; 35 = least important)

	1971	1975	1978	1981	1984	1989	1993
Coal	1	1	13	20	24	21	22
Gold	6	19	20	27	18	8	9
Other	25	21	31	28	27	29	26

The results show that no mining sector, apart from Coal Mining in 1971 and 1975, has been the prime generator of jobs during the period under review. However, section 6.6 shows that no other sector was a significantly greater generator of jobs.

The rankings of the mining sectors according to their employment multipliers is generally higher than that according to their GDP multipliers, i.e., the mining sectors generate more jobs but less income. This comparison is an indication that wages in the mining sectors are generally lower than in other sectors. In 1993, the leading employment generator was "agriculture, forestry and fishing". "Financial institutions

and insurance services" were second, with "wood and furniture" in third place. The observation that "others, scrap and government services" were placed fourth prompts a quotation from Smith (1776, Book II, Chap.3).

"The labour of some of the most respectable orders in the society is, like that of menial servants, unproductive of any value. The sovereign, for example, with all the officers both of justice and war who serve under him, are unproductive labourers. Their service, how honourable, how useful, or how necessary soever, produces nothing for which an equal quantity of service can afterwards be procured."

Employment Multipliers show the number of jobs created for each R1 million increase in output. In 1993 the average employment multiplier for the whole economy, weighted according to output, was 27.397, and that for the economy excluding the three mining sectors was 29.099. The average employment multiplier for the combined mining industries, also weighted according to output, was 28.299, and places the mining industry thirteenth as a generator of employment. The calculations for these averages are in the 1993 model.

Notwithstanding the ranking of the sector, there has been a general trend of decreasing employment linked to increased output, and the actual number of new jobs created by an increase in output from the mining sectors has diminished significantly. In 1971 an increase of R1m in output from the Coal Mining industry would have resulted in 69.49 new jobs. This figure has decreased in every year to 24.84 in 1993, placing it in twenty-second position. Gold Mining ranked sixth in 1971, with 53.75 new jobs per R1m increase, and ninth in 1993, but with only 33.69 new jobs per R1m. Other mining ranked twenty-fifth in 1971 and twenty-sixth in 1993. These decreases are due to inflation, but also to the amount of mechanisation, particularly in the coal and other mining sectors.

Employment in the "machinery and equipment renting and leasing" sector decreased the most between 1971 and 1993, i.e., 68.55%. The second largest decrease (64.26%) was coal mining. Gold mining (37.32%) and other mining (36.16%) showed the ninth

and tenth largest decreases, respectively. In other words, the importance of coal mining, as a generator of employment, decreased more rapidly than 33 other sectors, gold mining more rapidly than 26 other sectors and other mining more rapidly than 25 other sectors.

Figure 6.7 also shows that:

(i) Gold mining increased steadily in importance between 1981 and 1989, but decreased between 1989 and 1993, although it was, in 1993, the most important of the mining sectors, and above the mean.

(ii) The coal mining industry has since 1971, decreased in importance as a generator of jobs at a faster rate than any other sector. This indicates the increased mechanisation of the industry

(iii) The other mining industry has never ranked higher than either coal mining or gold mining, and has always been below the mean..

These observations indicate that, whilst increased production by the mining industry will no doubt lead to an increase in employment, the trend has been to a smaller number of jobs per unit of output, not more. Annual reports from Department of Minerals and Energy show that employment in the mining industry dropped from an average of 827485 in 1987 to an average of 552896 in 1996.

6.4.2 Arithmetic means and standard deviations of employment multipliers.

Table 6.27 shows the arithmetic means and standard deviations of each set of employment multipliers. Between 1971 and 1975, coal mining had the maximum positive deviation from the mean employment multiplier, but it has been negative since 1981. The range of standard deviations for coal mining indicates a significant change its employment impact. The employment impact of gold

mining has changed by more than one standard deviation since 1981, and other mining has remained relatively unchanged.

The largest multipliers in each year deviated positively from the mean by between 2.45 (coal mining) and 1.78 standard deviations. The smallest multiplier deviated by between -2.84 and –2.50 standard deviations.

The coal mining standard deviation ranged between 2.45 and –0.33, gold mining between 1.11 and –0.54, and other mining between –1.00 and –0.19.

Figure 6.8, as in section 6.2, is an "envelope" of maximum and minimum deviations from the mean, and shows the position of the mining sectors within this envelope. The drop in significance of the coal mining sector is evident. Although gold mining increased in relative importance between 1981 and 1993, the number of jobs created decreased.

Figure 6.9 is a graphic display showing the frequency of distribution around the mean of employment multipliers for all the sectors in each year. The dispersion is much broader than for either of the GDP multipliers, but the only mining employment multipliers that fall outside the mode are those for coal mining, in 1971 and 1975.

TABLE 6.20

RANKING OF SECTORS BY TOTAL EMPLOYMENT MULTIPLIERS	1971	Standard Deviations from Mean
COAL MINING.	69.4944	2.4533
COMMUNICATION	61.7918	1.7961
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	58.7184	1.5339
AGRICULTURE, FORESTRY AND FISHING.	58.2512	1.4940
CATERING AND ACCOMODATION SERVICES	56.0335	1.3048
GOLD MINING.	53.7529	1.1102
WOOD AND FURNITURE.	52.4048	0.9952
CIVIL ENGINEERING AND OTHER CONSTRUCTION	50.5864	0.8400
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	46.7503	0.5127
OTHERS,SCRAP AND GOVERNMENT SERVICES	44.9283	0.3573
OTHER SERVICES, NON-PROFIT SEEKING	44.5713	0.3268
BUILDING CONSTRUCTION	43.4335	0.2297
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	41.5668	0.0704
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	41.2315	0.0418
REMUNERATION OF EMPLOYEES	40.9244	0.0156
FABRICATED METAL PRODUCTS.	40.7456	0.0004
TRANSPORT AND STORAGE	40.7381	-0.0003
OTHER MANUFACTURING INDUSTRIES	40.7247	-0.0014
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	40.5968	-0.0123
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	38.1930	-0.2174
JEWELLERY AND RELATED ARTICLES	38.1291	-0.2229
ENGINES,MACHINERY AND EQUIPMENT.	37.0162	-0.3178
PAPER, PRINTING AND PUBLISHING.	36.5675	-0.3561
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	36.3180	-0.3774
OTHER MINING.	35.7869	-0.4227
ELECTRICAL MACHINERY AND APPLIANCES.	35.1208	-0.4795
MACHINERY AND EQUIPMENT RENTING AND LEASING	33.1894	-0.6443
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	29.9781	-0.9183
MOTOR VEHICLES, PARTS AND ACCESSORIES.	28.7265	-1.0251
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	28.2413	-1.0665
OTHER SERVICES, PROFIT SEEKING	28.1644	-1.0731
WATER SUPPLY	28.1183	-1.0770
ELECTRICITY, GAS AND STEAM	27.7157	-1.1114
BUSINESS SERVICES	27.2016	-1.1552
REAL ESTATE	10.2279	-2.6035

Arithmetic Mean (A.M.)	40.7411
Standard Deviation (S.D.)	11.7201

TABLE 6.21

RANKING OF SECTORS BY TOTAL EMPLOYMENT MULTIPLIERS	1975	Standard Deviations from Mean
COAL MINING.	56.0315	2.3543
CATERING AND ACCOMODATION SERVICES	53.2376	2.0475
AGRICULTURE, FORESTRY AND FISHING.	51.6079	1.8686
WOOD AND FURNITURE.	44.2839	1.0645
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	42.9369	0.9166
COMMUNICATION	42.9162	0.9143
OTHERS,SCRAP AND GOVERNMENT SERVICES	40.6306	0.6634
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	40.2835	0.6253
OTHER SERVICES, NON-PROFIT SEEKING	40.0783	0.6028
BUILDING CONSTRUCTION	39.3967	0.5279
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	37.9657	0.3708
CIVIL ENGINEERING AND OTHER CONSTRUCTION	37.3898	0.3076
TRANSPORT AND STORAGE	36.0633	0.1619
REMUNERATION OF EMPLOYEES	35.9261	0.1469
OTHER MANUFACTURING INDUSTRIES	35.7176	0.1240
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	34.8789	0.0319
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	34.7481	0.0175
FABRICATED METAL PRODUCTS.	33.8562	-0.0804
GOLD MINING.	33.8489	-0.0812
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	33.6569	-0.1023
OTHER MINING.	32.8206	-0.1941
BUSINESS SERVICES	32.3394	-0.2469
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	31.2799	-0.3632
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	30.6420	-0.4333
ENGINES,MACHINERY AND EQUIPMENT.	30.0675	-0.4964
JEWELLERY AND RELATED ARTICLES	30.0140	-0.5022
PAPER, PRINTING AND PUBLISHING.	29.2847	-0.5823
ELECTRICAL MACHINERY AND APPLIANCES.	28.9309	-0.6211
ELECTRICITY, GAS AND STEAM	28.8726	-0.6275
WATER SUPPLY	28.5159	-0.6667
OTHER SERVICES, PROFIT SEEKING	27.8954	-0.7348
MOTOR VEHICLES, PARTS AND ACCESSORIES.	25.6136	-0.9854
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	21.2262	-1.4671
MACHINERY AND EQUIPMENT RENTING AND LEASING	18.9134	-1.7210
REAL ESTATE	8.7218	-2.8400

Arithmetic Mean (A.M.)	34.5884
Standard Deviation (S.D.)	9.1081

TABLE 6.22

RANKING OF SECTORS BY TOTAL EMPLOYMENT MULTIPLIERS	1978	Standard Deviations from Mean
CATERING AND ACCOMODATION SERVICES	60.4018	2.2197
AGRICULTURE, FORESTRY AND FISHING.	53.5930	1.5939
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	53.5130	1.5866
WOOD AND FURNITURE.	52.7060	1.5124
BUILDING CONSTRUCTION	46.7185	0.9621
COMMUNICATION	45.8218	0.8797
OTHER SERVICES, NON-PROFIT SEEKING	43.6849	0.6833
OTHERS,SCRAP AND GOVERNMENT SERVICES	43.4596	0.6626
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	42.6717	0.5902
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	42.6161	0.5851
CIVIL ENGINEERING AND OTHER CONSTRUCTION	41.8222	0.5121
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	40.5900	0.3989
COAL MINING.	40.5434	0.3946
OTHER MANUFACTURING INDUSTRIES	39.8011	0.3263
REMUNERATION OF EMPLOYEES	38.8442	0.2384
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	38.5317	0.2097
FABRICATED METAL PRODUCTS.	38.1477	0.1744
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	36.0851	-0.0152
TRANSPORT AND STORAGE	35.8198	-0.0396
GOLD MINING.	35.0795	-0.1076
BUSINESS SERVICES	34.6298	-0.1489
ENGINES,MACHINERY AND EQUIPMENT.	34.4423	-0.1662
ELECTRICAL MACHINERY AND APPLIANCES.	34.1479	-0.1932
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	32.5651	-0.3387
PAPER, PRINTING AND PUBLISHING.	32.4627	-0.3481
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	31.6287	-0.4248
OTHER SERVICES, PROFIT SEEKING	28.2458	-0.7357
WATER SUPPLY	26.5216	-0.8941
MOTOR VEHICLES, PARTS AND ACCESSORIES.	26.3402	-0.9108
JEWELLERY AND RELATED ARTICLES	25.8146	-0.9591
OTHER MINING.	25.3535	-1.0015
ELECTRICITY, GAS AND STEAM	21.4447	-1.3607
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	21.0164	-1.4001
MACHINERY AND EQUIPMENT RENTING AND LEASING	14.6700	-1.9834
REAL ESTATE	9.0250	-2.5022

Arithmetic Mean (A.M.)	36.2503
Standard Deviation (S.D.)	10.8805

TABLE 6.23

RANKING OF SECTORS BY TOTAL EMPLOYMENT MULTIPLIERS	1981	Standard Deviations from Mean
CATERING AND ACCOMODATION SERVICES	53.9346	2.3780
OTHER MANUFACTURING INDUSTRIES	45.4968	1.4599
AGRICULTURE, FORESTRY AND FISHING.	44.6012	1.3624
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	43.5999	1.2535
COMMUNICATION	42.2521	1.1068
WOOD AND FURNITURE.	41.4766	1.0225
OTHERS,SCRAP AND GOVERNMENT SERVICES	40.4940	0.9156
BUILDING CONSTRUCTION	39.5314	0.8108
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	38.2855	0.6753
OTHER SERVICES, NON-PROFIT SEEKING	37.9810	0.6421
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	36.3873	0.4687
CIVIL ENGINEERING AND OTHER CONSTRUCTION	35.7344	0.3977
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	35.4021	0.3615
BUSINESS SERVICES	34.9303	0.3102
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	33.4728	0.1516
REMUNERATION OF EMPLOYEES	33.3913	0.1427
TRANSPORT AND STORAGE	32.8790	0.0870
FABRICATED METAL PRODUCTS.	31.6512	-0.0466
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	30.7262	-0.1472
COAL MINING.	30.5767	-0.1635
ENGINES,MACHINERY AND EQUIPMENT.	30.5124	-0.1705
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	29.0019	-0.3349
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	28.3017	-0.4110
PAPER, PRINTING AND PUBLISHING.	28.0977	-0.4332
ELECTRICAL MACHINERY AND APPLIANCES.	27.8940	-0.4554
JEWELLERY AND RELATED ARTICLES	27.8638	-0.4587
GOLD MINING.	27.1057	-0.5412
OTHER MINING.	27.0403	-0.5483
OTHER SERVICES, PROFIT SEEKING	26.4421	-0.6134
WATER SUPPLY	25.6364	-0.7010
MOTOR VEHICLES, PARTS AND ACCESSORIES.	22.8788	-1.0011
ELECTRICITY, GAS AND STEAM	20.3066	-1.2810
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	15.9395	-1.7561
MACHINERY AND EQUIPMENT RENTING AND LEASING	14.9956	-1.8588
REAL ESTATE	7.9612	-2.6242

Arithmetic Mean (A.M.)	32.0795
Standard Deviation (S.D.)	9.1906

TABLE 6.24

RANKING OF SECTORS BY TOTAL EMPLOYMENT MULTIPLIERS	1984	Standard Deviations from Mean
AGRICULTURE, FORESTRY AND FISHING.	46.9687	1.7854
CATERING AND ACCOMODATION SERVICES	46.5687	1.7391
WOOD AND FURNITURE.	42.6216	1.2819
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	42.2366	1.2373
OTHERS,SCRAP AND GOVERNMENT SERVICES	40.4051	1.0252
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	40.1533	0.9960
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	39.2444	0.8908
BUILDING CONSTRUCTION	39.0969	0.8737
OTHER MANUFACTURING INDUSTRIES	39.0582	0.8692
COMMUNICATION	37.4989	0.6886
CIVIL ENGINEERING AND OTHER CONSTRUCTION	36.2845	0.5479
OTHER SERVICES, NON-PROFIT SEEKING	36.2683	0.5461
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	35.7706	0.4884
BUSINESS SERVICES	35.6533	0.4748
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	34.0970	0.2946
FABRICATED METAL PRODUCTS.	32.5651	0.1172
REMUNERATION OF EMPLOYEES	31.8974	0.0398
GOLD MINING.	30.5272	-0.1189
TRANSPORT AND STORAGE	30.4572	-0.1270
ENGINES,MACHINERY AND EQUIPMENT.	30.3010	-0.1451
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	30.2356	-0.1526
JEWELLERY AND RELATED ARTICLES	30.2060	-0.1561
ELECTRICAL MACHINERY AND APPLIANCES.	28.7344	-0.3265
COAL MINING.	28.7136	-0.3289
PAPER, PRINTING AND PUBLISHING.	28.6119	-0.3407
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	27.1510	-0.5099
OTHER MINING.	26.1310	-0.6280
MOTOR VEHICLES, PARTS AND ACCESSORIES.	25.9448	-0.6496
WATER SUPPLY	25.1739	-0.7389
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	24.2700	-0.8436
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	20.3024	-1.3031
ELECTRICITY, GAS AND STEAM	19.7758	-1.3641
OTHER SERVICES, PROFIT SEEKING	17.9477	-1.5758
MACHINERY AND EQUIPMENT RENTING AND LEASING	15.0497	-1.9115
REAL ESTATE	8.4515	-2.6757

Arithmetic Mean (A.M.)	31.5535
Standard Deviation (S.D.)	8.6340

TABLE 6.25

RANKING OF SECTORS BY TOTAL EMPLOYMENT MULTIPLIERS	1989	Standard Deviations from Mean
AGRICULTURE, FORESTRY AND FISHING.	43.4124	1.7833
CATERING AND ACCOMODATION SERVICES	42.2456	1.6328
WOOD AND FURNITURE.	40.3299	1.3857
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	40.1520	1.3628
OTHERS,SCRAP AND GOVERNMENT SERVICES	38.6020	1.1629
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	37.9184	1.0747
BUILDING CONSTRUCTION	36.7490	0.9239
GOLD MINING.	35.7199	0.7912
BUSINESS SERVICES	35.5440	0.7685
CIVIL ENGINEERING AND OTHER CONSTRUCTION	35.4773	0.7599
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	34.8601	0.6803
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	34.4286	0.6246
OTHER SERVICES, NON-PROFIT SEEKING	33.4170	0.4941
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	31.8392	0.2907
FABRICATED METAL PRODUCTS.	29.5308	-0.0071
OTHER MANUFACTURING INDUSTRIES	29.5213	-0.0083
COMMUNICATION	29.3251	-0.0336
REMUNERATION OF EMPLOYEES	29.1927	-0.0507
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	29.1773	-0.0527
TRANSPORT AND STORAGE	28.8346	-0.0969
COAL MINING.	28.6501	-0.1207
ENGINES,MACHINERY AND EQUIPMENT.	27.8363	-0.2256
ELECTRICAL MACHINERY AND APPLIANCES.	26.5901	-0.3863
PAPER, PRINTING AND PUBLISHING.	26.2350	-0.4321
JEWELLERY AND RELATED ARTICLES	26.1994	-0.4367
OTHER SERVICES, PROFIT SEEKING	25.6390	-0.5090
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	25.2960	-0.5532
MOTOR VEHICLES, PARTS AND ACCESSORIES.	24.0314	-0.7163
OTHER MINING.	23.0510	-0.8428
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	22.5393	-0.9088
WATER SUPPLY	22.3006	-0.9396
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	18.6936	-1.4048
ELECTRICITY, GAS AND STEAM	18.3865	-1.4444
MACHINERY AND EQUIPMENT RENTING AND LEASING	15.5722	-1.8074
REAL ESTATE	8.1985	-2.7584

Arithmetic Mean (A.M.)	29.5856
Standard Deviation (S.D.)	7.7536

TABLE 6.26

RANKING OF SECTORS BY TOTAL EMPLOYMENT MULTIPLIERS	1993	Standard Deviations from Mean
AGRICULTURE, FORESTRY AND FISHING.	45.1475	2.2251
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	40.4073	1.6479
WOOD AND FURNITURE.	39.9823	1.5961
OTHERS,SCRAP AND GOVERNMENT SERVICES	38.9588	1.4715
BUILDING CONSTRUCTION	36.9006	1.2209
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	33.8308	0.8471
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	33.8100	0.8446
CIVIL ENGINEERING AND OTHER CONSTRUCTION	33.7886	0.8419
GOLD MINING.	33.6941	0.8304
CATERING AND ACCOMODATION SERVICES	30.3732	0.4261
OTHER SERVICES, NON-PROFIT SEEKING	29.3091	0.2965
ELECTRICAL MACHINERY AND APPLIANCES.	29.2630	0.2909
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	29.0082	0.2599
OTHER MANUFACTURING INDUSTRIES	28.2138	0.1631
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	28.1279	0.1527
FABRICATED METAL PRODUCTS.	27.5841	0.0865
REMUNERATION OF EMPLOYEES	26.5115	-0.0442
PAPER, PRINTING AND PUBLISHING.	26.3111	-0.0686
TRANSPORT AND STORAGE	26.1609	-0.0868
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	25.9067	-0.1178
BUSINESS SERVICES	25.0943	-0.2167
COAL MINING.	24.8371	-0.2480
COMMUNICATION	24.6008	-0.2768
ENGINES,MACHINERY AND EQUIPMENT.	24.3606	-0.3061
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	23.6132	-0.3971
OTHER MINING.	22.8451	-0.4906
MOTOR VEHICLES, PARTS AND ACCESSORIES.	22.4840	-0.5346
OTHER SERVICES, PROFIT SEEKING	21.4852	-0.6562
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	20.3802	-0.7907
JEWELLERY AND RELATED ARTICLES	18.9713	-0.9623
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	18.5779	-1.0102
WATER SUPPLY	18.1127	-1.0668
ELECTRICITY, GAS AND STEAM	16.4936	-1.2640
MACHINERY AND EQUIPMENT RENTING AND LEASING	10.4381	-2.0013
REAL ESTATE	5.0108	-2.6622

Arithmetic Mean (A.M.)	26.8741
Standard Deviation (S.D.)	8.2125

Table 6.27 Statistical Analysis - Total Employment Multipliers

	1971	1975	1978	1981	1984	1989	1993
Arithmetic Mean (A.M.)	40.7411	34.5884	36.2503	32.0795	31.5535	29.5856	26.8741
Standard Deviation (S.D.)	11.7201	9.1081	10.8805	9.1906	8.6340	7.7536	8.2125
Standard Deviations of largest multiplier from AM	2.4533	2.3543	2.2197	2.3780	1.7854	1.7833	2.2251
Standard Deviations of coal mining from AM.	2.4533	2.3543	0.3946	-0.1635	-0.3289	-0.1207	-0.2480
Standard Deviations of gold mining from AM.	1.1102	-0.0812	-0.1076	-0.5412	-0.1189	0.7912	0.8304
Standard Deviations of other mining from AM.	-0.4227	-0.1941	-1.0015	-0.5483	-0.6280	-0.8428	-0.4906
Standard Deviations of smallest multiplier from AM	-2.6035	-2.8400	-2.5022	-2.6242	-2.6757	-2.7584	-2.6622
Is coal mining multiplier greater/less than AM?	greater	greater	greater	less	less	less	less
Is gold mining multiplier greater/less than AM?	greater	less	less	less	less	greater	greater
Is other mining multiplier greater/less than AM?	less	less	less	less	less	less	less
Number of multipliers greater than coal mining.	0	0	12	19	19	20	21
Number of multipliers greater than gold mining.	5	18	19	26	18	7	8
Number of multipliers greater than other mining.	24	20	30	27	17	28	25

Figure 6.7 **TOTAL EMPLOYMENT MULTIPLIERS**

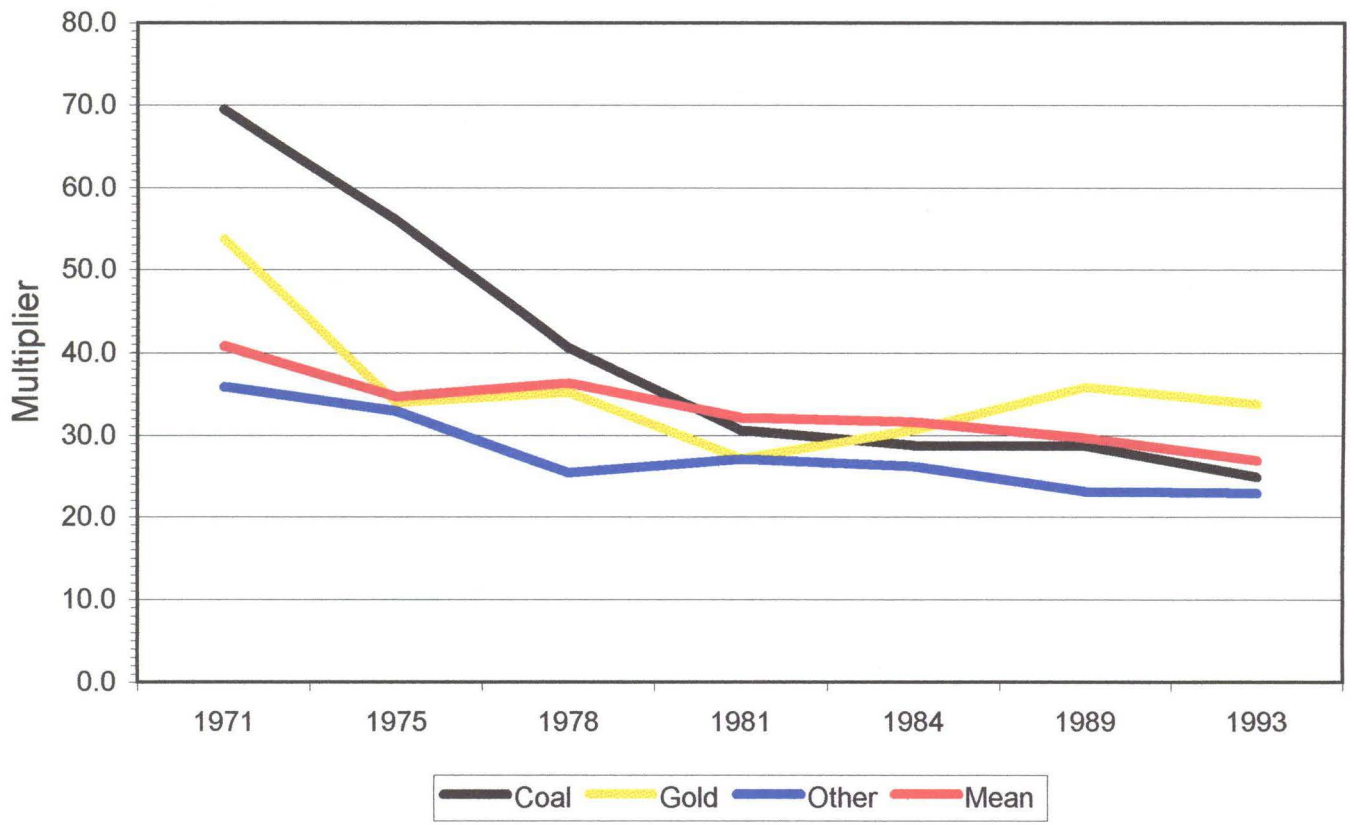


Figure 6.8 **STANDARD DEVIATIONS FROM MEAN**

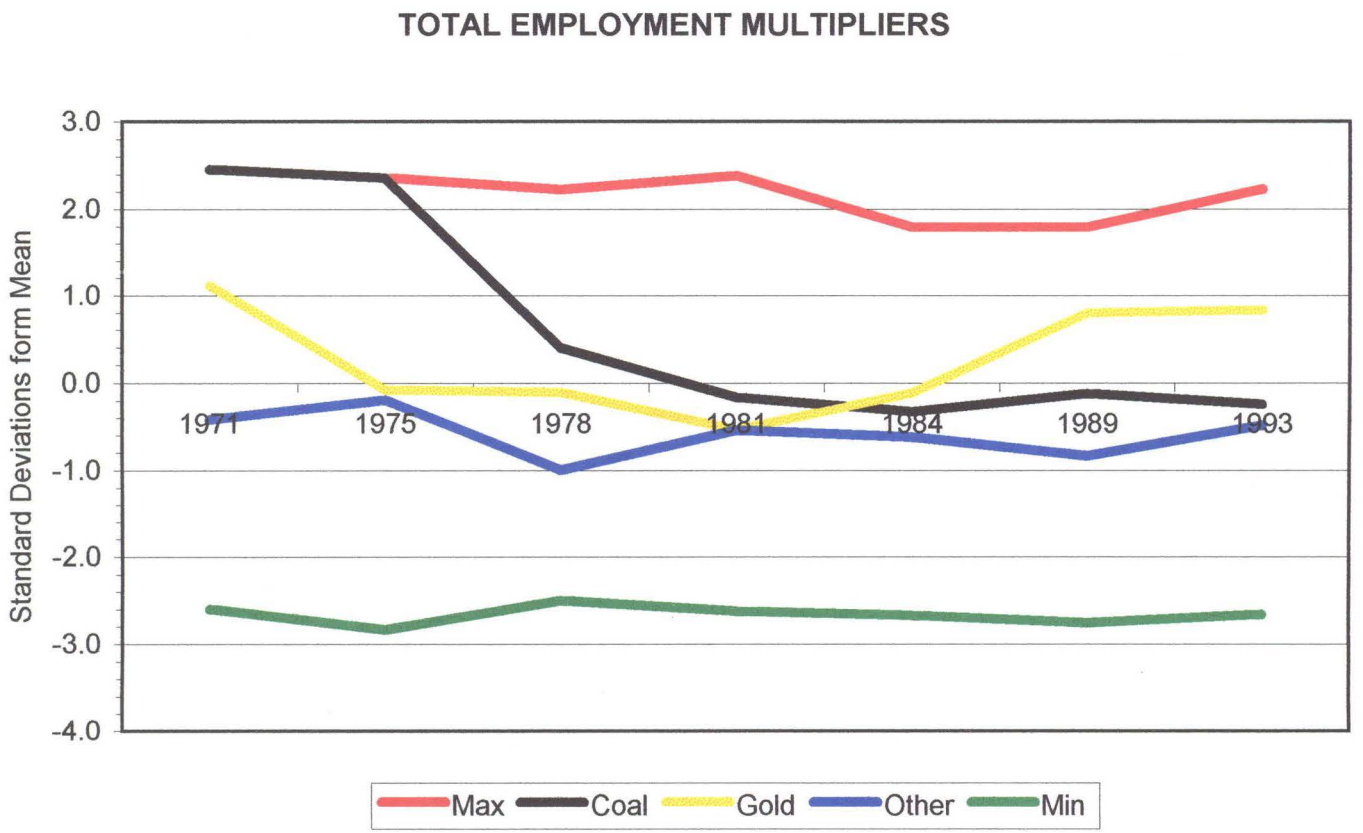
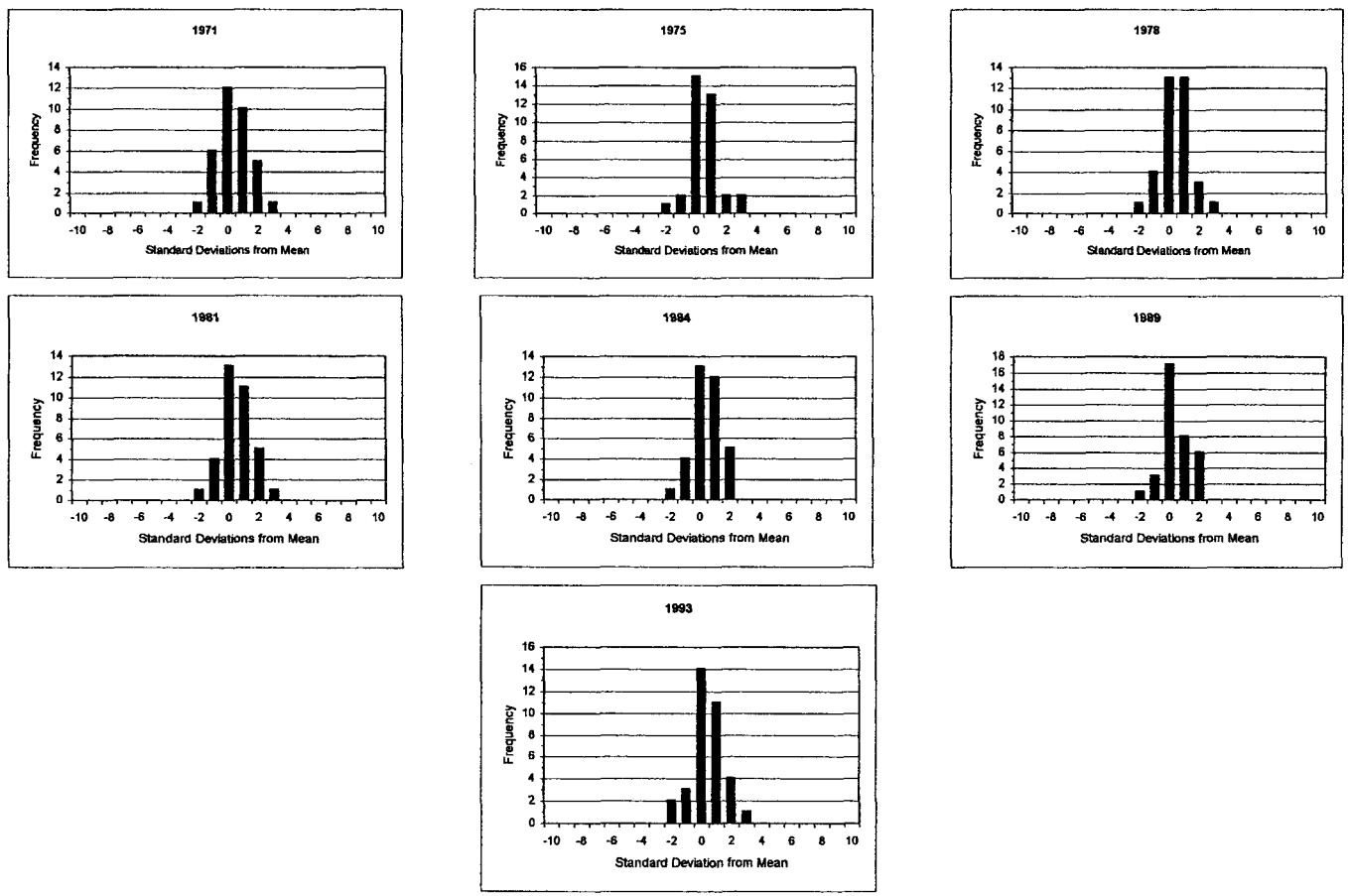


Figure 6.9 FREQUENCY DISTRIBUTIONS TOTAL EMPLOYMENT MULTIPLIERS



6.5 Type II Total Employment Multipliers

Type II total employment multipliers, calculated in step 12 of the model, establish the link between employment in a sector and employment in the economy. They show the number of jobs created in the economy for every job created in the sector. Because they are total multipliers they show direct, indirect and induced effects.

6.5.1 Relative importance

Table 6.28 summarises the relative positions of the three mining sectors. Tables 6.29 to 6.35 show the relative positions of all thirty-five type II total employment multipliers in the economy for each year, i.e., from 1971 to 1993. Figure 6.10 shows the time paths of type II total employment multipliers for the mining sectors, as well as the mean.

Table 6.28 Ranking According to Type II Total Employment Multipliers
(1 = most important; 35 = least important)

	1971	1975	1978	1981	1984	1989	1993
Coal	34	34	32	29	27	27	19
Gold	33	33	34	34	34	34	34
Other	29	30	22	22	18	19	20

The results show that employment in the mining sectors, in comparison to other activities, had relatively little impact on employment in the rest of the economy during the period under review. In every year except 1971 and 1975, increased employment in the gold mining sector had less impact on employment in the rest of the economy than any other sector, except agriculture.

Notwithstanding the ranking of the sector, there has been a general trend of

increasing impact on employment in the economy by employment in the coal and other mining sectors. Conversely, there has been little change in the impact of employment in the gold mining sector. All three mining sector multipliers, however, remain below the mean.

Type II total employment multipliers are a truer indication of the value of the sector to the rest of the economy, in terms of job creation, than are the total employment Multipliers. An example illustrates this conclusion. The employment multiplier of, say, the gold mining industry in 1993 was 33.69, placing it in ninth position as a generator of employment. (Table 6.26). However, the type II total GDP multiplier (Table 6.17) places the gold mining sector third last in terms of income flowing back into the economy. This restricted flow of income value must offset the impact of increased employment in the gold mining sector, and the type II total employment multipliers show this result (Table 6.29). Likewise, higher coal mining and other mining type II total GDP multipliers show that employment in these sectors is worth more to the economy than in gold mining. The higher type II total employment multipliers confirms this result.

6.5.2 Arithmetic means and standard deviations of employment multipliers.

Table 6.36 shows the arithmetic means and standard deviations of each set of type II total employment multipliers. The range of standard deviations indicates no significant change in the impact of any multiplier during the period under review.

The largest multipliers in each year deviated positively from the mean by between 5.23 and 2.80 standard deviations. The smallest multiplier deviated by between –1.50 and –0.72 standard deviations.

The coal mining standard deviation ranged between –1.21 and –0.44, gold mining between -1.36 and –0.66, and other mining between –0.89 and –0.23.

Figure 6.11, as in previous sections, is an "envelope" of maximum and minimum deviations from the mean, and shows the position of the mining sectors within this envelope. The proximity of the gold mining multiplier to the minimum is evident.

Figure 6.12 is a graphic display showing the frequency of distribution around the mean of employment multipliers for all the sectors in each year. No mining type II total employment multipliers fall outside the mode.

TABLE 6.29

RANKING OF SECTORS BY TYPE II TOTAL EMPLOYMENT MULTIPLIERS	1971	Standard Deviations from Mean
MACHINERY AND EQUIPMENT RENTING AND LEASING	33.8880	IGNORE
JEWELLERY AND RELATED ARTICLES	14.1656	3.9396
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	9.5163	2.0363
REAL ESTATE	7.8316	1.3466
OTHER SERVICES, NON-PROFIT SEEKING	5.9804	0.5888
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	5.9099	0.5599
REMUNERATION OF EMPLOYEES	5.8709	0.5439
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	5.7056	0.4763
ELECTRICITY, GAS AND STEAM	5.7000	0.4740
BUILDING CONSTRUCTION	5.6870	0.4686
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	5.6852	0.4679
OTHERS,SCRAP AND GOVERNMENT SERVICES	5.2671	0.2967
ELECTRICAL MACHINERY AND APPLIANCES.	5.2564	0.2924
OTHER SERVICES, PROFIT SEEKING	5.2557	0.2921
PAPER, PRINTING AND PUBLISHING.	5.0627	0.2131
MOTOR VEHICLES, PARTS AND ACCESSORIES.	4.8917	0.1431
ENGINES,MACHINERY AND EQUIPMENT.	4.7674	0.0922
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	4.3390	-0.0832
FABRICATED METAL PRODUCTS.	4.3024	-0.0982
BUSINESS SERVICES	3.6716	-0.3564
OTHER MANUFACTURING INDUSTRIES	3.6155	-0.3794
TRANSPORT AND STORAGE	3.2974	-0.5096
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	3.2793	-0.5170
CIVIL ENGINEERING AND OTHER CONSTRUCTION	3.1435	-0.5726
WOOD AND FURNITURE.	3.1169	-0.5835
WATER SUPPLY	3.0959	-0.5921
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	2.9916	-0.6348
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.8264	-0.7024
OTHER MINING.	2.5090	-0.8324
CATERING AND ACCOMODATION SERVICES	2.4986	-0.8366
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	2.4443	-0.8589
COMMUNICATION	1.8777	-1.0908
GOLD MINING.	1.7766	-1.1322
COAL MINING.	1.6590	-1.1804
AGRICULTURE, FORESTRY AND FISHING.	1.4384	-1.2707

Arithmetic Mean (A.M.) [IGNORE MACHINE RENTING]	4.5423
Standard Deviation (S.D.)	2.4427

TABLE 6.30

RANKING OF SECTORS BY TYPE II TOTAL EMPLOYMENT MULTIPLIERS	1975	Standard Deviations from Mean
JEWELLERY AND RELATED ARTICLES	11.4341	3.1286
MACHINERY AND EQUIPMENT RENTING AND LEASING	10.2735	2.6138
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	9.0062	2.0517
REAL ESTATE	6.5030	0.9414
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	6.1966	0.8055
REMUNERATION OF EMPLOYEES	5.6971	0.5839
ELECTRICITY, GAS AND STEAM	5.5269	0.5084
ELECTRICAL MACHINERY AND APPLIANCES.	5.4462	0.4726
OTHER SERVICES, PROFIT SEEKING	5.1562	0.3440
OTHER SERVICES, NON-PROFIT SEEKING	5.0500	0.2969
PAPER, PRINTING AND PUBLISHING.	5.0440	0.2942
ENGINES,MACHINERY AND EQUIPMENT.	4.9581	0.2561
BUILDING CONSTRUCTION	4.8463	0.2065
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	4.8255	0.1973
MOTOR VEHICLES, PARTS AND ACCESSORIES.	4.8167	0.1934
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	4.4142	0.0149
FABRICATED METAL PRODUCTS.	4.2051	-0.0779
OTHERS,SCRAP AND GOVERNMENT SERVICES	4.0710	-0.1374
CIVIL ENGINEERING AND OTHER CONSTRUCTION	4.0222	-0.1590
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	3.9317	-0.1992
OTHER MANUFACTURING INDUSTRIES	3.3008	-0.4790
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	3.2445	-0.5040
WOOD AND FURNITURE.	3.2212	-0.5143
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	3.1032	-0.5666
TRANSPORT AND STORAGE	3.0278	-0.6001
BUSINESS SERVICES	2.8616	-0.6738
WATER SUPPLY	2.8311	-0.6873
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.7087	-0.7416
CATERING AND ACCOMODATION SERVICES	2.4234	-0.8682
OTHER MINING.	2.3722	-0.8909
COMMUNICATION	2.0342	-1.0408
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	1.9069	-1.0973
GOLD MINING.	1.7795	-1.1538
COAL MINING.	1.6430	-1.2143
AGRICULTURE, FORESTRY AND FISHING.	1.4416	-1.3037

Arithmetic Mean (A.M.)	4.3807
Standard Deviation (S.D.)	2.2545

TABLE 6.31

RANKING OF SECTORS BY TYPE II TOTAL EMPLOYMENT MULTIPLIERS	1978	Standard Deviations from Mean
JEWELLERY AND RELATED ARTICLES	16.7313	4.7950
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	8.0670	1.4563
REAL ESTATE	6.3285	0.7864
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	6.0713	0.6873
REMUNERATION OF EMPLOYEES	5.9890	0.6556
ELECTRICITY, GAS AND STEAM	5.5923	0.5028
MACHINERY AND EQUIPMENT RENTING AND LEASING	5.3824	0.4219
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	5.3326	0.4027
ENGINES,MACHINERY AND EQUIPMENT.	5.0168	0.2810
OTHER SERVICES, NON-PROFIT SEEKING	4.9399	0.2514
OTHER SERVICES, PROFIT SEEKING	4.9072	0.2388
MOTOR VEHICLES, PARTS AND ACCESSORIES.	4.8340	0.2106
PAPER, PRINTING AND PUBLISHING.	4.6503	0.1398
ELECTRICAL MACHINERY AND APPLIANCES.	4.6001	0.1204
FABRICATED METAL PRODUCTS.	4.4892	0.0777
BUILDING CONSTRUCTION	3.9363	-0.1353
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	3.8119	-0.1833
OTHERS,SCRAP AND GOVERNMENT SERVICES	3.7652	-0.2013
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	3.6182	-0.2579
CIVIL ENGINEERING AND OTHER CONSTRUCTION	3.5948	-0.2669
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	3.1564	-0.4359
OTHER MINING.	3.1111	-0.4533
BUSINESS SERVICES	3.0703	-0.4690
OTHER MANUFACTURING INDUSTRIES	3.0051	-0.4942
WOOD AND FURNITURE.	3.0009	-0.4958
WATER SUPPLY	2.8819	-0.5416
TRANSPORT AND STORAGE	2.8712	-0.5458
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	2.8650	-0.5481
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.6873	-0.6166
COMMUNICATION	2.2825	-0.7726
CATERING AND ACCOMODATION SERVICES	2.1516	-0.8230
COAL MINING.	1.9913	-0.8848
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	1.9226	-0.9113
GOLD MINING.	1.9141	-0.9146
AGRICULTURE, FORESTRY AND FISHING.	1.4943	-1.0763

Arithmetic Mean (A.M.)	4.2875
Standard Deviation (S.D.)	2.5952

TABLE 6.32

RANKING OF SECTORS BY TYPE II TOTAL EMPLOYMENT MULTIPLIERS	1981	Standard Deviations from Mean
JEWELLERY AND RELATED ARTICLES	9.2411	3.0855
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	8.1087	2.4326
REMUNERATION OF EMPLOYEES	6.1220	1.2872
REAL ESTATE	5.7458	1.0704
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	5.7451	1.0700
OTHER SERVICES, PROFIT SEEKING	5.4026	0.8725
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	5.2134	0.7634
ENGINES,MACHINERY AND EQUIPMENT.	5.1630	0.7344
MOTOR VEHICLES, PARTS AND ACCESSORIES.	5.0836	0.6886
ELECTRICITY, GAS AND STEAM	4.7273	0.4832
OTHER SERVICES, NON-PROFIT SEEKING	4.7220	0.4801
FABRICATED METAL PRODUCTS.	4.5276	0.3680
PAPER, PRINTING AND PUBLISHING.	4.4665	0.3328
ELECTRICAL MACHINERY AND APPLIANCES.	4.4432	0.3194
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	4.1645	0.1587
BUILDING CONSTRUCTION	3.7391	-0.0866
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	3.6092	-0.1615
CIVIL ENGINEERING AND OTHER CONSTRUCTION	3.3749	-0.2965
MACHINERY AND EQUIPMENT RENTING AND LEASING	3.1675	-0.4161
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	3.1638	-0.4182
OTHERS,SCRAP AND GOVERNMENT SERVICES	3.0699	-0.4724
OTHER MINING.	3.0506	-0.4835
WOOD AND FURNITURE.	2.9172	-0.5604
TRANSPORT AND STORAGE	2.8123	-0.6209
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	2.7133	-0.6780
WATER SUPPLY	2.7018	-0.6846
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.6703	-0.7028
BUSINESS SERVICES	2.4654	-0.8209
COAL MINING.	2.3199	-0.9048
COMMUNICATION	2.0923	-1.0360
OTHER MANUFACTURING INDUSTRIES	2.0893	-1.0377
CATERING AND ACCOMODATION SERVICES	1.9983	-1.0902
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	1.9012	-1.1462
GOLD MINING.	1.8993	-1.1473
AGRICULTURE, FORESTRY AND FISHING.	1.4919	-1.3821

Arithmetic Mean (A.M.)	3.8893
Standard Deviation (S.D.)	1.7345

TABLE 6.33

RANKING OF SECTORS BY TYPE II TOTAL EMPLOYMENT MULTIPLIERS	1984	Standard Deviations from Mean
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	8.7399	2.7969
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	7.2938	1.9285
REMUNERATION OF EMPLOYEES	6.8554	1.6653
REAL ESTATE	6.6185	1.5230
WATER SUPPLY	5.6814	0.9603
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	5.5889	0.9047
MOTOR VEHICLES, PARTS AND ACCESSORIES.	5.5481	0.8802
JEWELLERY AND RELATED ARTICLES	5.4500	0.8213
ELECTRICITY, GAS AND STEAM	5.1181	0.6220
PAPER, PRINTING AND PUBLISHING.	5.0596	0.5869
OTHER SERVICES, NON-PROFIT SEEKING	4.9806	0.5394
ENGINES,MACHINERY AND EQUIPMENT.	4.9243	0.5056
OTHER SERVICES, PROFIT SEEKING	4.5374	0.2733
ELECTRICAL MACHINERY AND APPLIANCES.	4.4512	0.2215
MACHINERY AND EQUIPMENT RENTING AND LEASING	4.3322	0.1501
FABRICATED METAL PRODUCTS.	4.2686	0.1119
BUILDING CONSTRUCTION	3.8504	-0.1393
OTHER MINING.	3.6967	-0.2316
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	3.6133	-0.2817
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	3.6059	-0.2861
CIVIL ENGINEERING AND OTHER CONSTRUCTION	3.5777	-0.3030
OTHERS,SCRAP AND GOVERNMENT SERVICES	3.1541	-0.5574
TRANSPORT AND STORAGE	3.0970	-0.5917
WOOD AND FURNITURE.	2.9535	-0.6779
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	2.7155	-0.8208
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	2.7094	-0.8245
COAL MINING.	2.6536	-0.8580
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.5787	-0.9029
OTHER MANUFACTURING INDUSTRIES	2.5178	-0.9395
CATERING AND ACCOMODATION SERVICES	2.3626	-1.0327
BUSINESS SERVICES	2.3440	-1.0439
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	2.2411	-1.1057
COMMUNICATION	2.2191	-1.1189
GOLD MINING.	1.9518	-1.2794
AGRICULTURE, FORESTRY AND FISHING.	1.5912	-1.4959

Arithmetic Mean (A.M.)	4.0823
Standard Deviation (S.D.)	1.6653

TABLE 6.34

RANKING OF SECTORS BY TYPE II TOTAL EMPLOYMENT MULTIPLIERS	1989	Standard Deviations from Mean
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	7.1175	2.3868
REMUNERATION OF EMPLOYEES	6.9157	2.2466
JEWELLERY AND RELATED ARTICLES	6.4529	1.9249
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	5.6108	1.3397
REAL ESTATE	5.2721	1.1043
OTHER SERVICES, PROFIT SEEKING	5.1834	1.0427
MOTOR VEHICLES, PARTS AND ACCESSORIES.	5.0455	0.9468
ELECTRICITY, GAS AND STEAM	5.0164	0.9266
OTHER SERVICES, NON-PROFIT SEEKING	4.9208	0.8602
PAPER, PRINTING AND PUBLISHING.	4.8042	0.7791
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	4.5389	0.5947
WATER SUPPLY	4.3532	0.4657
MACHINERY AND EQUIPMENT RENTING AND LEASING	4.0650	0.2654
ELECTRICAL MACHINERY AND APPLIANCES.	3.5796	-0.0719
ENGINES,MACHINERY AND EQUIPMENT.	3.5563	-0.0881
BUILDING CONSTRUCTION	3.2926	-0.2714
FABRICATED METAL PRODUCTS.	3.2363	-0.3105
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	3.1701	-0.3565
OTHER MINING.	3.0996	-0.4055
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	2.9587	-0.5034
OTHERS,SCRAP AND GOVERNMENT SERVICES	2.9556	-0.5056
TRANSPORT AND STORAGE	2.8153	-0.6031
CIVIL ENGINEERING AND OTHER CONSTRUCTION	2.8132	-0.6046
WOOD AND FURNITURE.	2.6585	-0.7121
OTHER MANUFACTURING INDUSTRIES	2.6314	-0.7309
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	2.5908	-0.7591
COAL MINING.	2.5580	-0.7819
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	2.5474	-0.7893
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.5151	-0.8117
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	2.4523	-0.8554
CATERING AND ACCOMODATION SERVICES	2.3524	-0.9248
BUSINESS SERVICES	2.2080	-1.0252
COMMUNICATION	2.1519	-1.0642
GOLD MINING.	1.9513	-1.2036
AGRICULTURE, FORESTRY AND FISHING.	1.5182	-1.5046

Arithmetic Mean (A.M.)	3.6831
Standard Deviation (S.D.)	1.4389

TABLE 6.35

RANKING OF SECTORS BY TYPE II TOTAL EMPLOYMENT MULTIPLIERS	1993	Standard Deviations from Mean
REMUNERATION OF EMPLOYEES	7.8997	2.3818
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	7.4980	2.1336
WATER SUPPLY	7.0408	1.8511
OTHER SERVICES, PROFIT SEEKING	6.4266	1.4717
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	6.0741	1.2539
OTHER SERVICES, NON-PROFIT SEEKING	5.8331	1.1050
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	5.6806	1.0108
MOTOR VEHICLES, PARTS AND ACCESSORIES.	5.6142	0.9698
ELECTRICITY, GAS AND STEAM	5.5355	0.9211
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	4.8598	0.5037
MACHINERY AND EQUIPMENT RENTING AND LEASING	4.8137	0.4752
ENGINES,MACHINERY AND EQUIPMENT.	4.4147	0.2287
PAPER, PRINTING AND PUBLISHING.	4.3795	0.2069
REAL ESTATE	4.3299	0.1763
CATERING AND ACCOMODATION SERVICES	4.2578	0.1318
JEWELLERY AND RELATED ARTICLES	3.7809	-0.1629
BUILDING CONSTRUCTION	3.3626	-0.4213
TRANSPORT AND STORAGE	3.3478	-0.4305
COAL MINING.	3.3272	-0.4432
OTHER MINING.	3.2920	-0.4649
FABRICATED METAL PRODUCTS.	3.2848	-0.4694
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	3.2187	-0.5102
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.9162	-0.6971
COMMUNICATION	2.8783	-0.7205
BUSINESS SERVICES	2.8682	-0.7268
CIVIL ENGINEERING AND OTHER CONSTRUCTION	2.8373	-0.7459
OTHER MANUFACTURING INDUSTRIES	2.7494	-0.8002
ELECTRICAL MACHINERY AND APPLIANCES.	2.7062	-0.8268
OTHERS,SCRAP AND GOVERNMENT SERVICES	2.6921	-0.8356
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	2.5812	-0.9041
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	2.5658	-0.9136
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	2.5419	-0.9284
WOOD AND FURNITURE.	2.5299	-0.9358
GOLD MINING.	1.8380	-1.3632
AGRICULTURE, FORESTRY AND FISHING.	1.5826	-1.5210

Arithmetic Mean (A.M.)	4.0445
Standard Deviation (S.D.)	1.6186

Table 6.36 Statistical Analysis - Type II Total Employment Multipliers

	1971	1975	1978	1981	1984	1989	1993
Arithmetic Mean (A.M.)	4.5423	4.3807	4.2875	3.8893	4.0823	3.6831	4.0445
Standard Deviation (S.D.)	2.4427	2.2545	2.5952	1.7345	1.6653	1.4389	1.6186
Standard Deviations of largest multiplier from AM	12.0137	3.1286	4.7950	3.0855	2.7969	2.3868	2.3818
Standard Deviations of coal mining from AM.	-1.1804	-1.2143	-0.8848	-0.9048	-0.8580	-0.7819	-0.4432
Standard Deviations of gold mining from AM.	-1.1322	-1.1538	-0.9146	-1.1473	-1.2794	-1.2036	-1.3632
Standard Deviations of other mining from AM.	-0.8324	-0.8909	-0.4533	-0.4835	-0.2316	-0.4055	-0.4649
Standard Deviations of smallest multiplier from AM	-1.2707	-1.3037	-1.0763	-1.3821	-1.4959	-1.5046	-1.5210
Is coal mining multiplier greater/less than AM?	less	less	less	less	less	less	less
Is gold mining multiplier greater/less than AM?	less	less	less	less	less	less	less
Is other mining multiplier greater/less than AM?	less	less	less	less	less	less	less
Number of multipliers greater than coal mining.	33	33	31	28	26	26	18
Number of multipliers greater than gold mining.	32	32	33	33	33	33	33

Figure 6.10 **TYPE II TOTAL EMPLOYMENT MULTIPLIERS**

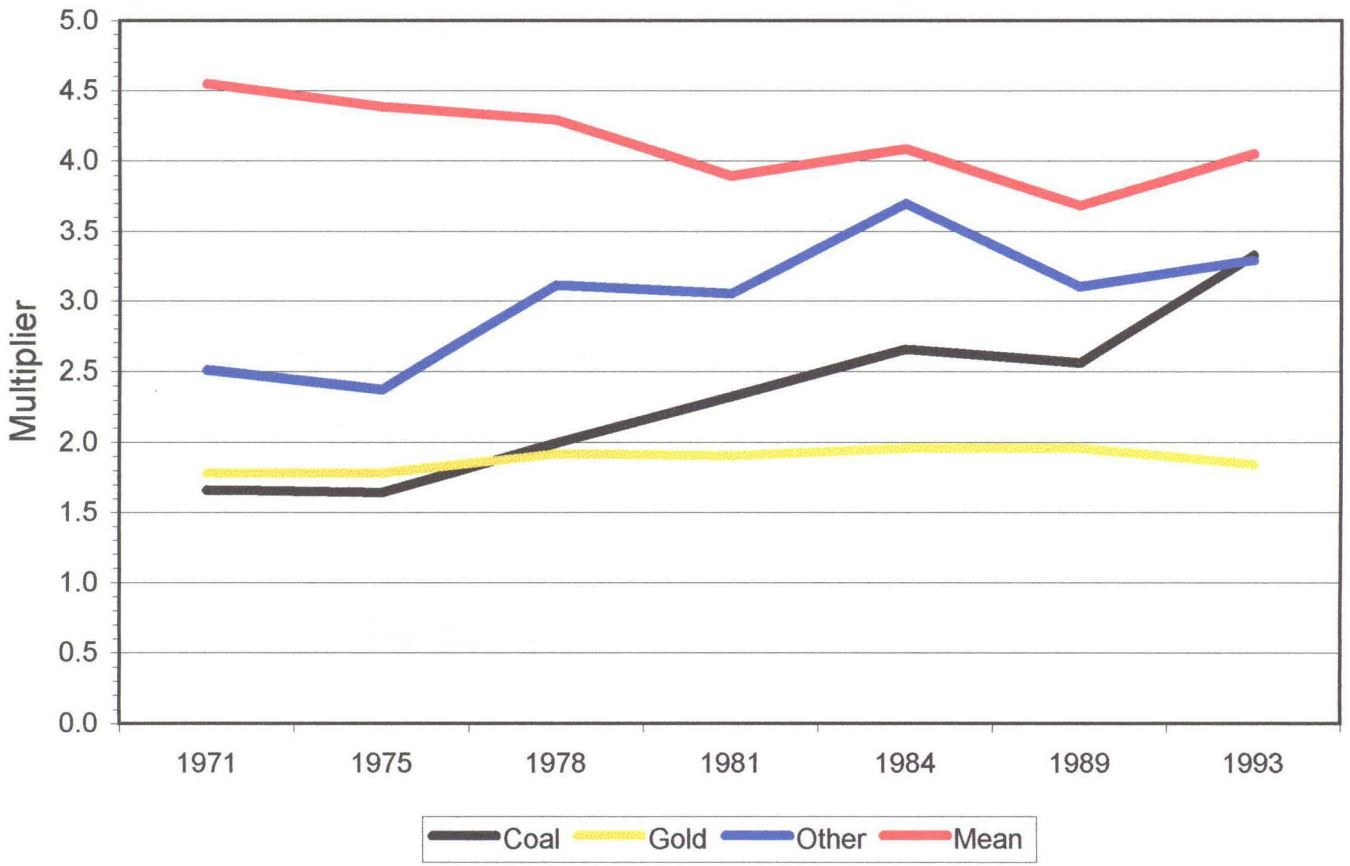


Figure 6.11 **STANDARD DEVIATIONS FROM MEAN**

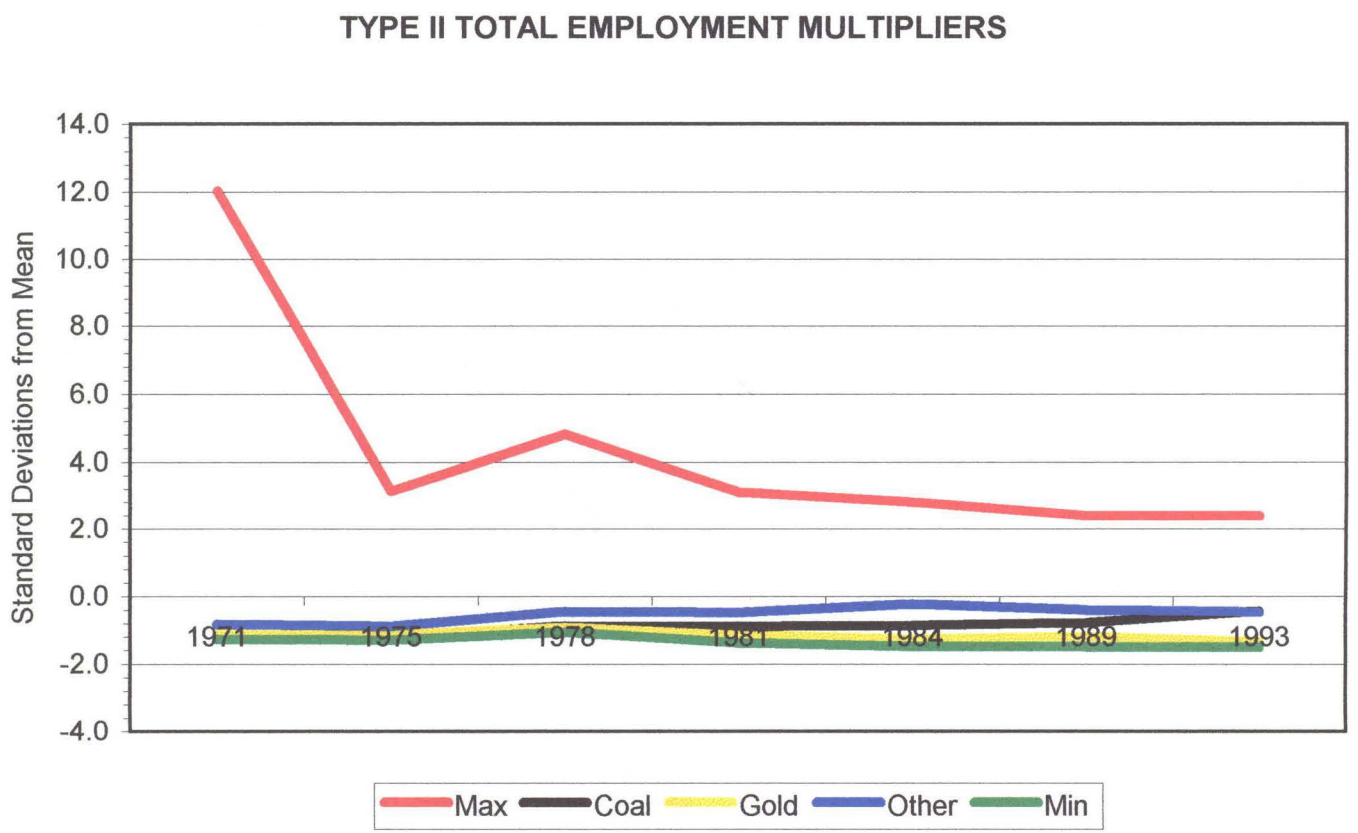
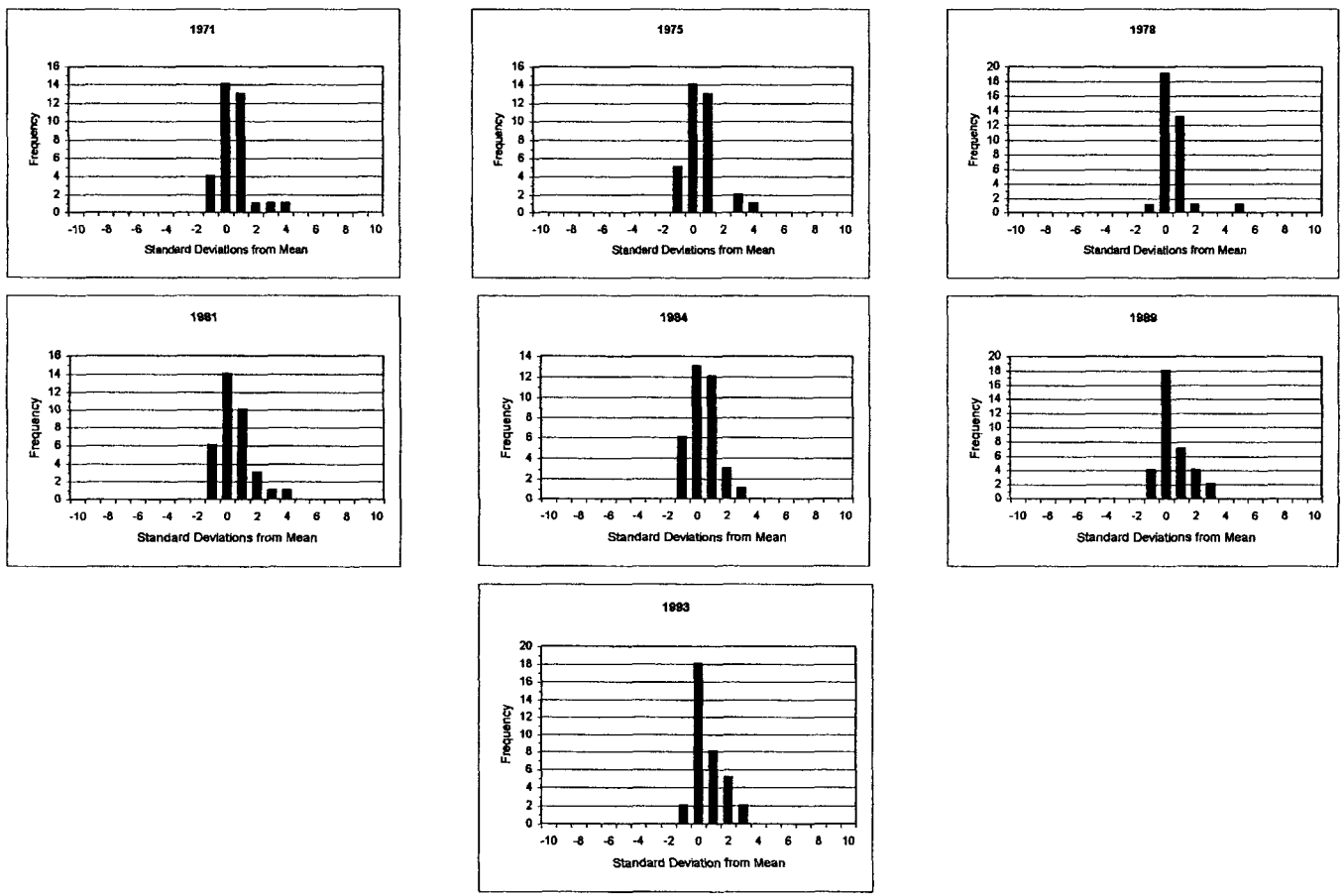


Figure 6.12 **FREQUENCY DISTRIBUTIONS TYPE II TOTAL EMPLOYMENT MULTIPLIERS**



6.6 Tests for Significant Differences

The object is to show any significant difference between the impact, on GDP and employment, of output from each of the three mining sectors and output from each other activity in the economy. This will confirm the relative rankings of the sectors. Student's *t* distribution tests the *difference between the sectors*, expressed in the null hypothesis "There has been no significant difference between the impact of mining sector output and the output from each other sector on either GDP or employment".

The tests compare a set of one of the four multipliers for the three mining sectors to the corresponding multiplier set for all the other sectors.

For example, one set contains the coal mining total GDP multipliers for each year, i.e.:

1971 – 1.578
1975 – 1.555
1978 – 1.380
1981 – 1.335
1984 – 1.410
1989 – 1.348
1993 – 1.388

Another set contains the agricultural, forestry and fishing total GDP multipliers for the same years, i.e.:

1971 – 1.279
1975 – 1.206
1978 – 1.235
1981 – 1.128
1984 – 1.250
1989 – 1.200
1993 – 1.306

The set of total GDP multipliers for the coal mining sector is compared to the set of total GDP multipliers for the agricultural, forestry and fishing sector.

The arithmetic mean of the coal mining set is 1.428, and that of the agriculture, forestry and fishing set is 1.229. The standard deviations are 0.091 and 0.054, respectively. There are twelve degrees of freedom, ν, because there are seven observations, N, and one population parameter, k, required to be estimated in each set, i.e.:

$$\nu = N - k \qquad (6.1)$$

When the coal mining set is compared to the agriculture, forestry and fishing set Student's t is calculated to be 4.590. This falls outside the range +/- 2.179, at 0.05 level of significance (i.e., five chances in one hundred of being wrong) and twelve degrees of freedom.

The conclusion is, therefore that there is a significant difference between the impact of an increase in coal mining output and the impact of an increase in output from the agriculture, forestry and fishing sector on GDP.

Because the calculated value of t is greater than the positive limit of the range, i.e., greater than +2.179, it shows that the mean impact of the coal mining sector is significantly greater than the mean impact of the agricultural, forestry and fishing sector during the period under review. If the calculated value of t had been less than the negative limit of the range, i.e., less than –2.179, the conclusion would be that the mean impact of the coal mining sector was significantly less than the mean impact of the agricultural, forestry and fishing sector.

There are 140 sets of multipliers, i.e., one for each of the four multipliers in each of the 35 sectors in the economy. Each set of total GDP multipliers, type II GDP multipliers, total employment multipliers and type II total employment multipliers for the coal, gold and other mining sectors is compared to each other sector in the economy. In other words, the tests compare sets of multipliers, for each of the three

mining sectors, to a set of the same multiplier from each of the other sectors.

Table 6.37 collates the results of these tests. It shows, for each mining sector and multiplier, the number of sectors whose mean impact on GDP and employment is significantly greater or less, as well as the number of sectors whose mean impact is not significantly different. Tables 6.38, 6.39 and 6.40 summarise results of the tests for the coal, gold and other mining sectors the respectively. Tables 6.41, 6.42 and 6.43 contain the detailed tests.

Table 6.37 Number of sectors with significantly different mean impacts

Sectors with significantly greater or less mean impact than the mining sector concerned	GDPM	TYPE II GDPM	EM	TYPE II EM
COAL MINING				
Sectors significantly less	9	3	7	1
Sectors significantly greater	8	21	0	24
Sectors without significant difference	17	10	27	9
GOLD MINING				
Sectors significantly less	9	1	9	1
Sectors significantly greater	8	28	4	31
Sectors without significant difference	17	5	21	2
OTHER MINING				
Sectors significantly less	8	2	4	5
Sectors significantly greater	14	23	17	17
Sectors without significant difference	12	9	13	12

Table 6.38 Summary-Coal mining compared to all other sectors

Sector	Is null hypothesis rejected?			
	GDP Multipliers	Type II GDP Multipliers	Employment Multipliers	Type II Employment Multipliers
AGRICULTURE, FORESTRY AND FISHING.	Yes	No	No	Yes
GOLD MINING.	No	Yes	No	No
OTHER MINING.	No	No	No	Yes
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	Yes	Yes	No	Yes
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	Yes	Yes	No	No
WOOD AND FURNITURE.	No	Yes	No	Yes
PAPER, PRINTING AND PUBLISHING.	No	Yes	No	Yes
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	Yes	Yes	Yes	Yes
POTTERY,GLASS,REFRACTORY & OTHER NON-METALLICS.	No	Yes	No	Yes
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	No	Yes	No	Yes
FABRICATED METAL PRODUCTS.	No	Yes	No	Yes
ENGINES,MACHINERY AND EQUIPMENT.	No	Yes	No	Yes
ELECTRICAL MACHINERY AND APPLIANCES.	No	Yes	No	Yes
MOTOR VEHICLES, PARTS AND ACCESSORIES.	Yes	Yes	Yes	Yes
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	No	Yes	No	Yes
JEWELLERY AND RELATED ARTICLES	No	Yes	No	Yes
OTHER MANUFACTURING INDUSTRIES	No	Yes	No	No
ELECTRICITY, GAS AND STEAM	No	No	Yes	Yes
WATER SUPPLY	No	No	Yes	Yes
BUILDING CONSTRUCTION	Yes	Yes	No	Yes
CIVIL ENGINEERING AND OTHER CONSTRUCTION	No	Yes	No	Yes
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	Yes	No	No	No
CATERING AND ACCOMODATION SERVICES	No	Yes	No	No
TRANSPORT AND STORAGE	Yes	No	No	Yes
COMMUNICATION	Yes	No	No	No
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	Yes	Yes	No	Yes
REAL ESTATE	Yes	Yes	Yes	Yes
BUSINESS SERVICES	Yes	No	No	No
MACHINERY AND EQUIPMENT RENTING AND LEASING	Yes	No	Yes	No
MEDICAL, DENTAL, HEALTH & VETERINARY SERVICES	Yes	Yes	No	No
OTHER SERVICES, PROFIT SEEKING	Yes	No	Yes	Yes
OTHER SERVICES, NON-PROFIT SEEKING	Yes	Yes	No	Yes
OTHERS,SCRAP AND GOVERNMENT SERVICES	No	Yes	No	Yes
REMUNERATION OF EMPLOYEES	Yes	Yes	No	Yes

Table 6.39 Summary-Gold mining compared to all other sectors

Sector	Is null hypothesis rejected?			
	GDP Multipliers	Type II GDP Multipliers	Employment Multipliers	Type II Employment Multipliers
AGRICULTURE, FORESTRY AND FISHING.	Yes	No	Yes	Yes
COAL MINING.	No	Yes	No	No
OTHER MINING.	No	Yes	Yes	Yes
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	Yes	Yes	No	Yes
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	Yes	Yes	No	Yes
WOOD AND FURNITURE.	No	Yes	Yes	Yes
PAPER, PRINTING AND PUBLISHING.	No	Yes	No	Yes
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	Yes	Yes	Yes	Yes
POTTERY,GLASS,REFRACTORY & OTHER NON-METALLICS.	No	Yes	No	Yes
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	No	Yes	No	Yes
FABRICATED METAL PRODUCTS.	No	Yes	No	Yes
ENGINES,MACHINERY AND EQUIPMENT.	No	Yes	No	Yes
ELECTRICAL MACHINERY AND APPLIANCES.	No	Yes	No	Yes
MOTOR VEHICLES, PARTS AND ACCESSORIES.	Yes	Yes	Yes	Yes
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	No	Yes	No	Yes
JEWELLERY AND RELATED ARTICLES	No	Yes	No	Yes
OTHER MANUFACTURING INDUSTRIES	No	Yes	No	Yes
ELECTRICITY, GAS AND STEAM	No	Yes	Yes	Yes
WATER SUPPLY	No	Yes	Yes	Yes
BUILDING CONSTRUCTION	Yes	Yes	No	Yes
CIVIL ENGINEERING AND OTHER CONSTRUCTION	No	Yes	No	Yes
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	Yes	Yes	No	Yes
CATERING AND ACCOMODATION SERVICES	No	Yes	Yes	Yes
TRANSPORT AND STORAGE	Yes	Yes	No	Yes
COMMUNICATION	Yes	No	No	Yes
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	Yes	Yes	Yes	Yes
REAL ESTATE	Yes	Yes	Yes	Yes
BUSINESS SERVICES	Yes	No	No	Yes
MACHINERY AND EQUIPMENT RENTING AND LEASING	Yes	No	Yes	No
MEDICAL, DENTAL, HEALTH & VETERINARY SERVICES	Yes	No	Yes	Yes
OTHER SERVICES, PROFIT SEEKING	Yes	Yes	Yes	Yes
OTHER SERVICES, NON-PROFIT SEEKING	Yes	Yes	No	Yes
OTHERS,SCRAP AND GOVERNMENT SERVICES	No	Yes	No	Yes
REMUNERATION OF EMPLOYEES	Yes	Yes	No	Yes

Table 6.40 Summary-Other mining compared to all other sectors

Sector	Is null hypothesis rejected?			
	GDP Multipliers	Type II GDP Multipliers	Employment Multipliers	Type II Employment Multipliers
AGRICULTURE, FORESTRY AND FISHING.	Yes	No	Yes	Yes
COAL MINING.	No	No	No	Yes
GOLD MINING.	No	Yes	Yes	Yes
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	Yes	Yes	Yes	Yes
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	Yes	Yes	Yes	No
WOOD AND FURNITURE.	Yes	Yes	Yes	No
PAPER, PRINTING AND PUBLISHING.	No	Yes	No	Yes
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	Yes	Yes	Yes	Yes
POTTERY,GLASS,REFRACTORY & OTHER NON-METALLICS.	No	Yes	No	No
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	No	Yes	No	Yes
FABRICATED METAL PRODUCTS.	Yes	Yes	Yes	Yes
ENGINES,MACHINERY AND EQUIPMENT.	Yes	Yes	No	Yes
ELECTRICAL MACHINERY AND APPLIANCES.	No	Yes	No	Yes
MOTOR VEHICLES, PARTS AND ACCESSORIES.	Yes	Yes	No	Yes
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	Yes	Yes	Yes	Yes
JEWELLERY AND RELATED ARTICLES	No	Yes	No	Yes
OTHER MANUFACTURING INDUSTRIES	No	Yes	Yes	No
ELECTRICITY, GAS AND STEAM	No	No	Yes	Yes
WATER SUPPLY	No	Yes	No	No
BUILDING CONSTRUCTION	Yes	Yes	Yes	Yes
CIVIL ENGINEERING AND OTHER CONSTRUCTION	Yes	Yes	Yes	No
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	Yes	Yes	Yes	No
CATERING AND ACCOMODATION SERVICES	Yes	Yes	Yes	No
TRANSPORT AND STORAGE	Yes	No	No	No
COMMUNICATION	Yes	No	Yes	Yes
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	Yes	Yes	Yes	Yes
REAL ESTATE	Yes	Yes	Yes	Yes
BUSINESS SERVICES	Yes	No	No	No
MACHINERY AND EQUIPMENT RENTING AND LEASING	Yes	No	Yes	No
MEDICAL, DENTAL, HEALTH & VETERINARY SERVICES	No	No	No	Yes
OTHER SERVICES, PROFIT SEEKING	Yes	No	No	Yes
OTHER SERVICES, NON-PROFIT SEEKING	Yes	Yes	Yes	Yes
OTHERS,SCRAP AND GOVERNMENT SERVICES	No	Yes	Yes	No
REMUNERATION OF EMPLOYEES	Yes	Yes	Yes	Yes

Table 6.41 Detailed comparison: Coal mining to other sectors

GDP MULTIPLIERS	COAL MINING.	AGRICULTURE, FORESTRY AND FISHING.	GOLD MINING.	OTHER MINING.	FOOD, LIQUOR,BEVERAGES AND TOBACCO.	TEXTILES,CLOTHING,CORDAGE AND LEATHER.	WOOD AND FURNITURE.	PAPER, PRINTING AND PUBLISHING.	CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.
1971	1.5781	1.2791	1.5304	1.4204	1.3538	1.2734	1.5265	1.4749	1.2471
1975	1.5547	1.2063	1.3772	1.3679	1.2757	1.2499	1.4344	1.3196	0.9942
1978	1.380	1.235	1.380	1.287	1.295	1.269	1.464	1.339	0.974
1981	1.335	1.128	1.302	1.319	1.225	1.230	1.360	1.262	0.822
1984	1.410	1.250	1.415	1.418	1.288	1.373	1.477	1.401	1.187
1989	1.348	1.200	1.440	1.344	1.265	1.279	1.374	1.342	1.089
1993	1.388	1.306	1.581	1.392	1.378	1.396	1.498	1.452	1.177
Arithmetic Mean=	1.428	1.229	1.432	1.364	1.297	1.296	1.448	1.370	1.070
Standard Deviation=	0.091	0.054	0.089	0.047	0.049	0.058	0.058	0.070	0.138
sigma=		0.081	0.097	0.078	0.079	0.083	0.082	0.088	0.126
Student's t=		4.590	-0.088	1.520	3.095	2.985	-0.459	1.228	5.297
Reject null hypothesis?		Yes	No	No	Yes	Yes	No	No	Yes
TYPE II GDP MULTIPLIERS									
1971	2.635	1.925	2.174	2.187	6.917	3.776	4.461	3.638	3.414
1975	2.125	1.896	1.671	2.158	6.552	3.949	4.290	3.426	3.740
1978	2.147	1.958	1.783	1.972	6.272	3.876	4.437	3.482	3.552
1981	2.088	1.883	1.641	2.255	6.063	3.564	3.760	3.377	3.284
1984	2.345	2.392	1.854	2.487	7.028	4.058	4.335	3.904	3.619
1989	2.435	2.045	2.226	2.104	5.683	3.445	3.705	3.351	3.239
1993	3.060	2.542	2.055	2.573	6.313	3.535	3.916	3.647	3.768
Arithmetic Mean=	2.405	2.092	1.915	2.248	6.404	3.743	4.129	3.546	3.517
Standard Deviation=	0.324	0.246	0.220	0.197	0.437	0.215	0.301	0.182	0.195
sigma=		0.310	0.299	0.289	0.415	0.297	0.338	0.284	0.289
Student's t=		1.889	3.068	1.016	-18.020	-8.434	-9.556	-7.530	-7.206
Reject null hypothesi?		No	Yes	No	Yes	Yes	Yes	Yes	Yes
EMPLOYMENT MULTIPLIERS									
1971	69.494	58.251	53.753	35.787	46.750	41.232	52.405	36.568	28.241
1975	56.032	51.608	33.849	32.821	40.284	37.966	44.284	29.285	21.226
1978	40.543	53.593	35.080	25.354	42.616	42.672	52.706	32.463	21.016
1981	30.577	44.601	27.106	27.040	36.387	38.286	41.477	28.098	15.940
1984	28.714	46.969	30.527	26.131	35.771	40.153	42.622	28.612	20.302
1989	28.650	43.412	35.720	23.051	34.429	37.918	40.330	26.235	18.694
1993	24.837	45.148	33.694	22.845	33.810	33.831	39.982	26.311	18.578
Arithmetic Mean=	39.835	49.083	35.675	27.575	38.578	38.865	44.829	29.653	20.571
Standard Deviation=	15.593	5.113	7.877	4.553	4.450	2.649	5.065	3.427	3.555
sigma=		12.533	13.343	12.406	12.385	12.080	12.522	12.193	12.215
Student's t=		-1.380	0.583	1.849	0.190	0.150	-0.746	1.562	2.951
Reject null hypothesis?		No	No	No	No	No	No	No	Yes
TYPE II EMPLOYMENT. MULTIPLIERS									
1971	1.659	1.438	1.777	2.509	9.516	2.992	3.117	5.063	5.685
1975	1.643	1.442	1.780	2.372	9.006	3.103	3.221	5.044	6.197
1978	1.991	1.494	1.914	3.111	8.067	2.865	3.001	4.650	6.071
1981	2.320	1.492	1.899	3.051	8.109	2.713	2.917	4.467	5.745
1984	2.654	1.591	1.952	3.697	8.740	2.716	2.954	5.060	7.294
1989	2.558	1.518	1.951	3.100	7.118	2.452	2.659	4.804	5.611
1993	3.327	1.583	1.838	3.292	7.498	2.566	2.530	4.380	5.681
Arithmetic Mean=	2.307	1.508	1.873	3.019	8.293	2.772	2.914	4.781	6.040
Standard Deviation=	0.559	0.056	0.070	0.419	0.784	0.213	0.226	0.268	0.551
sigma=		0.429	0.430	0.533	0.735	0.457	0.460	0.473	0.599
Student's t=		3.486	1.890	-2.495	-15.230	-1.905	-2.466	-9.777	-11.656
Reject null hypothesis?		Yes	No	Yes	Yes	No	Yes	Yes	Yes

Table 6.41 (continued)

GDP MULTIPLIERS	POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	FABRICATED METAL PRODUCTS.	ENGINES,MACHINERY AND EQUIPMENT.	ELECTRICAL MACHINERY AND APPLIANCES.	MOTOR VEHICLES, PARTS AND ACCESSORIES.	RAILWAY AND OTHER TRANSPORT EQUIPMENT.	JEWELLERY AND RELATED ARTICLES	OTHER MANUFACTURING INDUSTRIES
1971	1.4772	1.4781	1.5534	1.4854	1.4069	1.1073	1.5121	1.5432	1.4896
1975	1.3904	1.3798	1.4331	1.3882	1.3064	1.088	1.4236	1.3612	1.3996
1978	1.390	1.385	1.498	1.441	1.401	1.021	1.441	1.341	1.370
1981	1.351	1.367	1.424	1.434	1.285	1.030	1.456	1.332	1.314
1984	1.424	1.390	1.503	1.490	1.393	1.206	1.614	1.474	1.405
1989	1.311	1.250	1.367	1.337	1.302	1.207	1.541	1.329	1.322
1993	1.443	1.383	1.481	1.467	1.447	1.329	1.596	0.937	1.414
Arithmetic Mean=	1.398	1.376	1.466	1.434	1.363	1.141	1.512	1.331	1.388
Standard Deviation=	0.052	0.062	0.057	0.051	0.059	0.103	0.070	0.178	0.056
sigma=	0.080	0.084	0.082	0.080	0.083	0.105	0.088	0.153	0.081
Student's t=	0.692	1.145	-0.867	-0.162	1.457	5.094	-1.804	1.180	0.915
Reject null hypothesis?	No	No	No	No	No	Yes	No	No	No
TYPE II GDP MULTIPLIERS									
1971	3.386	3.988	4.195	3.807	4.238	4.477	4.562	6.804	3.649
1975	3.269	3.327	4.038	3.458	4.078	4.320	3.822	6.006	3.292
1978	3.267	3.801	4.721	3.863	3.843	4.680	4.021	4.936	3.487
1981	3.017	3.884	4.038	3.599	3.522	4.243	4.156	6.778	3.752
1984	3.666	4.345	4.727	4.060	3.938	5.518	3.188	5.424	4.133
1989	2.757	3.060	3.617	3.360	3.277	4.019	2.928	9.274	2.677
1993	2.834	2.870	3.755	3.374	3.198	4.331	3.573	6.923	3.032
Arithmetic Mean=	3.171	3.611	4.156	3.646	3.728	4.512	3.750	6.592	3.432
Standard Deviation=	0.297	0.496	0.401	0.250	0.372	0.452	0.525	1.300	0.446
sigma=	0.336	0.453	0.393	0.312	0.376	0.424	0.471	1.023	0.421
Student's t=	-4.269	-4.985	-8.325	-7.432	-6.576	-9.293	-5.345	-7.654	-4.563
Reject null hypothesi?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
EMPLOYMENT MULTIPLIERS									
1971	40.597	36.318	40.746	37.016	35.121	28.727	38.193	38.129	40.725
1975	34.879	30.642	33.856	30.068	28.931	25.614	33.657	30.014	35.718
1978	36.085	31.629	38.148	34.442	34.148	26.340	38.532	25.815	39.801
1981	30.726	29.002	31.651	30.512	27.894	22.879	35.402	27.864	45.497
1984	30.236	27.151	32.565	30.301	28.734	25.945	39.244	30.206	39.058
1989	29.177	22.539	29.531	27.836	26.590	24.031	34.860	26.199	29.521
1993	28.128	20.380	27.584	24.361	29.263	22.484	25.907	18.971	28.214
Arithmetic Mean=	32.833	28.237	33.440	30.648	30.097	25.146	35.114	28.171	36.933
Standard Deviation=	4.170	5.050	4.297	3.833	2.993	2.020	4.230	5.357	5.768
sigma=	12.328	12.518	12.353	12.264	12.127	12.009	12.340	12.592	12.698
Student's t=	1.063	1.733	0.969	1.401	1.502	2.288	0.716	1.733	0.428
Reject null hypothesis?	No	No	No	No	No	Yes	No	No	No
TYPE II EMPLOYMENT. MULTIPLIERS									
1971	3.279	5.706	4.302	4.767	5.256	4.892	5.910	14.166	3.616
1975	3.245	4.826	4.205	4.958	5.446	4.817	4.414	11.434	3.301
1978	3.156	5.333	4.489	5.017	4.600	4.834	3.812	16.731	3.005
1981	3.164	5.213	4.528	5.163	4.443	5.084	4.165	9.241	2.089
1984	3.613	5.589	4.269	4.924	4.451	5.548	2.709	5.450	2.518
1989	2.591	4.539	3.236	3.556	3.580	5.046	2.959	6.453	2.631
1993	2.581	4.860	3.285	4.415	2.706	5.614	6.074	3.781	2.749
Arithmetic Mean=	3.090	5.152	4.045	4.686	4.355	5.119	4.292	9.608	2.844
Standard Deviation=	0.349	0.397	0.508	0.510	0.878	0.307	1.215	4.411	0.472
sigma=	0.503	0.523	0.577	0.578	0.795	0.487	1.022	3.396	0.559
Student's t=	-2.910	-10.170	-5.638	-7.698	-4.818	-10.603	-3.634	-4.022	-1.798
Reject null hypothesis?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No

Table 6.41 (continued)

GDP MULTIPLIERS	ELECTRICITY, GAS AND STEAM	WATER SUPPLY	BUILDING CONSTRUCTION	CIVIL ENGINEERING AND OTHER CONSTRUCTION	WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	CATERING AND ACCOMODATION SERVICES	TRANSPORT AND STORAGE	COMMUNICATION	FINANCIAL INSTITUTIONS AND INSURANCE SERVICES
1971	1.4216	1.3489	1.5735	1.5534	1.6639	1.5029	1.7907	1.8404	2.2424
1975	1.4469	1.309	1.5558	1.4957	1.5407	1.4535	1.6034	1.6657	1.8893
1978	1.296	1.262	1.582	1.508	1.593	1.457	1.517	1.692	1.983
1981	1.289	1.231	1.485	1.444	1.494	1.377	1.492	1.610	1.877
1984	1.362	1.595	1.599	1.540	1.630	1.459	1.545	1.695	1.938
1989	1.325	1.284	1.401	1.386	1.519	1.379	1.455	1.506	1.853
1993	1.376	1.346	1.590	1.565	1.660	1.539	1.576	1.574	2.013
Arithmetic Mean=	1.359	1.339	1.541	1.499	1.586	1.452	1.568	1.655	1.971
Standard Deviation=	0.056	0.111	0.067	0.060	0.064	0.055	0.102	0.099	0.123
sigma=	0.082	0.110	0.086	0.083	0.085	0.081	0.104	0.103	0.117
Student's t=	1.561	1.499	-2.456	-1.602	-3.485	-0.574	-2.522	-4.142	-8.691
Reject null hypothesis?	No	No	Yes	No	Yes	No	Yes	Yes	Yes
TYPE II GDP MULTIPLIERS									
1971	2.273	2.261	5.717	5.471	2.680	3.927	2.250	2.154	3.810
1975	2.626	2.319	4.818	4.268	2.405	4.689	2.447	1.958	3.025
1978	2.225	2.375	5.022	4.606	2.595	4.632	2.276	2.165	3.499
1981	2.318	2.433	4.775	4.044	2.499	4.245	2.360	2.126	3.108
1984	2.433	2.839	4.848	4.587	2.513	4.624	2.603	2.107	3.401
1989	2.364	3.201	4.928	4.337	2.547	3.911	2.457	1.900	3.140
1993	2.493	3.522	5.234	4.175	2.885	4.060	2.767	2.298	3.941
Arithmetic Mean=	2.390	2.707	5.049	4.498	2.589	4.298	2.451	2.101	3.418
Standard Deviation=	0.128	0.457	0.308	0.440	0.144	0.320	0.170	0.124	0.330
sigma=	0.266	0.427	0.341	0.417	0.270	0.348	0.279	0.265	0.353
Student's t=	0.104	-1.322	-14.496	-9.390	-1.274	-10.186	-0.311	2.149	-5.368
Reject null hypothesi?	No	No	Yes	Yes	No	Yes	No	No	Yes
EMPLOYMENT MULTIPLIERS									
1971	27.716	28.118	43.434	50.586	41.567	56.034	40.738	61.792	58.718
1975	28.873	28.516	39.397	37.390	34.748	53.238	36.063	42.916	42.937
1978	21.445	26.522	46.719	41.822	40.590	60.402	35.820	45.822	53.513
1981	20.307	25.636	39.531	35.734	33.473	53.935	32.879	42.252	43.600
1984	19.776	25.174	39.097	36.285	34.097	46.569	30.457	37.499	42.237
1989	18.387	22.301	36.749	35.477	31.839	42.246	28.835	29.325	40.152
1993	16.494	18.113	36.901	33.789	29.008	30.373	26.161	24.601	40.407
Arithmetic Mean=	21.857	24.911	40.261	38.726	35.046	48.971	32.993	40.601	45.938
Standard Deviation=	4.330	3.370	3.339	5.370	4.200	9.413	4.595	11.194	6.686
sigma=	12.360	12.184	12.179	12.596	12.334	13.911	12.416	14.660	12.958
Student's t=	2.721	2.292	-0.065	0.165	0.726	-1.229	1.031	-0.098	-0.881
Reject null hypothesis?	Yes	Yes	No	No	No	No	No	No	No
TYPE II EMPLOYMENT. MULTIPLIERS									
1971	5.700	3.096	5.687	3.144	2.826	2.499	3.297	1.878	4.339
1975	5.527	2.831	4.846	4.022	2.709	2.423	3.028	2.034	3.932
1978	5.592	2.882	3.936	3.595	2.687	2.152	2.871	2.283	3.618
1981	4.727	2.702	3.739	3.375	2.670	1.998	2.812	2.092	3.609
1984	5.118	5.681	3.850	3.578	2.579	2.363	3.097	2.219	3.606
1989	5.016	4.353	3.293	2.813	2.515	2.352	2.815	2.152	3.170
1993	5.536	7.041	3.363	2.837	2.916	4.258	3.348	2.878	3.219
Arithmetic Mean=	5.317	4.084	4.102	3.338	2.700	2.578	3.038	2.219	3.642
Standard Deviation=	0.336	1.571	0.801	0.407	0.127	0.704	0.205	0.295	0.373
sigma=	0.498	1.273	0.746	0.528	0.438	0.686	0.455	0.483	0.513
Student's t=	-11.304	-2.610	-4.502	-3.653	-1.680	-0.737	-3.008	0.341	-4.865
Reject null hypothesis?	Yes	Yes	Yes	Yes	No	No	Yes	No	Yes

Table 6.41 (continued)

GDP MULTIPLIERS	REAL ESTATE	BUSINESS SERVICES	MACHINERY AND EQUIPMENT RENTING AND LEASING	MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	OTHER SERVICES, PROFIT SEEKING	OTHER SERVICES, NON-PROFIT SEEKING	OTHERS,SCRAP AND GOVERNMENT SERVICES	REMUNERATION OF EMPLOYEES
1971	1.1626	1.5711	1.4565	1.3719	1.6046	2.0431	1.5328	1.3743
1975	1.1242	1.6201	1.2356	1.3027	1.6001	1.8776	1.3867	1.2903
1978	1.133	1.651	1.200	1.303	1.533	1.881	1.349	1.305
1981	1.121	1.615	1.175	1.269	1.556	1.810	1.349	1.231
1984	1.158	1.662	1.229	1.326	1.344	1.845	1.512	1.320
1989	1.133	1.604	1.169	1.344	1.594	1.839	1.376	1.251
1993	1.112	1.612	1.170	1.420	1.641	1.826	1.543	1.354
Arithmetic Mean=	1.135	1.619	1.233	1.334	1.553	1.874	1.436	1.304
Standard Deviation=	0.017	0.028	0.095	0.047	0.091	0.073	0.083	0.048
sigma=	0.071	0.073	0.100	0.078	0.098	0.089	0.094	0.079
Student's t=	7.733	-4.935	3.621	2.244	-2.389	-9.386	-0.160	2.952
Reject null hypothesis?	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
TYPE II GDP MULTIPLIERS								
1971	1.514	1.870	317.563	1.922	2.385	2.697	13.726	15.802
1975	1.368	2.006	2.576	1.897	2.349	2.809	12.396	16.516
1978	1.360	2.039	1.656	1.902	2.428	2.856	10.784	15.064
1981	1.336	2.031	1.608	1.840	2.494	2.741	6.977	16.599
1984	1.415	2.202	1.799	1.939	2.098	3.102	6.698	16.585
1989	1.367	2.302	1.911	2.277	2.621	2.741	10.491	12.093
1993	1.230	2.371	1.697	2.429	2.886	3.392	10.669	13.317
Arithmetic Mean=	1.370	2.117	46.973	2.029	2.466	2.905	10.249	15.139
Standard Deviation=	0.079	0.166	110.468	0.211	0.226	0.235	2.406	1.654
sigma=	0.254	0.278	84.372	0.295	0.302	0.305	1.854	1.288
Student's t=	7.612	1.939	-0.988	2.383	-0.377	-3.066	-7.913	-18.503
Reject null hypothesi?	Yes	No	No	Yes	No	Yes	Yes	Yes
EMPLOYMENT MULTIPLIERS								
1971	10.228	27.202	33.189	29.978	28.164	44.571	44.928	40.924
1975	8.722	32.339	18.913	31.280	27.895	40.078	40.631	35.926
1978	9.025	34.630	14.670	32.565	28.246	43.685	43.460	38.844
1981	7.961	34.930	14.996	28.302	26.442	37.981	40.494	33.391
1984	8.452	35.653	15.050	24.270	17.948	36.268	40.405	31.897
1989	8.199	35.544	15.572	25.296	25.639	33.417	38.602	29.193
1993	5.011	25.094	10.438	23.613	21.485	29.309	38.959	26.512
Arithmetic Mean=	8.228	32.199	17.547	27.901	25.117	37.901	41.068	33.813
Standard Deviation=	1.481	3.999	6.782	3.295	3.653	5.061	2.142	4.764
sigma=	11.963	12.295	12.987	12.172	12.232	12.521	12.021	12.453
Student's t=	4.943	1.162	3.211	1.834	2.251	0.289	-0.192	0.905
Reject null hypothesis?	Yes	No	Yes	No	Yes	No	No	No
TYPE II EMPLOYMENT. MULTIPLIERS								
1971	7.832	3.672	33.888	2.444	5.256	5.980	5.267	5.871
1975	6.503	2.862	10.274	1.907	5.156	5.050	4.071	5.697
1978	6.329	3.070	5.382	1.923	4.907	4.940	3.765	5.989
1981	5.746	2.465	3.168	1.901	5.403	4.722	3.070	6.122
1984	6.619	2.344	4.332	2.241	4.537	4.981	3.154	6.855
1989	5.272	2.208	4.065	2.547	5.183	4.921	2.956	6.916
1993	4.330	2.868	4.814	2.542	6.427	5.833	2.692	7.900
Arithmetic Mean=	6.090	2.784	9.417	2.215	5.267	5.204	3.568	6.479
Standard Deviation=	1.030	0.464	10.216	0.280	0.540	0.456	0.823	0.727
sigma=	0.895	0.555	7.814	0.477	0.594	0.551	0.760	0.700
Student's t=	-7.908	-1.607	-1.702	0.362	-9.327	-9.840	-3.104	-11.144
Reject null hypothesis?	Yes	No	No	No	Yes	Yes	Yes	Yes

Table 6.42 Detailed comparison: Gold mining to other sectors

GDP MULTIPLIERS	GOLD MINING.	AGRICULTURE, FORESTRY AND FISHING.	COAL MINING.	OTHER MINING.	FOOD, LIQUOR,BEVERAGES AND TOBACCO.	TEXTILES,CLOTHING,CORDAGE AND LEATHER.	WOOD AND FURNITURE.	PAPER, PRINTING AND PUBLISHING.	CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.
1971	1.5304	1.2791	1.5781	1.4204	1.3538	1.2734	1.5265	1.4749	1.2471
1975	1.3772	1.2063	1.5547	1.3679	1.2757	1.2499	1.4344	1.3196	0.9942
1978	1.380	1.235	1.380	1.287	1.295	1.269	1.464	1.339	0.974
1981	1.302	1.128	1.335	1.319	1.225	1.230	1.360	1.262	0.822
1984	1.415	1.250	1.410	1.418	1.288	1.373	1.477	1.401	1.187
1989	1.440	1.200	1.348	1.344	1.265	1.279	1.374	1.342	1.089
1993	1.581	1.306	1.388	1.392	1.378	1.396	1.498	1.452	1.177
Arithmetic Mean=	1.432	1.229	1.428	1.364	1.297	1.296	1.448	1.370	1.070
Standard Deviation=	0.089	0.054	0.091	0.047	0.049	0.058	0.058	0.070	0.138
sigma=		0.079	0.097	0.076	0.077	0.081	0.081	0.086	0.125
Student's t=		4.793	0.088	1.666	3.274	3.150	-0.362	1.349	5.410
Reject null hypothesis?		Yes	No	No	Yes	Yes	No	No	Yes
TYPE II GDP MULTIPLIERS									
1971	2.174	1.925	2.635	2.187	6.917	3.776	4.461	3.638	3.414
1975	1.671	1.896	2.125	2.158	6.552	3.949	4.290	3.426	3.740
1978	1.783	1.958	2.147	1.972	6.272	3.876	4.437	3.482	3.552
1981	1.641	1.883	2.088	2.255	6.063	3.564	3.760	3.377	3.284
1984	1.854	2.392	2.345	2.487	7.028	4.058	4.335	3.904	3.619
1989	2.226	2.045	2.435	2.104	5.683	3.445	3.705	3.351	3.239
1993	2.055	2.542	3.060	2.573	6.313	3.535	3.916	3.647	3.768
Arithmetic Mean=	1.915	2.092	2.405	2.248	6.404	3.743	4.129	3.546	3.517
Standard Deviation=	0.220	0.246	0.324	0.197	0.437	0.215	0.301	0.182	0.195
sigma=		0.252	0.299	0.226	0.374	0.235	0.285	0.218	0.225
Student's t=		-1.313	-3.068	-2.763	-22.478	-14.537	-14.540	-13.982	-13.332
Reject null hypothesi?		No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
EMPLOYMENT MULTIPLIERS									
1971	53.753	58.251	69.494	35.787	46.750	41.232	52.405	36.568	28.241
1975	33.849	51.608	56.032	32.821	40.284	37.966	44.284	29.285	21.226
1978	35.080	53.593	40.543	25.354	42.616	42.672	52.706	32.463	21.016
1981	27.106	44.601	30.577	27.040	36.387	38.286	41.477	28.098	15.940
1984	30.527	46.969	28.714	26.131	35.771	40.153	42.622	28.612	20.302
1989	35.720	43.412	28.650	23.051	34.429	37.918	40.330	26.235	18.694
1993	33.694	45.148	24.837	22.845	33.810	33.831	39.982	26.311	18.578
Arithmetic Mean=	35.675	49.083	39.835	27.575	38.578	38.865	44.829	29.653	20.571
Standard Deviation=	7.877	5.113	15.593	4.553	4.450	2.649	5.065	3.427	3.555
sigma=		7.172	13.343	6.949	6.910	6.348	7.153	6.561	6.601
Student's t=		-3.497	-0.583	2.181	-0.786	-0.940	-2.394	1.717	4.281
Reject null hypothesis?		Yes	No	Yes	No	No	Yes	No	Yes
TYPE II EMPLOYMENT. MULTIPLIERS									
1971	1.777	1.438	1.659	2.509	9.516	2.992	3.117	5.063	5.685
1975	1.780	1.442	1.643	2.372	9.006	3.103	3.221	5.044	6.197
1978	1.914	1.494	1.991	3.111	8.067	2.865	3.001	4.650	6.071
1981	1.899	1.492	2.320	3.051	8.109	2.713	2.917	4.467	5.745
1984	1.952	1.591	2.654	3.697	8.740	2.716	2.954	5.060	7.294
1989	1.951	1.518	2.558	3.100	7.118	2.452	2.659	4.804	5.611
1993	1.838	1.583	3.327	3.292	7.498	2.566	2.530	4.380	5.681
Arithmetic Mean=	1.873	1.508	2.307	3.019	8.293	2.772	2.914	4.781	6.040
Standard Deviation=	0.070	0.056	0.559	0.419	0.784	0.213	0.226	0.268	0.551
sigma=		0.068	0.430	0.324	0.601	0.171	0.181	0.212	0.424
Student's t=		9.962	-1.890	-6.609	-19.978	-9.826	-10.784	-25.697	-18.387
Reject null hypothesis?		Yes	No	Yes	Yes	Yes	Yes	Yes	Yes

Table 6.42 (continued)

GDP MULTIPLIERS	POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	FABRICATED METAL PRODUCTS.	ENGINES,MACHINERY AND EQUIPMENT.	ELECTRICAL MACHINERY AND APPLIANCES.	MOTOR VEHICLES, PARTS AND ACCESSORIES.	RAILWAY AND OTHER TRANSPORT EQUIPMENT.	JEWELLERY AND RELATED ARTICLES	OTHER MANUFACTURING INDUSTRIES
1971	1.4772	1.4781	1.5534	1.4854	1.4069	1.1073	1.5121	1.5432	1.4896
1975	1.3904	1.3798	1.4331	1.3882	1.3064	1.088	1.4236	1.3612	1.3996
1978	1.390	1.385	1.498	1.441	1.401	1.021	1.441	1.341	1.370
1981	1.351	1.367	1.424	1.434	1.285	1.030	1.456	1.332	1.314
1984	1.424	1.390	1.503	1.490	1.393	1.206	1.614	1.474	1.405
1989	1.311	1.250	1.367	1.337	1.302	1.207	1.541	1.329	1.322
1993	1.443	1.383	1.461	1.467	1.447	1.329	1.596	0.937	1.414
Arithmetic Mean=	1.398	1.376	1.466	1.434	1.363	1.141	1.512	1.331	1.388
Standard Deviation=	0.052	0.062	0.057	0.051	0.059	0.103	0.070	0.178	0.056
sigma=	0.078	0.082	0.081	0.078	0.081	0.104	0.086	0.152	0.080
Student's t=	0.816	1.271	-0.778	-0.055	1.592	5.239	-1.737	1.243	1.041
Reject null hypothesis?	No	No	No	No	No	Yes	No	No	No
TYPE II GDP MULTIPLIERS									
1971	3.386	3.988	4.195	3.807	4.238	4.477	4.562	6.804	3.649
1975	3.269	3.327	4.038	3.458	4.078	4.320	3.822	6.006	3.292
1978	3.267	3.801	4.721	3.863	3.843	4.680	4.021	4.936	3.487
1981	3.017	3.884	4.038	3.599	3.522	4.243	4.156	6.778	3.752
1984	3.666	4.345	4.727	4.060	3.938	5.518	3.188	5.424	4.133
1989	2.757	3.060	3.617	3.360	3.277	4.019	2.928	9.274	2.677
1993	2.834	2.870	3.755	3.374	3.198	4.331	3.573	6.923	3.032
Arithmetic Mean=	3.171	3.611	4.156	3.646	3.728	4.512	3.750	6.592	3.432
Standard Deviation=	0.297	0.496	0.401	0.250	0.372	0.452	0.525	1.300	0.446
sigma=	0.283	0.415	0.349	0.255	0.330	0.384	0.435	1.007	0.380
Student's t=	-8.314	-7.649	-12.001	-12.721	-10.281	-12.665	-7.901	-8.688	-7.467
Reject null hypothesi?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
EMPLOYMENT MULTIPLIERS									
1971	40.597	36.318	40.746	37.016	35.121	28.727	38.193	38.129	40.725
1975	34.879	30.642	33.856	30.068	28.931	25.614	33.657	30.014	35.718
1978	36.085	31.629	38.148	34.442	34.148	26.340	38.532	25.815	39.801
1981	30.726	29.002	31.651	30.512	27.894	22.879	35.402	27.864	45.497
1984	30.236	27.151	32.565	30.301	28.734	25.945	39.244	30.206	39.058
1989	29.177	22.539	29.531	27.836	26.590	24.031	34.860	26.199	29.521
1993	28.128	20.380	27.584	24.361	29.263	22.484	25.907	18.971	28.214
Arithmetic Mean=	32.833	28.237	33.440	30.648	30.097	25.146	35.114	28.171	36.933
Standard Deviation=	4.170	5.050	4.297	3.833	2.993	2.020	4.230	5.357	5.768
sigma=	6.807	7.147	6.853	6.691	6.436	6.211	6.829	7.276	7.457
Student's t=	0.781	1.947	0.610	1.406	1.621	3.172	0.154	1.930	-0.316
Reject null hypothesis?	No	No	No	No	No	Yes	No	No	No
TYPE II EMPLOYMENT. MULTIPLIERS									
1971	3.279	5.706	4.302	4.767	5.256	4.892	5.910	14.166	3.616
1975	3.245	4.826	4.205	4.958	5.446	4.817	4.414	11.434	3.301
1978	3.156	5.333	4.489	5.017	4.600	4.834	3.812	16.731	3.005
1981	3.164	5.213	4.528	5.163	4.443	5.084	4.165	9.241	2.089
1984	3.613	5.589	4.269	4.924	4.451	5.548	2.709	5.450	2.518
1989	2.591	4.539	3.236	3.556	3.580	5.046	2.959	6.453	2.631
1993	2.581	4.860	3.285	4.415	2.706	5.614	6.074	3.781	2.749
Arithmetic Mean=	3.090	5.152	4.045	4.686	4.355	5.119	4.292	9.608	2.844
Standard Deviation=	0.349	0.397	0.508	0.510	0.878	0.307	1.215	4.411	0.472
sigma=	0.272	0.308	0.391	0.394	0.673	0.241	0.930	3.369	0.364
Student's t=	-8.381	-19.942	-10.382	-13.373	-6.900	-25.248	-4.868	-4.295	-4.986
Reject null hypothesis?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 6.42 (continued)

GDP MULTIPLIERS	ELECTRICITY, GAS AND STEAM	WATER SUPPLY	BUILDING CONSTRUCTION	CIVIL ENGINEERING AND OTHER CONSTRUCTION	WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	CATERING AND ACCOMODATION SERVICES	TRANSPORT AND STORAGE	COMMUNICATION	FINANCIAL INSTITUTIONS AND INSURANCE SERVICES
1971	1.4216	1.3489	1.5735	1.5534	1.6639	1.5029	1.7907	1.8404	2.2424
1975	1.4469	1.309	1.5558	1.4957	1.5407	1.4535	1.6034	1.6657	1.8893
1978	1.296	1.262	1.582	1.508	1.593	1.457	1.517	1.692	1.983
1981	1.289	1.231	1.485	1.444	1.494	1.377	1.492	1.610	1.877
1984	1.362	1.595	1.599	1.540	1.630	1.459	1.545	1.695	1.938
1989	1.325	1.284	1.401	1.386	1.519	1.379	1.455	1.506	1.853
1993	1.376	1.346	1.590	1.565	1.660	1.539	1.576	1.574	2.013
Arithmetic Mean=	1.359	1.339	1.541	1.499	1.586	1.452	1.568	1.655	1.971
Standard Deviation=	0.056	0.111	0.067	0.060	0.064	0.055	0.102	0.099	0.123
sigma=	0.080	0.109	0.085	0.082	0.083	0.080	0.103	0.101	0.116
Student's t=	1.699	1.595	-2.399	-1.529	-3.447	-0.478	-2.470	-4.110	-8.702
Reject null hypothesis?	No	No	Yes	No	Yes	No	Yes	Yes	Yes
TYPE II GDP MULTIPLIERS									
1971	2.273	2.261	5.717	5.471	2.680	3.927	2.250	2.154	3.810
1975	2.626	2.319	4.818	4.268	2.405	4.689	2.447	1.958	3.025
1978	2.225	2.375	5.022	4.606	2.595	4.632	2.276	2.165	3.499
1981	2.318	2.433	4.775	4.044	2.499	4.245	2.360	2.126	3.108
1984	2.433	2.839	4.848	4.587	2.513	4.624	2.603	2.107	3.401
1989	2.364	3.201	4.928	4.337	2.547	3.911	2.457	1.900	3.140
1993	2.493	3.522	5.234	4.175	2.885	4.060	2.767	2.298	3.941
Arithmetic Mean=	2.390	2.707	5.049	4.498	2.589	4.298	2.451	2.101	3.418
Standard Deviation=	0.128	0.457	0.308	0.440	0.144	0.320	0.170	0.124	0.330
sigma=	0.195	0.387	0.289	0.376	0.201	0.297	0.213	0.193	0.303
Student's t=	-4.569	-3.828	-20.270	-12.864	-6.277	-15.019	-4.725	-1.807	-9.280
Reject null hypothesi?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
EMPLOYMENT MULTIPLIERS									
1971	27.716	28.118	43.434	50.586	41.567	56.034	40.738	61.792	58.718
1975	28.873	28.516	39.397	37.390	34.748	53.238	36.063	42.916	42.937
1978	21.445	26.522	46.719	41.822	40.590	60.402	35.820	45.822	53.513
1981	20.307	25.636	39.531	35.734	33.473	53.935	32.879	42.252	43.600
1984	19.776	25.174	39.097	36.285	34.097	46.569	30.457	37.499	42.237
1989	18.387	22.301	36.749	35.477	31.839	42.246	28.835	29.325	40.152
1993	16.494	18.113	36.901	33.789	29.008	30.373	26.161	24.601	40.407
Arithmetic Mean=	21.857	24.911	40.261	38.726	35.046	48.971	32.993	40.601	45.938
Standard Deviation=	4.330	3.370	3.339	5.370	4.200	9.413	4.595	11.194	6.686
sigma=	6.865	6.544	6.534	7.281	6.818	9.375	6.965	10.454	7.892
Student's t=	3.766	3.077	-1.313	-0.784	0.173	-2.653	0.720	-0.881	-2.433
Reject null hypothesis?	Yes	Yes	No	No	No	Yes	No	No	Yes
TYPE II EMPLOYMENT. MULTIPLIERS									
1971	5.700	3.096	5.687	3.144	2.826	2.499	3.297	1.878	4.339
1975	5.527	2.831	4.846	4.022	2.709	2.423	3.028	2.034	3.932
1978	5.592	2.882	3.936	3.595	2.687	2.152	2.871	2.283	3.618
1981	4.727	2.702	3.739	3.375	2.670	1.998	2.812	2.092	3.609
1984	5.118	5.681	3.850	3.578	2.579	2.363	3.097	2.219	3.606
1989	5.016	4.353	3.293	2.813	2.515	2.352	2.815	2.152	3.170
1993	5.536	7.041	3.363	2.837	2.916	4.258	3.348	2.878	3.219
Arithmetic Mean=	5.317	4.084	4.102	3.338	2.700	2.578	3.038	2.219	3.642
Standard Deviation=	0.336	1.571	0.801	0.407	0.127	0.704	0.205	0.295	0.373
sigma=	0.262	1.201	0.614	0.315	0.111	0.540	0.166	0.232	0.290
Student's t=	-24.557	-3.444	-6.792	-8.699	-14.000	-2.441	-13.164	-2.798	-11.415
Reject null hypothesis?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 6.42 (continued)

GDP MULTIPLIERS	REAL ESTATE	BUSINESS SERVICES	MACHINERY AND EQUIPMENT RENTING AND LEASING	MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	OTHER SERVICES, PROFIT SEEKING	OTHER SERVICES, NON-PROFIT SEEKING	OTHERS,SCRAP AND GOVERNMENT SERVICES	REMUNERATION OF EMPLOYEES
1971	1.1626	1.5711	1.4565	1.3719	1.6046	2.0431	1.5328	1.3743
1975	1.1242	1.6201	1.2356	1.3027	1.6001	1.8776	1.3867	1.2903
1978	1.133	1.651	1.200	1.303	1.533	1.881	1.349	1.305
1981	1.121	1.615	1.175	1.269	1.556	1.810	1.349	1.231
1984	1.158	1.662	1.229	1.326	1.344	1.845	1.512	1.320
1989	1.133	1.604	1.169	1.344	1.594	1.839	1.376	1.251
1993	1.112	1.612	1.170	1.420	1.641	1.826	1.543	1.354
Arithmetic Mean=	1.135	1.619	1.233	1.334	1.553	1.874	1.436	1.304
Standard Deviation=	0.017	0.028	0.095	0.047	0.091	0.073	0.083	0.048
sigma=	0.069	0.071	0.099	0.076	0.097	0.088	0.093	0.077
Student's t=	8.069	-4.941	3.756	2.406	-2.334	-9.447	-0.070	3.129
Reject null hypothesis?	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
TYPE II GDP MULTIPLIERS								
1971	1.514	1.870	317.563	1.922	2.385	2.697	13.726	15.802
1975	1.368	2.006	2.576	1.897	2.349	2.809	12.396	16.516
1978	1.360	2.039	1.656	1.902	2.428	2.856	10.784	15.064
1981	1.336	2.031	1.608	1.840	2.494	2.741	6.977	16.599
1984	1.415	2.202	1.799	1.939	2.098	3.102	6.698	16.585
1989	1.367	2.302	1.911	2.277	2.621	2.741	10.491	12.093
1993	1.230	2.371	1.697	2.429	2.886	3.392	10.669	13.317
Arithmetic Mean=	1.370	2.117	46.973	2.029	2.466	2.905	10.249	15.139
Standard Deviation=	0.079	0.166	110.468	0.211	0.226	0.235	2.406	1.654
sigma=	0.179	0.211	84.372	0.233	0.241	0.246	1.846	1.275
Student's t=	5.700	-1.797	-0.999	-0.921	-4.273	-7.539	-8.448	-19.408
Reject null hypothesi?	Yes	No	No	No	Yes	Yes	Yes	Yes
EMPLOYMENT MULTIPLIERS								
1971	10.228	27.202	33.189	29.978	28.164	44.571	44.928	40.924
1975	8.722	32.339	18.913	31.280	27.895	40.078	40.631	35.926
1978	9.025	34.630	14.670	32.565	28.246	43.685	43.460	38.844
1981	7.961	34.930	14.996	28.302	26.442	37.981	40.494	33.391
1984	8.452	35.653	15.050	24.270	17.948	36.268	40.405	31.897
1989	8.199	35.544	15.572	25.296	25.639	33.417	38.602	29.193
1993	5.011	25.094	10.438	23.613	21.485	29.309	38.959	26.512
Arithmetic Mean=	8.228	32.199	17.547	27.901	25.117	37.901	41.068	33.813
Standard Deviation=	1.481	3.999	6.782	3.295	3.653	5.061	2.142	4.764
sigma=	6.122	6.747	7.939	6.522	6.632	7.151	6.235	7.031
Student's t=	8.388	0.964	4.272	2.230	2.979	-0.582	-1.618	0.496
Reject null hypothesis?	Yes	No	Yes	Yes	Yes	No	No	No
TYPE II EMPLOYMENT. MULTIPLIERS								
1971	7.832	3.672	33.888	2.444	5.256	5.980	5.267	5.871
1975	6.503	2.862	10.274	1.907	5.156	5.050	4.071	5.697
1978	6.329	3.070	5.382	1.923	4.907	4.940	3.765	5.989
1981	5.746	2.465	3.168	1.901	5.403	4.722	3.070	6.122
1984	6.619	2.344	4.332	2.241	4.537	4.981	3.154	6.855
1989	5.272	2.208	4.065	2.547	5.183	4.921	2.956	6.916
1993	4.330	2.868	4.814	2.542	6.427	5.833	2.692	7.900
Arithmetic Mean=	6.090	2.784	9.417	2.215	5.267	5.204	3.568	6.479
Standard Deviation=	1.030	0.464	10.216	0.280	0.540	0.456	0.823	0.727
sigma=	0.788	0.359	7.803	0.221	0.416	0.352	0.631	0.558
Student's t=	-10.006	-4.753	-1.809	-2.903	-15.258	-17.694	-5.027	-15.447
Reject null hypothesis?	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes

Table 6.43 Detailed comparison: Other mining to other sectors

GDP MULTIPLIERS	OTHER MINING.	AGRICULTURE, FORESTRY AND FISHING.	COAL MINING.	GOLD MINING.	FOOD, LIQUOR,BEVERAGES AND TOBACCO.	TEXTILES,CLOTHING,CORDAGE AND LEATHER.	WOOD AND FURNITURE.	PAPER, PRINTING AND PUBLISHING.	CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.
1971	1.420	1.2791	1.5781	1.5304	1.3538	1.2734	1.5265	1.4749	1.2471
1975	1.368	1.2063	1.5547	1.3772	1.2757	1.2499	1.4344	1.3196	0.9942
1978	1.287	1.235	1.380	1.380	1.295	1.269	1.464	1.339	0.974
1981	1.319	1.128	1.335	1.302	1.225	1.230	1.360	1.262	0.822
1984	1.418	1.250	1.410	1.415	1.288	1.373	1.477	1.401	1.187
1989	1.344	1.200	1.348	1.440	1.265	1.279	1.374	1.342	1.089
1993	1.392	1.306	1.388	1.581	1.378	1.396	1.498	1.452	1.177
Arithmetic Mean=	1.364	1.229	1.428	1.432	1.297	1.296	1.448	1.370	1.070
Standard Deviation=	0.047	0.054	0.091	0.089	0.049	0.058	0.058	0.070	0.138
sigma=		0.055	0.078	0.076	0.051	0.057	0.057	0.064	0.111
Student's t=		4.626	-1.520	-1.666	2.430	2.237	-2.765	-0.170	4.943
Reject null hypothesis?		Yes	No	No	Yes	Yes	Yes	No	Yes
TYPE II GDP MULTIPLIERS									
1971	2.187	1.925	2.635	2.174	6.917	3.776	4.461	3.638	3.414
1975	2.158	1.896	2.125	1.671	6.552	3.949	4.290	3.426	3.740
1978	1.972	1.958	2.147	1.783	6.272	3.876	4.437	3.482	3.552
1981	2.255	1.883	2.088	1.641	6.063	3.564	3.760	3.377	3.284
1984	2.487	2.392	2.345	1.854	7.028	4.058	4.335	3.904	3.619
1989	2.104	2.045	2.435	2.226	5.683	3.445	3.705	3.351	3.239
1993	2.573	2.542	3.060	2.055	6.313	3.535	3.916	3.647	3.768
Arithmetic Mean=	2.248	2.092	2.405	1.915	6.404	3.743	4.129	3.546	3.517
Standard Deviation=	0.197	0.246	0.324	0.220	0.437	0.215	0.301	0.182	0.195
sigma=		0.240	0.289	0.226	0.366	0.223	0.275	0.205	0.212
Student's t=		1.216	-1.016	2.763	-21.249	-12.553	-12.811	-11.861	-11.212
Reject null hypothesi?		No	No	Yes	Yes	Yes	Yes	Yes	Yes
EMPLOYMENT MULTIPLIERS									
1971	35.787	58.251	69.494	53.753	46.750	41.232	52.405	36.568	28.241
1975	32.821	51.608	56.032	33.849	40.284	37.966	44.284	29.285	21.226
1978	25.354	53.593	40.543	35.080	42.616	42.672	52.706	32.463	21.016
1981	27.040	44.601	30.577	27.106	36.387	38.286	41.477	28.098	15.940
1984	26.131	46.969	28.714	30.527	35.771	40.153	42.622	28.612	20.302
1989	23.051	43.412	28.650	35.720	34.429	37.918	40.330	26.235	18.694
1993	22.845	45.148	24.837	33.694	33.810	33.831	39.982	26.311	18.578
Arithmetic Mean=	27.575	49.083	39.835	35.675	38.578	38.865	44.829	29.653	20.571
Standard Deviation=	4.553	5.113	15.593	7.877	4.450	2.649	5.065	3.427	3.555
sigma=		5.229	12.406	6.949	4.863	4.023	5.202	4.352	4.412
Student's t=		-7.695	-1.849	-2.181	-4.233	-5.250	-6.206	-0.893	2.970
Reject null hypothesis?		Yes	No	Yes	Yes	Yes	Yes	No	Yes
TYPE II EMPLOYMENT. MULTIPLIERS									
1971	2.509	1.438	1.659	1.777	9.516	2.992	3.117	5.063	5.685
1975	2.372	1.442	1.643	1.780	9.006	3.103	3.221	5.044	6.197
1978	3.111	1.494	1.991	1.914	8.067	2.865	3.001	4.650	6.071
1981	3.051	1.492	2.320	1.899	8.109	2.713	2.917	4.467	5.745
1984	3.697	1.591	2.654	1.952	8.740	2.716	2.954	5.060	7.294
1989	3.100	1.518	2.558	1.951	7.118	2.452	2.659	4.804	5.611
1993	3.292	1.583	3.327	1.838	7.498	2.566	2.530	4.380	5.681
Arithmetic Mean=	3.019	1.508	2.307	1.873	8.293	2.772	2.914	4.781	6.040
Standard Deviation=	0.419	0.056	0.559	0.070	0.784	0.213	0.226	0.268	0.551
sigma=		0.323	0.533	0.324	0.679	0.359	0.364	0.380	0.529
Student's t=		8.753	2.495	6.609	-14.534	1.284	0.539	-8.678	-10.696
Reject null hypothesis?		Yes	Yes	Yes	Yes	No	No	Yes	Yes

Table 6.43 (continued)

GDP MULTIPLIERS	POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS..	IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	FABRICATED METAL PRODUCTS.	ENGINES,MACHINERY AND EQUIPMENT.	ELECTRICAL MACHINERY AND APPLIANCES.	MOTOR VEHICLES, PARTS AND ACCESSORIES.	RAILWAY AND OTHER TRANSPORT EQUIPMENT.	JEWELLERY AND RELATED ARTICLES	OTHER MANUFACTURING INDUSTRIES
1971	1.4772	1.4781	1.5534	1.4854	1.4069	1.1073	1.5121	1.5432	1.4896
1975	1.3904	1.3798	1.4331	1.3882	1.3064	1.088	1.4236	1.3612	1.3996
1978	1.390	1.385	1.498	1.441	1.401	1.021	1.441	1.341	1.370
1981	1.351	1.367	1.424	1.434	1.285	1.030	1.456	1.332	1.314
1984	1.424	1.390	1.503	1.490	1.393	1.206	1.614	1.474	1.405
1989	1.311	1.250	1.367	1.337	1.302	1.207	1.541	1.329	1.322
1993	1.443	1.383	1.481	1.467	1.447	1.329	1.596	0.937	1.414
Arithmetic Mean=	1.398	1.376	1.466	1.434	1.363	1.141	1.512	1.331	1.388
Standard Deviation=	0.052	0.062	0.057	0.051	0.059	0.103	0.070	0.178	0.056
sigma=	0.053	0.059	0.056	0.053	0.057	0.087	0.064	0.141	0.056
Student's t=	-1.189	-0.381	-3.366	-2.487	0.033	4.815	-4.314	0.437	-0.797
Reject null hypothesis?	No	No	Yes	Yes	No	Yes	Yes	No	No
TYPE II GDP MULTIPLIERS									
1971	3.386	3.988	4.195	3.807	4.238	4.477	4.562	6.804	3.649
1975	3.269	3.327	4.038	3.458	4.078	4.320	3.822	6.006	3.292
1978	3.267	3.801	4.721	3.863	3.843	4.680	4.021	4.936	3.487
1981	3.017	3.884	4.038	3.599	3.522	4.243	4.156	6.778	3.752
1984	3.666	4.345	4.727	4.060	3.938	5.518	3.188	5.424	4.133
1989	2.757	3.060	3.617	3.360	3.277	4.019	2.928	9.274	2.677
1993	2.834	2.870	3.755	3.374	3.198	4.331	3.573	6.923	3.032
Arithmetic Mean=	3.171	3.611	4.156	3.646	3.728	4.512	3.750	6.592	3.432
Standard Deviation=	0.297	0.496	0.401	0.250	0.372	0.452	0.525	1.300	0.446
sigma=	0.272	0.408	0.341	0.243	0.321	0.376	0.428	1.004	0.372
Student's t=	-6.339	-6.251	-10.465	-10.758	-8.621	-11.261	-6.567	-8.091	-5.945
Reject null hypothesi?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
EMPLOYMENT MULTIPLIERS									
1971	40.597	36.318	40.746	37.016	35.121	28.727	38.193	38.129	40.725
1975	34.879	30.642	33.856	30.068	28.931	25.614	33.657	30.014	35.718
1978	36.085	31.629	38.148	34.442	34.148	26.340	38.532	25.815	39.801
1981	30.726	29.002	31.651	30.512	27.894	22.879	35.402	27.864	45.497
1984	30.236	27.151	32.565	30.301	28.734	25.945	39.244	30.206	39.058
1989	29.177	22.539	29.531	27.836	26.590	24.031	34.860	26.199	29.521
1993	28.128	20.380	27.584	24.361	29.263	22.484	25.907	18.971	28.214
Arithmetic Mean=	32.833	28.237	33.440	30.648	30.097	25.146	35.114	28.171	36.933
Standard Deviation=	4.170	5.050	4.297	3.833	2.993	2.020	4.230	5.357	5.768
sigma=	4.715	5.193	4.781	4.546	4.161	3.804	4.747	5.369	5.612
Student's t=	-2.086	-0.238	-2.295	-1.265	-1.134	1.195	-2.971	-0.208	-3.119
Reject null hypothesis?	No	No	Yes	No	No	No	Yes	No	Yes
TYPE II EMPLOYMENT. MULTIPLIERS									
1971	3.279	5.706	4.302	4.767	5.256	4.892	5.910	14.166	3.616
1975	3.245	4.826	4.205	4.958	5.446	4.817	4.414	11.434	3.301
1978	3.156	5.333	4.489	5.017	4.600	4.834	3.812	16.731	3.005
1981	3.164	5.213	4.528	5.163	4.443	5.084	4.165	9.241	2.089
1984	3.613	5.589	4.269	4.924	4.451	5.548	2.709	5.450	2.518
1989	2.591	4.539	3.236	3.556	3.580	5.046	2.959	6.453	2.631
1993	2.581	4.860	3.285	4.415	2.706	5.614	6.074	3.781	2.749
Arithmetic Mean=	3.090	5.152	4.045	4.686	4.355	5.119	4.292	9.608	2.844
Standard Deviation=	0.349	0.397	0.508	0.510	0.878	0.307	1.215	4.411	0.472
sigma=	0.416	0.441	0.503	0.504	0.743	0.397	0.982	3.384	0.482
Student's t=	-0.320	-9.058	-3.819	-6.184	-3.363	-9.905	-2.426	-3.643	0.677
Reject null hypothesis?	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No

Table 6.43 (continued)

GDP MULTIPLIERS	ELECTRICITY, GAS AND STEAM	WATER SUPPLY	BUILDING CONSTRUCTION	CIVIL ENGINEERING AND OTHER CONSTRUCTION	WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	CATERING AND ACCOMODATION SERVICES	TRANSPORT AND STORAGE	COMMUNICATION	FINANCIAL INSTITUTIONS AND INSURANCE SERVICES
1971	1.4216	1.3489	1.5735	1.5534	1.6639	1.5029	1.7907	1.8404	2.2424
1975	1.4469	1.309	1.5558	1.4957	1.5407	1.4535	1.6034	1.6657	1.8893
1978	1.296	1.262	1.582	1.508	1.593	1.457	1.517	1.692	1.983
1981	1.289	1.231	1.485	1.444	1.494	1.377	1.492	1.610	1.877
1984	1.362	1.595	1.599	1.540	1.630	1.459	1.545	1.695	1.938
1989	1.325	1.284	1.401	1.386	1.519	1.379	1.455	1.506	1.853
1993	1.376	1.346	1.590	1.565	1.660	1.539	1.576	1.574	2.013
Arithmetic Mean=	1.359	1.339	1.541	1.499	1.586	1.452	1.568	1.655	1.971
Standard Deviation=	0.056	0.111	0.067	0.060	0.064	0.055	0.102	0.099	0.123
sigma=	0.056	0.092	0.063	0.058	0.060	0.055	0.086	0.083	0.101
Student's t=	0.156	0.498	-5.293	-4.355	-6.864	-3.000	-4.461	-6.516	-11.286
Reject null hypothesis?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
TYPE II GDP MULTIPLIERS									
1971	2.273	2.261	5.717	5.471	2.680	3.927	2.250	2.154	3.810
1975	2.626	2.319	4.818	4.268	2.405	4.689	2.447	1.958	3.025
1978	2.225	2.375	5.022	4.606	2.595	4.632	2.276	2.165	3.499
1981	2.318	2.433	4.775	4.044	2.499	4.245	2.360	2.126	3.108
1984	2.433	2.839	4.848	4.587	2.513	4.624	2.603	2.107	3.401
1989	2.364	3.201	4.928	4.337	2.547	3.911	2.457	1.900	3.140
1993	2.493	3.522	5.234	4.175	2.885	4.060	2.767	2.298	3.941
Arithmetic Mean=	2.390	2.707	5.049	4.498	2.589	4.298	2.451	2.101	3.418
Standard Deviation=	0.128	0.457	0.308	0.440	0.144	0.320	0.170	0.124	0.330
sigma=	0.179	0.380	0.279	0.368	0.186	0.287	0.199	0.178	0.293
Student's t=	-1.483	-2.262	-18.767	-11.439	-3.428	-13.360	-1.916	1.548	-7.458
Reject null hypothesi?	No	Yes	Yes	Yes	Yes	Yes	No	No	Yes
EMPLOYMENT MULTIPLIERS									
1971	27.716	28.118	43.434	50.586	41.567	56.034	40.738	61.792	58.718
1975	28.873	28.516	39.397	37.390	34.748	53.238	36.063	42.916	42.937
1978	21.445	26.522	46.719	41.822	40.590	60.402	35.820	45.822	53.513
1981	20.307	25.636	39.531	35.734	33.473	53.935	32.879	42.252	43.600
1984	19.776	25.174	39.097	36.285	34.097	46.569	30.457	37.499	42.237
1989	18.387	22.301	36.749	35.477	31.839	42.246	28.835	29.325	40.152
1993	16.494	18.113	36.901	33.789	29.008	30.373	26.161	24.601	40.407
Arithmetic Mean=	21.857	24.911	40.261	38.726	35.046	48.971	32.993	40.601	45.938
Standard Deviation=	4.330	3.370	3.339	5.370	4.200	9.413	4.595	11.194	6.686
sigma=	4.799	4.326	4.312	5.377	4.731	7.986	4.941	9.230	6.178
Student's t=	2.230	1.152	-5.504	-3.879	-2.954	-5.012	-2.052	-2.640	-5.560
Reject null hypothesis?	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes
TYPE II EMPLOYMENT. MULTIPLIERS									
1971	5.700	3.096	5.687	3.144	2.826	2.499	3.297	1.878	4.339
1975	5.527	2.831	4.846	4.022	2.709	2.423	3.028	2.034	3.932
1978	5.592	2.882	3.936	3.595	2.687	2.152	2.871	2.283	3.618
1981	4.727	2.702	3.739	3.375	2.670	1.998	2.812	2.092	3.609
1984	5.118	5.681	3.850	3.578	2.579	2.363	3.097	2.219	3.606
1989	5.016	4.353	3.293	2.813	2.515	2.352	2.815	2.152	3.170
1993	5.536	7.041	3.363	2.837	2.916	4.258	3.348	2.878	3.219
Arithmetic Mean=	5.317	4.084	4.102	3.338	2.700	2.578	3.038	2.219	3.642
Standard Deviation=	0.336	1.571	0.801	0.407	0.127	0.704	0.205	0.295	0.373
sigma=	0.410	1.242	0.690	0.446	0.334	0.626	0.356	0.391	0.428
Student's t=	-10.478	-1.605	-2.936	-1.338	1.782	1.319	-0.103	3.821	-2.721
Reject null hypothesis?	Yes	No	Yes	No	No	No	No	Yes	Yes

Table 6.43 (continued)

GDP MULTIPLIERS	REAL ESTATE	BUSINESS SERVICES	MACHINERY AND EQUIPMENT RENTING AND LEASING	MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	OTHER SERVICES, PROFIT SEEKING	OTHER SERVICES, NON-PROFIT SEEKING	OTHERS,SCRAP AND GOVERNMENT SERVICES	REMUNERATION OF EMPLOYEES
1971	1.1626	1.5711	1.4565	1.3719	1.6046	2.0431	1.5328	1.3743
1975	1.1242	1.6201	1.2356	1.3027	1.6001	1.8776	1.3867	1.2903
1978	1.133	1.651	1.200	1.303	1.533	1.881	1.349	1.305
1981	1.121	1.615	1.175	1.269	1.556	1.810	1.349	1.231
1984	1.158	1.662	1.229	1.326	1.344	1.845	1.512	1.320
1989	1.133	1.604	1.169	1.344	1.594	1.839	1.376	1.251
1993	1.112	1.612	1.170	1.420	1.641	1.826	1.543	1.354
Arithmetic Mean=	1.135	1.619	1.233	1.334	1.553	1.874	1.436	1.304
Standard Deviation=	0.017	0.028	0.095	0.047	0.091	0.073	0.083	0.048
sigma=	0.038	0.042	0.081	0.050	0.078	0.066	0.073	0.051
Student's t=	11.248	-11.495	3.032	1.120	-4.522	-14.437	-1.844	2.214
Reject null hypothesis?	Yes	Yes	Yes	No	Yes	Yes	No	Yes
TYPE II GDP MULTIPLIERS								
1971	1.514	1.870	317.563	1.922	2.385	2.697	13.726	15.802
1975	1.368	2.006	2.576	1.897	2.349	2.809	12.396	16.516
1978	1.360	2.039	1.656	1.902	2.428	2.856	10.784	15.064
1981	1.336	2.031	1.608	1.840	2.494	2.741	6.977	16.599
1984	1.415	2.202	1.799	1.939	2.098	3.102	6.698	16.585
1989	1.367	2.302	1.911	2.277	2.621	2.741	10.491	12.093
1993	1.230	2.371	1.697	2.429	2.886	3.392	10.669	13.317
Arithmetic Mean=	1.370	2.117	46.973	2.029	2.466	2.905	10.249	15.139
Standard Deviation=	0.079	0.166	110.468	0.211	0.226	0.235	2.406	1.654
sigma=	0.162	0.197	84.372	0.220	0.229	0.234	1.844	1.273
Student's t=	10.139	1.245	-0.992	1.858	-1.778	-5.258	-8.117	-18.953
Reject null hypothesi?	Yes	No	No	No	No	Yes	Yes	Yes
EMPLOYMENT MULTIPLIERS								
1971	10.228	27.202	33.189	29.978	28.164	44.571	44.928	40.924
1975	8.722	32.339	18.913	31.280	27.895	40.078	40.631	35.926
1978	9.025	34.630	14.670	32.565	28.246	43.685	43.460	38.844
1981	7.961	34.930	14.996	28.302	26.442	37.981	40.494	33.391
1984	8.452	35.653	15.050	24.270	17.948	36.268	40.405	31.897
1989	8.199	35.544	15.572	25.296	25.639	33.417	38.602	29.193
1993	5.011	25.094	10.438	23.613	21.485	29.309	38.959	26.512
Arithmetic Mean=	8.228	32.199	17.547	27.901	25.117	37.901	41.068	33.813
Standard Deviation=	1.481	3.999	6.782	3.295	3.653	5.061	2.142	4.764
sigma=	3.657	4.628	6.239	4.292	4.458	5.199	3.843	5.033
Student's t=	9.899	-1.869	3.007	-0.142	1.032	-3.716	-6.569	-2.318
Reject null hypothesis?	Yes	No	Yes	No	No	Yes	Yes	Yes
TYPE II EMPLOYMENT. MULTIPLIERS								
1971	7.832	3.672	33.888	2.444	5.256	5.980	5.267	5.871
1975	6.503	2.862	10.274	1.907	5.156	5.050	4.071	5.697
1978	6.329	3.070	5.382	1.923	4.907	4.940	3.765	5.989
1981	5.746	2.465	3.168	1.901	5.403	4.722	3.070	6.122
1984	6.619	2.344	4.332	2.241	4.537	4.981	3.154	6.855
1989	5.272	2.208	4.065	2.547	5.183	4.921	2.956	6.916
1993	4.330	2.868	4.814	2.542	6.427	5.833	2.692	7.900
Arithmetic Mean=	6.090	2.784	9.417	2.215	5.267	5.204	3.568	6.479
Standard Deviation=	1.030	0.464	10.216	0.280	0.540	0.456	0.823	0.727
sigma=	0.849	0.478	7.809	0.385	0.522	0.473	0.705	0.641
Student's t=	-6.766	0.919	-1.533	3.906	-8.054	-8.646	-1.457	-10.101
Reject null hypothesis?	Yes	No	No	Yes	Yes	Yes	No	Yes

6.7 Summary

This section describes the impact that increased mining output had on the rest of the economy during the period from 1971 to 1993. It shows that:

(i) Output from the mining sectors did not have the greatest impact on GDP. The highest ranking achieved by a mining sector was coal mining in 1971 (seventh), and the lowest was other mining, also in 1971. In 1993 gold mining ranked eighth, other mining twenty-third and coal mining twenty-fourth. The mean impact of eight sectors was significantly greater than coal mining and gold mining, and fourteen sectors greater than other mining.

(ii) There was no significant change, during the period under review, in the impact of mining on the GDP, as not once has the total GDP multiplier of any mining sector deviated by more than two standard deviations from the mean.

(iii) The gold mining industry developed stronger links with the rest of the economy while at the same time its share of total mineral output decreased.

(iv) Mean income generated in twenty-one other activities in the economy had more important impacts on GDP than have coal mining activities, twenty-eight other activities had more important impacts than gold mining and twenty three other activities had more important impacts than other mining. Only two sectors, in 1993, influenced GDP to a lesser extent than gold mining, eight less to a lesser extent than other mining, and 15 to a lesser extent than less than coal mining.

(v) Wages in the mining sectors were generally less than in the rest of the economy.

(vi) Coal mining dropped in importance faster than 33 other activities, gold mining faster than 26 other activities and other mining faster than 25 other activities.

(vii) The mean impact, on employment in the rest of the economy, of increased mining output from no sector was significantly greater than output from coal mining, in four sectors than output from gold mining, and in seventeen sectors than output from other mining. However, in 1993, increased output from coal mining, gold mining and other mining ranked twenty-second, ninth and twenty-sixth, respectively, as generators of employment.

(viii) The mean impact, on employment in the rest of the economy, of employment in twenty-four sectors was significantly higher than employment in coal mining, in thirty-one sectors than it was in gold mining, and in seventeen sectors than it was in other mining. In 1993 employment in coal mining, gold mining and other mining ranked eighteenth, thirty-second and nineteenth, respectively, generators of employment in the rest of the economy.

CHAPTER SEVEN

INTRA-SECTOR IMPACT OF INCREASED MINING OUTPUT

7.1 Introduction

The previous Chapter describes the impact that increased production from the three mining sectors had on other sectors in the national economy, i.e., the inter-sector impact. The four multipliers used, found in the total **rows** of steps 8, 9, 11 and 12 in the model, quantify the importance of these industries relative to the other sectors in the economy.

This Chapter describes the impact that increased output from the mining sectors had on each of their suppliers of intermediate input, i.e., the intra-sector impact. The multipliers used to do this, found in the mining **columns** of the same steps in the model, are called sectoral multipliers

7.2 Definition of Sectoral Multipliers

The total multipliers for a particular sector show the impact of increasing output from that sector by one unit, either R1 or one employee. Each total multiplier is the sum of the impact that a one unit increase in output will have on each of the suppliers of intermediate input to the producing sector.

Equation (7.1) expresses a total multiplier, i.e.,

$$T_i = \Sigma\, a_{ij} \quad (\text{from } j = 1 \text{ to } j = j) \qquad (7.1)$$

Each element in the summation a_{ij} is the effect that an increase in output from the sector in column *i* will have on the supplier in row *j*, and is called the Sectoral Multiplier of the *column industry* on the *row industry*.

Sectoral multipliers are therefore different from the multipliers calculated in Chapter Six. They show the impact that an increase in output from a sector will have on suppliers of intermediate input to that sector, whereas GDP multipliers, type II GDP multipliers, employment multipliers and type II employment multipliers show the impact of a sector on the whole economic system.

7.3 Coal Mining Sectoral Total GDP Multipliers

These multipliers show the impact that increased coal mining output had on its suppliers of intermediate input. The calculations exclude the impact of coal mining on itself.

Tables 7.1 to 7.7 show:

(i) Coal mining sectoral multipliers for each of the years discussed in this thesis.
(ii) An arithmetic mean for each set.
(iii) The standard deviation of each set.
(iv) The distance, expressed in standard deviations, of each multiplier from its mean.

In 1993 the maximum multiplier was 0.1730 and the minimum was 0.0001, with a mean of 0.0272. The standard deviation was 0.0342. The multipliers of twenty-four sectors were between –1 and 0 standard deviations from this mean, four sectors were between 0 and +1 standard deviations, five sectors were between +1 and +2 standard deviations, and one sector was further than +4 standard deviations from the mean.

Figure 7.1 shows the frequency distributions of multipliers around the mean in terms of standard deviations for each of the seven years. Increases in coal mining output did not affect those suppliers of intermediate input with multipliers concentrated in the mode to any significantly different degree.

A deviation of more than two standard deviations indicates a significant difference from the mean. In 1993 the impact of increased coal mining output on suppliers of intermediate input was significantly different in one sector (wholesale and retail trade and motor trade). In no year except 1971 was the impact greater than 10% in more than one sector. In 1993, for every R1m increase in coal mining output, increased demand for intermediate input was less than R0.1m in thirty-three sectors, less than R0.05m in twenty-eight sectors, and less than R0.01m in eleven sectors.

The sector, which, throughout the period under review, consistently benefited most from increased coal production, is "wholesale and retail trade and motor trade". In 1993 the multiplier was 0.1730, i.e., for every R1 million increase in coal output, demand for intermediate input from "wholesale and retail and motor trade" increased by R0.173 million.

Section 7.9, the summary of this Chapter, discusses possible reasons why "wholesale and retail trade and motor trade" benefits the most from increased coal mining output.

Table 7.1

Ranking of Sectors by Coal Mining GDP Multipliers	1971 Multiplier	Standard Deviations from Mean
COAL MINING.	0.6060	Excluded
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	0.1703	3.9604
REAL ESTATE	0.1090	2.2473
AGRICULTURE, FORESTRY AND FISHING.	0.0844	1.5598
TRANSPORT AND STORAGE	0.0746	1.2859
REMUNERATION OF EMPLOYEES	0.0743	1.2775
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.0490	0.5704
ELECTRICITY, GAS AND STEAM	0.0412	0.3525
BUSINESS SERVICES	0.0353	0.1876
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.0336	0.1401
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.0307	0.0590
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.0285	-0.0025
COMMUNICATION	0.0271	-0.0416
OTHER SERVICES, NON-PROFIT SEEKING	0.0234	-0.1450
PAPER, PRINTING AND PUBLISHING.	0.0210	-0.2121
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.0187	-0.2763
FABRICATED METAL PRODUCTS.	0.0182	-0.2903
ENGINES,MACHINERY AND EQUIPMENT.	0.0177	-0.3043
OTHER SERVICES, PROFIT SEEKING	0.0176	-0.3071
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.0166	-0.3350
ELECTRICAL MACHINERY AND APPLIANCES.	0.0123	-0.4552
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.0121	-0.4608
CATERING AND ACCOMODATION SERVICES	0.0120	-0.4636
OTHER MINING.	0.0073	-0.5949
WOOD AND FURNITURE.	0.0073	-0.5949
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0067	-0.6117
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.0064	-0.6201
WATER SUPPLY	0.0064	-0.6201
BUILDING CONSTRUCTION	0.0029	-0.7179
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0027	-0.7235
OTHER MANUFACTURING INDUSTRIES	0.0015	-0.7570
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0014	-0.7598
JEWELLERY AND RELATED ARTICLES	0.0012	-0.7654
GOLD MINING.	0.0006	-0.7822
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0000	-0.7990

Arithmetic Mean (A.M.) - Excluding Coal	0.0286
Standard Deviation (S.D.)	0.0358

Table 7.2

Ranking of Sectors by Coal Mining GDP Multipliers	1975 Multiplier	Standard Deviations from Mean
COAL MINING.	0.7390	Excluded
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	0.1717	4.3979
REAL ESTATE	0.0914	2.0070
AGRICULTURE, FORESTRY AND FISHING.	0.0667	1.2716
TRANSPORT AND STORAGE	0.0659	1.2477
REMUNERATION OF EMPLOYEES	0.0620	1.1316
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.0396	0.4647
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.0315	0.2235
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.0301	0.1818
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.0272	0.0955
ELECTRICITY, GAS AND STEAM	0.0250	0.0299
COMMUNICATION	0.0206	-0.1011
BUSINESS SERVICES	0.0187	-0.1576
PAPER, PRINTING AND PUBLISHING.	0.0178	-0.1844
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.0154	-0.2559
OTHER SERVICES, NON-PROFIT SEEKING	0.0148	-0.2738
ENGINES,MACHINERY AND EQUIPMENT.	0.0138	-0.3035
FABRICATED METAL PRODUCTS.	0.0137	-0.3065
OTHER SERVICES, PROFIT SEEKING	0.0115	-0.3720
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.0115	-0.3720
ELECTRICAL MACHINERY AND APPLIANCES.	0.0098	-0.4226
CATERING AND ACCOMODATION SERVICES	0.0086	-0.4584
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.0084	-0.4643
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.0075	-0.4911
WOOD AND FURNITURE.	0.0059	-0.5387
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0056	-0.5477
OTHER MINING.	0.0046	-0.5775
WATER SUPPLY	0.0044	-0.5834
BUILDING CONSTRUCTION	0.0035	-0.6102
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0035	-0.6102
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0019	-0.6578
OTHER MANUFACTURING INDUSTRIES	0.0012	-0.6787
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0011	-0.6817
JEWELLERY AND RELATED ARTICLES	0.0005	-0.6995
GOLD MINING.	0.0004	-0.7025

Arithmetic Mean (A.M.) - Excluding Coal	0.0240
Standard Deviation (S.D.)	0.0336

Table 7.3

Ranking of Sectors by Coal Mining GDP Multipliers	1978 Multiplier	Standard Deviations from Mean
COAL MINING.	0.6524	Excluded
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	0.1251	4.0147
REAL ESTATE	0.0655	1.7076
TRANSPORT AND STORAGE	0.0651	1.6921
AGRICULTURE, FORESTRY AND FISHING.	0.0563	1.3514
REMUNERATION OF EMPLOYEES	0.0522	1.1927
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.0440	0.8753
ELECTRICITY, GAS AND STEAM	0.0437	0.8637
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.0285	0.2753
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.0205	-0.0344
ENGINES,MACHINERY AND EQUIPMENT.	0.0201	-0.0499
BUSINESS SERVICES	0.0201	-0.0499
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.0183	-0.1195
COMMUNICATION	0.0175	-0.1505
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.0171	-0.1660
FABRICATED METAL PRODUCTS.	0.0148	-0.2550
PAPER, PRINTING AND PUBLISHING.	0.0147	-0.2589
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.0133	-0.3131
OTHER SERVICES, NON-PROFIT SEEKING	0.0125	-0.3441
ELECTRICAL MACHINERY AND APPLIANCES.	0.0123	-0.3518
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0093	-0.4679
OTHER MINING.	0.0091	-0.4757
OTHER SERVICES, PROFIT SEEKING	0.0086	-0.4950
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.0071	-0.5531
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.0060	-0.5957
CATERING AND ACCOMODATION SERVICES	0.0055	-0.6150
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0049	-0.6383
WATER SUPPLY	0.0045	-0.6537
WOOD AND FURNITURE.	0.0043	-0.6615
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0019	-0.7544
BUILDING CONSTRUCTION	0.0017	-0.7621
OTHER MANUFACTURING INDUSTRIES	0.0012	-0.7815
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0007	-0.8008
JEWELLERY AND RELATED ARTICLES	0.0006	-0.8047
GOLD MINING.	0.0002	-0.8202

Arithmetic Mean (A.M.) - Excluding Coal	0.0214
Standard Deviation (S.D.)	0.0258

Table 7.4

Ranking of Sectors by Coal Mining GDP Multipliers	1981 Multiplier	Standard Deviations from Mean
COAL MINING.	0.6484	Excluded
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	0.1249	4.3081
TRANSPORT AND STORAGE	0.0563	1.4857
REAL ESTATE	0.0539	1.3870
AGRICULTURE, FORESTRY AND FISHING.	0.0537	1.3788
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.0460	1.0620
REMUNERATION OF EMPLOYEES	0.0433	0.9509
ELECTRICITY, GAS AND STEAM	0.0343	0.5806
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.0275	0.3008
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.0225	0.0951
ENGINES,MACHINERY AND EQUIPMENT.	0.0205	0.0128
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.0196	-0.0242
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.0187	-0.0612
FABRICATED METAL PRODUCTS.	0.0152	-0.2052
BUSINESS SERVICES	0.0150	-0.2135
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.0146	-0.2299
COMMUNICATION	0.0146	-0.2299
PAPER, PRINTING AND PUBLISHING.	0.0131	-0.2916
ELECTRICAL MACHINERY AND APPLIANCES.	0.0117	-0.3492
OTHER SERVICES, NON-PROFIT SEEKING	0.0115	-0.3575
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0098	-0.4274
OTHER MINING.	0.0090	-0.4603
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.0081	-0.4973
OTHER SERVICES, PROFIT SEEKING	0.0079	-0.5056
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.0070	-0.5426
WOOD AND FURNITURE.	0.0056	-0.6002
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0052	-0.6167
BUILDING CONSTRUCTION	0.0050	-0.6249
CATERING AND ACCOMODATION SERVICES	0.0050	-0.6249
WATER SUPPLY	0.0035	-0.6866
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0012	-0.7812
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0009	-0.7936
JEWELLERY AND RELATED ARTICLES	0.0007	-0.8018
GOLD MINING.	0.0005	-0.8100
OTHER MANUFACTURING INDUSTRIES	0.0001	-0.8265

Arithmetic Mean (A.M.) - Excluding Coal	0.0202
Standard Deviation (S.D.)	0.0243

Table 7.5

Ranking of Sectors by Coal Mining GDP Multipliers	1984 Multiplier	Standard Deviations from Mean
COAL MINING.	0.6117	Excluded
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	0.1418	4.1129
REAL ESTATE	0.0707	1.6415
TRANSPORT AND STORAGE	0.0693	1.5929
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.0692	1.5894
REMUNERATION OF EMPLOYEES	0.0520	0.9915
ELECTRICITY, GAS AND STEAM	0.0472	0.8247
AGRICULTURE, FORESTRY AND FISHING.	0.0451	0.7517
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.0292	0.1990
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.0266	0.1087
ENGINES,MACHINERY AND EQUIPMENT.	0.0260	0.0878
COMMUNICATION	0.0215	-0.0686
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.0200	-0.1207
BUSINESS SERVICES	0.0178	-0.1972
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.0169	-0.2285
FABRICATED METAL PRODUCTS.	0.0153	-0.2841
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.0139	-0.3328
PAPER, PRINTING AND PUBLISHING.	0.0138	-0.3362
ELECTRICAL MACHINERY AND APPLIANCES.	0.0121	-0.3953
OTHER MINING.	0.0117	-0.4092
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0114	-0.4197
OTHER SERVICES, NON-PROFIT SEEKING	0.0100	-0.4683
OTHER SERVICES, PROFIT SEEKING	0.0097	-0.4788
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.0088	-0.5100
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.0074	-0.5587
CATERING AND ACCOMODATION SERVICES	0.0065	-0.5900
WATER SUPPLY	0.0060	-0.6074
WOOD AND FURNITURE.	0.0055	-0.6247
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0046	-0.6560
BUILDING CONSTRUCTION	0.0046	-0.6560
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0018	-0.7533
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0008	-0.7881
JEWELLERY AND RELATED ARTICLES	0.0004	-0.8020
OTHER MANUFACTURING INDUSTRIES	0.0004	-0.8020
GOLD MINING.	0.0001	-0.8124

Arithmetic Mean (A.M.) - Excluding Coal	0.0235
Standard Deviation (S.D.)	0.0288

Table 7.6

Ranking of Sectors by Coal Mining GDP Multipliers	1989 Multiplier	Standard Deviations from Mean
COAL MINING.	0.5612	Excluded
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	0.1336	3.9670
TRANSPORT AND STORAGE	0.0669	1.5732
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.0666	1.5606
REMUNERATION OF EMPLOYEES	0.0623	1.4068
REAL ESTATE	0.0584	1.2685
ELECTRICITY, GAS AND STEAM	0.0535	1.0922
AGRICULTURE, FORESTRY AND FISHING.	0.0478	0.8858
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.0307	0.2703
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.0305	0.2647
COMMUNICATION	0.0274	0.1517
ENGINES,MACHINERY AND EQUIPMENT.	0.0208	-0.0832
PAPER, PRINTING AND PUBLISHING.	0.0178	-0.1913
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.0170	-0.2211
FABRICATED METAL PRODUCTS.	0.0161	-0.2516
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.0151	-0.2879
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.0142	-0.3193
ELECTRICAL MACHINERY AND APPLIANCES.	0.0141	-0.3251
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.0128	-0.3695
OTHER SERVICES, NON-PROFIT SEEKING	0.0128	-0.3710
BUSINESS SERVICES	0.0098	-0.4802
OTHER MINING.	0.0094	-0.4938
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.0083	-0.5311
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0068	-0.5865
CATERING AND ACCOMODATION SERVICES	0.0068	-0.5870
OTHER SERVICES, PROFIT SEEKING	0.0067	-0.5904
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0057	-0.6254
WOOD AND FURNITURE.	0.0051	-0.6465
WATER SUPPLY	0.0031	-0.7202
OTHER MANUFACTURING INDUSTRIES	0.0019	-0.7625
BUILDING CONSTRUCTION	0.0017	-0.7699
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0013	-0.7844
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0011	-0.7925
JEWELLERY AND RELATED ARTICLES	0.0003	-0.8208
GOLD MINING.	0.0000	-0.8293

Arithmetic Mean (A.M.) - Excluding Coal	0.0231
Standard Deviation (S.D.)	0.0278

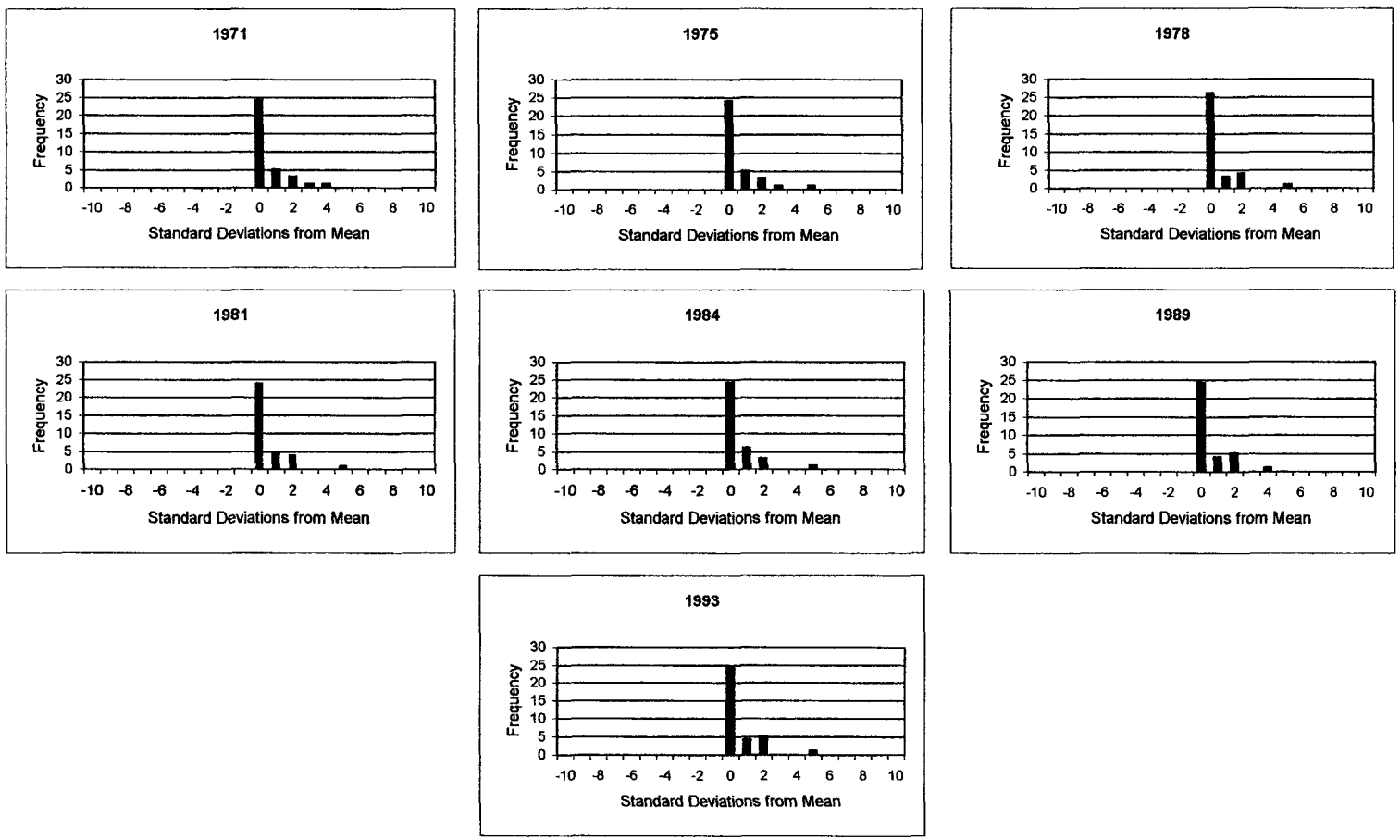
Table 7.7

Ranking of Sectors by Coal Mining GDP Multipliers	1993 Multiplier	Standard Deviations from Mean
COAL MINING.	0.4614	Excluded
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	0.1730	4.2580
REAL ESTATE	0.0819	1.5972
TRANSPORT AND STORAGE	0.0736	1.3539
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.0711	1.2825
ELECTRICITY, GAS AND STEAM	0.0688	1.2145
REMUNERATION OF EMPLOYEES	0.0684	1.2029
AGRICULTURE, FORESTRY AND FISHING.	0.0395	0.3586
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.0381	0.3173
COMMUNICATION	0.0298	0.0734
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.0283	0.0314
ENGINES,MACHINERY AND EQUIPMENT.	0.0268	-0.0127
FABRICATED METAL PRODUCTS.	0.0193	-0.2313
ELECTRICAL MACHINERY AND APPLIANCES.	0.0183	-0.2622
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.0174	-0.2888
PAPER, PRINTING AND PUBLISHING.	0.0171	-0.2956
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.0170	-0.3000
OTHER SERVICES, NON-PROFIT SEEKING	0.0154	-0.3468
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.0151	-0.3537
BUSINESS SERVICES	0.0141	-0.3855
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.0138	-0.3930
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0121	-0.4414
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.0117	-0.4530
OTHER MINING.	0.0115	-0.4614
OTHER SERVICES, PROFIT SEEKING	0.0085	-0.5469
CATERING AND ACCOMODATION SERVICES	0.0077	-0.5701
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0071	-0.5871
WOOD AND FURNITURE.	0.0061	-0.6190
WATER SUPPLY	0.0034	-0.6957
BUILDING CONSTRUCTION	0.0033	-0.7009
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0030	-0.7084
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0027	-0.7183
OTHER MANUFACTURING INDUSTRIES	0.0021	-0.7360
JEWELLERY AND RELATED ARTICLES	0.0003	-0.7877
GOLD MINING.	0.0001	-0.7943

Arithmetic Mean (A.M.) - Excluding Coal	0.0272
Standard Deviation (S.D.)	0.0342

Figure 7.1

TOTAL GDP MULTIPLIERS - COAL MINING FREQUENCY DISTRIBUTIONS



7.4 Gold Mining Sectoral Total GDP Multipliers

These multipliers show the impact that increased gold mining output had on its suppliers of intermediate input. The calculations exclude the impact of gold mining on itself.

Tables 7.8 to 7.14 show the same information as Tables 7.1 to 7.7 for the gold mining sector (multipliers, means, standard deviations and distance from means).

In 1993 the maximum multiplier was 0.1513 and the minimum was 0.0002, with a mean of 0.0239. The standard deviation was 0.0311. The multipliers of twenty-five sectors were between –1 and 0 standard deviations from this mean, five sectors were between 0 and +1 standard deviations, three sectors were between +1 and +2 standard deviations, and one sector was further than +4 standard deviations from the mean.

Figure 7.2 shows the frequency distributions of multipliers around the mean in terms of standard deviations for each of the seven years. Increases in gold mining output did not affect those suppliers of intermediate input with multipliers concentrated in the mode to any significantly different degree.

Deviations of more than two standard deviations indicate a significant difference from the mean. In 1993 the impact of increased gold mining output on suppliers of intermediate input was significantly different in one sector (wholesale and retail trade and motor trade). In no year was the impact greater than 10% in more than one sector. In 1993, for every R1m increase in gold mining output, increased demand for intermediate input was less than R0.1m in thirty-three sectors, less than R0.05m in thirty sectors, and less than R0.01m in sixteen sectors.

The sector that, throughout the period under review, consistently benefited most from increased coal production is "wholesale and retail trade and motor trade". In 1993 the multiplier was 0.1513, i.e., for every R1 million increase in gold output, demand

for intermediate input from "wholesale and retail trade and motor trade" increased by R0.1513 million.

This is the same sector that benefited the most from coal mining output. Section 7.9 discusses possible reasons.

Table 7.8

Ranking of Sectors by Gold Mining GDP Multipliers	1971 Multiplier	Standard Deviations from Mean
GOLD MINING.	0.7044	Excluded
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	0.1402	3.7596
REAL ESTATE	0.0932	2.2350
AGRICULTURE, FORESTRY AND FISHING.	0.0823	1.8815
REMUNERATION OF EMPLOYEES	0.0642	1.2944
TRANSPORT AND STORAGE	0.0615	1.2068
ELECTRICITY, GAS AND STEAM	0.0522	0.9051
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.0394	0.4899
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.0291	0.1558
BUSINESS SERVICES	0.0291	0.1558
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.0250	0.0228
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.0234	-0.0291
COMMUNICATION	0.0200	-0.1394
OTHER SERVICES, NON-PROFIT SEEKING	0.0166	-0.2497
PAPER, PRINTING AND PUBLISHING.	0.0161	-0.2659
FABRICATED METAL PRODUCTS.	0.0148	-0.3081
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.0134	-0.3535
OTHER SERVICES, PROFIT SEEKING	0.0134	-0.3535
ENGINES,MACHINERY AND EQUIPMENT.	0.0109	-0.4346
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.0105	-0.4475
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.0103	-0.4540
CATERING AND ACCOMODATION SERVICES	0.0099	-0.4670
COAL MINING.	0.0079	-0.5319
OTHER MINING.	0.0066	-0.5741
WATER SUPPLY	0.0066	-0.5741
WOOD AND FURNITURE.	0.0059	-0.5968
ELECTRICAL MACHINERY AND APPLIANCES.	0.0056	-0.6065
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0047	-0.6357
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.0046	-0.6389
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0026	-0.7038
BUILDING CONSTRUCTION	0.0024	-0.7103
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0015	-0.7395
OTHER MANUFACTURING INDUSTRIES	0.0012	-0.7492
JEWELLERY AND RELATED ARTICLES	0.0010	-0.7557
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0000	-0.7881

Arithmetic Mean (A.M.) - Excluding Gold	0.0243
Standard Deviation (S.D.)	0.0308

Table 7.9

Ranking of Sectors by Gold Mining GDP Multipliers	1975 Multiplier	Standard Deviations from Mean
GOLD MINING.	0.8245	Excluded
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	0.1085	4.1956
REAL ESTATE	0.0609	2.0305
AGRICULTURE, FORESTRY AND FISHING.	0.0518	1.6166
TRANSPORT AND STORAGE	0.0431	1.2209
REMUNERATION OF EMPLOYEES	0.0413	1.1390
ELECTRICITY, GAS AND STEAM	0.0289	0.5750
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.0257	0.4294
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.0211	0.2202
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.0188	0.1156
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.0181	0.0837
COMMUNICATION	0.0125	-0.1710
BUSINESS SERVICES	0.0121	-0.1892
PAPER, PRINTING AND PUBLISHING.	0.0113	-0.2256
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.0103	-0.2710
OTHER SERVICES, NON-PROFIT SEEKING	0.0095	-0.3074
FABRICATED METAL PRODUCTS.	0.0086	-0.3484
OTHER SERVICES, PROFIT SEEKING	0.0076	-0.3938
ENGINES,MACHINERY AND EQUIPMENT.	0.0075	-0.3984
COAL MINING.	0.0070	-0.4211
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.0064	-0.4484
CATERING AND ACCOMODATION SERVICES	0.0056	-0.4848
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.0056	-0.4848
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.0050	-0.5121
ELECTRICAL MACHINERY AND APPLIANCES.	0.0047	-0.5258
WOOD AND FURNITURE.	0.0039	-0.5621
WATER SUPPLY	0.0036	-0.5758
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0030	-0.6031
OTHER MINING.	0.0029	-0.6076
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0020	-0.6486
BUILDING CONSTRUCTION	0.0019	-0.6531
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0019	-0.6531
OTHER MANUFACTURING INDUSTRIES	0.0008	-0.7031
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0005	-0.7168
JEWELLERY AND RELATED ARTICLES	0.0004	-0.7213

Arithmetic Mean (A.M.) - Excluding Gold	0.0163
Standard Deviation (S.D.)	0.0220

Table 7.10

Ranking of Sectors by Gold Mining GDP Multipliers	1978 Multiplier	Standard Deviations from Mean
GOLD MINING.	0.7740	Excluded
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	0.0979	3.6416
AGRICULTURE, FORESTRY AND FISHING.	0.0559	1.7319
ELECTRICITY, GAS AND STEAM	0.0556	1.7183
REAL ESTATE	0.0553	1.7046
TRANSPORT AND STORAGE	0.0526	1.5819
REMUNERATION OF EMPLOYEES	0.0457	1.2682
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.0315	0.6225
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.0249	0.3224
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.0176	-0.0095
BUSINESS SERVICES	0.0155	-0.1050
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.0140	-0.1732
COMMUNICATION	0.0126	-0.2368
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.0119	-0.2687
PAPER, PRINTING AND PUBLISHING.	0.0112	-0.3005
COAL MINING.	0.0108	-0.3187
OTHER SERVICES, NON-PROFIT SEEKING	0.0100	-0.3551
ENGINES,MACHINERY AND EQUIPMENT.	0.0096	-0.3732
FABRICATED METAL PRODUCTS.	0.0093	-0.3869
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.0084	-0.4278
OTHER SERVICES, PROFIT SEEKING	0.0074	-0.4733
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.0061	-0.5324
OTHER MINING.	0.0060	-0.5369
WATER SUPPLY	0.0053	-0.5688
ELECTRICAL MACHINERY AND APPLIANCES.	0.0049	-0.5869
CATERING AND ACCOMODATION SERVICES	0.0045	-0.6051
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.0044	-0.6097
WOOD AND FURNITURE.	0.0035	-0.6506
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0035	-0.6506
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0033	-0.6597
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0026	-0.6915
BUILDING CONSTRUCTION	0.0014	-0.7461
OTHER MANUFACTURING INDUSTRIES	0.0010	-0.7643
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0008	-0.7734
JEWELLERY AND RELATED ARTICLES	0.0005	-0.7870

Arithmetic Mean (A.M.) - Excluding Gold	0.0178
Standard Deviation (S.D.)	0.0220

Table 7.11

Ranking of Sectors by Gold Mining GDP Multipliers	1981 Multiplier	Standard Deviations from Mean
GOLD MINING.	0.7940	Excluded
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	0.0862	3.9206
AGRICULTURE, FORESTRY AND FISHING.	0.0491	1.8793
ELECTRICITY, GAS AND STEAM	0.0425	1.5162
TRANSPORT AND STORAGE	0.0401	1.3841
REAL ESTATE	0.0401	1.3841
REMUNERATION OF EMPLOYEES	0.0336	1.0265
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.0292	0.7844
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.0215	0.3607
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.0154	0.0251
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.0150	0.0031
FABRICATED METAL PRODUCTS.	0.0113	-0.2005
BUSINESS SERVICES	0.0103	-0.2555
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.0101	-0.2665
COAL MINING.	0.0098	-0.2830
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.0098	-0.2830
COMMUNICATION	0.0092	-0.3161
PAPER, PRINTING AND PUBLISHING.	0.0090	-0.3271
ENGINES,MACHINERY AND EQUIPMENT.	0.0089	-0.3326
OTHER SERVICES, NON-PROFIT SEEKING	0.0082	-0.3711
OTHER SERVICES, PROFIT SEEKING	0.0061	-0.4866
OTHER MINING.	0.0059	-0.4976
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.0053	-0.5306
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.0052	-0.5361
ELECTRICAL MACHINERY AND APPLIANCES.	0.0040	-0.6022
WOOD AND FURNITURE.	0.0038	-0.6132
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0038	-0.6132
WATER SUPPLY	0.0037	-0.6187
CATERING AND ACCOMODATION SERVICES	0.0037	-0.6187
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0032	-0.6462
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0016	-0.7342
BUILDING CONSTRUCTION	0.0011	-0.7617
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0008	-0.7782
JEWELLERY AND RELATED ARTICLES	0.0005	-0.7947
OTHER MANUFACTURING INDUSTRIES	0.0001	-0.8168

Arithmetic Mean (A.M.) - Excluding Gold	0.0149
Standard Deviation (S.D.)	0.0182

Table 7.12

Ranking of Sectors by Gold Mining GDP Multipliers	1984 Multiplier	Standard Deviations from Mean
GOLD MINING.	0.7636	Excluded
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	0.1082	3.8153
REAL ESTATE	0.0578	1.6556
ELECTRICITY, GAS AND STEAM	0.0569	1.6170
TRANSPORT AND STORAGE	0.0558	1.5699
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.0485	1.2571
REMUNERATION OF EMPLOYEES	0.0456	1.1328
AGRICULTURE, FORESTRY AND FISHING.	0.0454	1.1242
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.0257	0.2801
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.0218	0.1129
COMMUNICATION	0.0178	-0.0585
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.0172	-0.0842
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.0150	-0.1785
BUSINESS SERVICES	0.0135	-0.2427
PAPER, PRINTING AND PUBLISHING.	0.0112	-0.3413
COAL MINING.	0.0105	-0.3713
FABRICATED METAL PRODUCTS.	0.0100	-0.3927
ENGINES,MACHINERY AND EQUIPMENT.	0.0099	-0.3970
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.0088	-0.4441
OTHER SERVICES, NON-PROFIT SEEKING	0.0087	-0.4484
OTHER SERVICES, PROFIT SEEKING	0.0084	-0.4613
OTHER MINING.	0.0079	-0.4827
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.0078	-0.4870
WATER SUPPLY	0.0061	-0.5598
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.0056	-0.5813
CATERING AND ACCOMODATION SERVICES	0.0056	-0.5813
ELECTRICAL MACHINERY AND APPLIANCES.	0.0044	-0.6327
WOOD AND FURNITURE.	0.0043	-0.6370
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0043	-0.6370
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0031	-0.6884
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0020	-0.7355
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0018	-0.7441
BUILDING CONSTRUCTION	0.0012	-0.7698
JEWELLERY AND RELATED ARTICLES	0.0004	-0.8041
OTHER MANUFACTURING INDUSTRIES	0.0004	-0.8041

Arithmetic Mean (A.M.) - Excluding Gold	0.0192
Standard Deviation (S.D.)	0.0233

Table 7.13

Ranking of Sectors by Gold Mining GDP Multipliers	1989 Multiplier	Standard Deviations from Mean
GOLD MINING.	0.6468	Excluded
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	0.1242	3.6357
ELECTRICITY, GAS AND STEAM	0.0885	2.3509
REMUNERATION OF EMPLOYEES	0.0672	1.5834
REAL ESTATE	0.0608	1.3518
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.0544	1.1192
AGRICULTURE, FORESTRY AND FISHING.	0.0518	1.0268
TRANSPORT AND STORAGE	0.0516	1.0186
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.0326	0.3349
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.0289	0.2014
COMMUNICATION	0.0245	0.0423
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.0184	-0.1772
PAPER, PRINTING AND PUBLISHING.	0.0170	-0.2281
FABRICATED METAL PRODUCTS.	0.0148	-0.3059
WOOD AND FURNITURE.	0.0141	-0.3316
ENGINES,MACHINERY AND EQUIPMENT.	0.0136	-0.3495
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.0128	-0.3793
OTHER SERVICES, NON-PROFIT SEEKING	0.0128	-0.3809
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.0119	-0.4109
COAL MINING.	0.0102	-0.4727
BUSINESS SERVICES	0.0096	-0.4958
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.0088	-0.5234
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.0086	-0.5298
OTHER MINING.	0.0079	-0.5549
ELECTRICAL MACHINERY AND APPLIANCES.	0.0073	-0.5783
OTHER SERVICES, PROFIT SEEKING	0.0071	-0.5848
CATERING AND ACCOMODATION SERVICES	0.0070	-0.5892
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0061	-0.6198
BUILDING CONSTRUCTION	0.0049	-0.6638
WATER SUPPLY	0.0043	-0.6855
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0043	-0.6856
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0027	-0.7444
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0020	-0.7676
OTHER MANUFACTURING INDUSTRIES	0.0018	-0.7752
JEWELLERY AND RELATED ARTICLES	0.0003	-0.8309

Arithmetic Mean (A.M.) - Excluding Gold	0.0233
Standard Deviation (S.D.)	0.0277

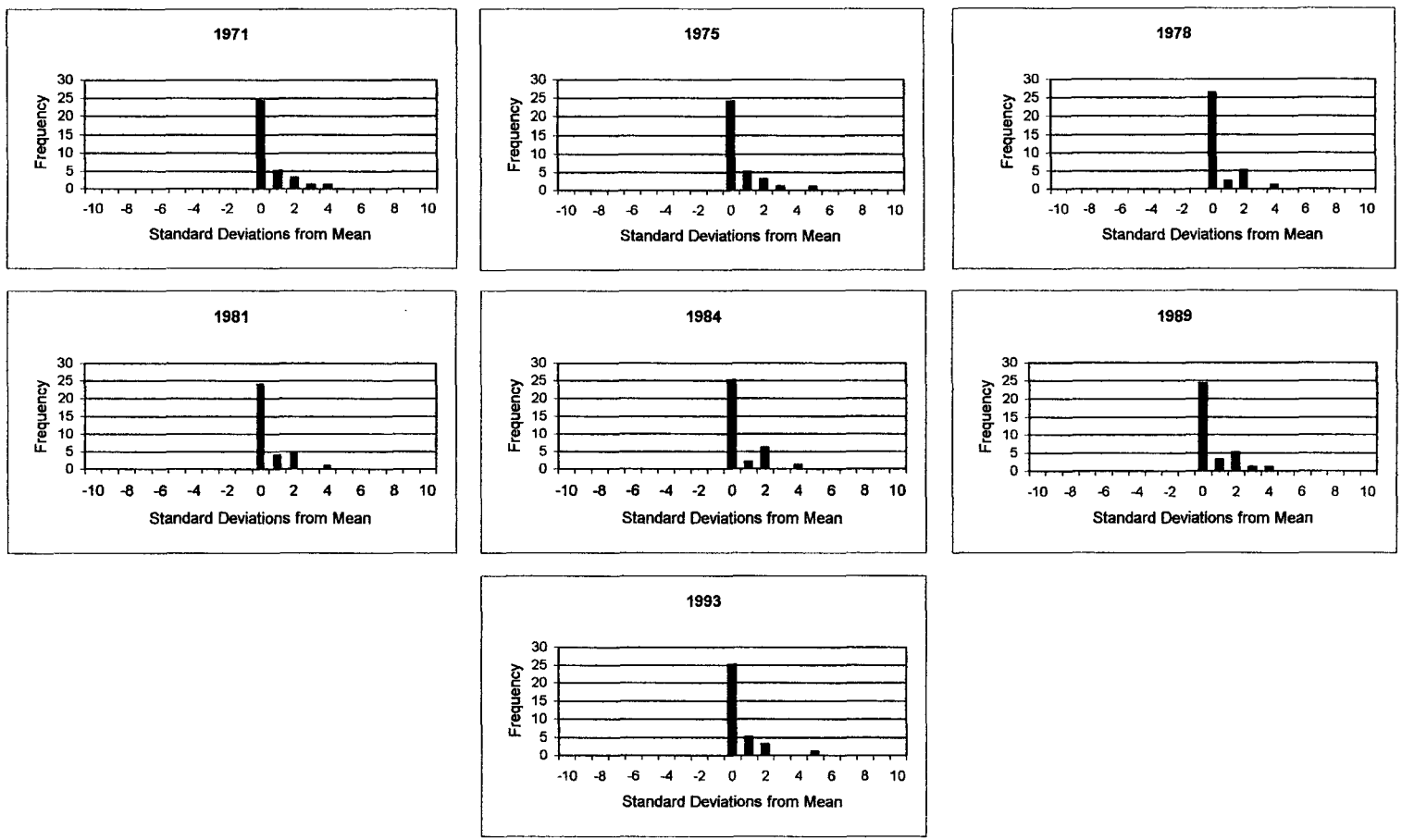
Table 7.14

Ranking of Sectors by Gold Mining GDP Multipliers	1993 Multiplier	Standard Deviations from Mean
GOLD MINING.	0.7693	Excluded
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	0.1513	4.1027
REAL ESTATE	0.0835	1.9208
REMUNERATION OF EMPLOYEES	0.0776	1.7288
ELECTRICITY, GAS AND STEAM	0.0719	1.5451
TRANSPORT AND STORAGE	0.0499	0.8390
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.0459	0.7098
AGRICULTURE, FORESTRY AND FISHING.	0.0432	0.6210
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.0331	0.2956
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.0313	0.2403
COMMUNICATION	0.0221	-0.0564
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.0171	-0.2176
PAPER, PRINTING AND PUBLISHING.	0.0152	-0.2781
BUSINESS SERVICES	0.0132	-0.3438
OTHER SERVICES, NON-PROFIT SEEKING	0.0124	-0.3676
FABRICATED METAL PRODUCTS.	0.0121	-0.3784
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.0117	-0.3933
ENGINES,MACHINERY AND EQUIPMENT.	0.0116	-0.3949
WOOD AND FURNITURE.	0.0110	-0.4143
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.0091	-0.4752
OTHER SERVICES, PROFIT SEEKING	0.0090	-0.4796
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.0087	-0.4880
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.0086	-0.4918
CATERING AND ACCOMODATION SERVICES	0.0080	-0.5116
COAL MINING.	0.0077	-0.5216
OTHER MINING.	0.0074	-0.5288
ELECTRICAL MACHINERY AND APPLIANCES.	0.0067	-0.5527
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0063	-0.5662
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0060	-0.5738
BUILDING CONSTRUCTION	0.0059	-0.5774
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0057	-0.5848
WATER SUPPLY	0.0036	-0.6514
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0028	-0.6783
OTHER MANUFACTURING INDUSTRIES	0.0016	-0.7163
JEWELLERY AND RELATED ARTICLES	0.0002	-0.7612

Arithmetic Mean (A.M.) - Excluding Gold	0.0239
Standard Deviation (S.D.)	0.0311

Figure 7.2

TOTAL GDP MULTIPLIERS - GOLD MINING FREQUENCY DISTRIBUTIONS



7.5 Other Mining Sectoral Total GDP Multipliers

These multipliers show the impact that increased other mining output had on its suppliers of intermediate input. The calculations exclude the impact of other mining on itself.

Tables 7.15 to 7.21 show the same information as Tables 7.1 to 7.7 for the other mining sector (multipliers, means, standard deviations and distance from means).

In 1993 the maximum multiplier was 0.1553 and the minimum was 0.0001, with a mean of 0.0247. The standard deviation was 0.0396. The multipliers of twenty-four sectors were between –1 and 0 standard deviations from this mean, seven sectors were between 0 and +1 standard deviations, two sectors were between +1 and +2 standard deviations, and one sector was further than +3 standard deviations from the mean.

Figure 7.3 shows the frequency distributions of multipliers around the mean in terms of standard deviations for each of the seven years. Increases in other mining output do not affect those suppliers of intermediate input with multipliers concentrated in the mode to any significantly different degree.

Deviations of more than two standard deviations indicate a significant difference from the mean. In 1993 the impact of increased other mining output on suppliers of intermediate input was significantly different in one sector (wholesale and retail trade and motor trade). In no year except 1971 was the impact greater than 10% in more than one sector. In 1993, for every R1m increase in other mining output, increased demand for intermediate input was less than R0.1m in thirty-three sectors, less than R0.05m in twenty-eight sectors, and less than R0.01m in thirteen sectors.

As with coal mining and gold mining, the sector which consistently benefited most from other mining production is "wholesale and retail trade and motor trade". In 1993 the multiplier was 0.1533 i.e., for every R1 million increase in coal output,

demand for intermediate input from this sector increased by R0.1533million.

Section 7.9 discusses the apparent importance of this sector (wholesale and retail trade and motor trade) to all three mining sectors.

Table 7.15

Ranking of Sectors by Other Mining GDP Multipliers	1971 Multiplier	Standard Deviations from Mean
OTHER MINING.	0.6555	Excluded
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	0.1328	3.9625
REAL ESTATE	0.0828	2.1664
AGRICULTURE, FORESTRY AND FISHING.	0.0637	1.4802
TRANSPORT AND STORAGE	0.0617	1.4084
REMUNERATION OF EMPLOYEES	0.0560	1.2036
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.0401	0.6325
ELECTRICITY, GAS AND STEAM	0.0394	0.6073
BUSINESS SERVICES	0.0281	0.2014
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.0253	0.1008
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.0227	0.0074
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.0219	-0.0213
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.0199	-0.0932
COMMUNICATION	0.0199	-0.0932
OTHER SERVICES, NON-PROFIT SEEKING	0.0169	-0.2010
PAPER, PRINTING AND PUBLISHING.	0.0162	-0.2261
ENGINES,MACHINERY AND EQUIPMENT.	0.0160	-0.2333
OTHER SERVICES, PROFIT SEEKING	0.0129	-0.3446
FABRICATED METAL PRODUCTS.	0.0120	-0.3770
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.0116	-0.3913
COAL MINING.	0.0099	-0.4524
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.0092	-0.4776
CATERING AND ACCOMODATION SERVICES	0.0090	-0.4847
ELECTRICAL MACHINERY AND APPLIANCES.	0.0058	-0.5997
WOOD AND FURNITURE.	0.0057	-0.6033
WATER SUPPLY	0.0056	-0.6069
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0052	-0.6213
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.0047	-0.6392
BUILDING CONSTRUCTION	0.0035	-0.6823
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0022	-0.7290
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0017	-0.7470
OTHER MANUFACTURING INDUSTRIES	0.0011	-0.7685
JEWELLERY AND RELATED ARTICLES	0.0009	-0.7757
GOLD MINING.	0.0004	-0.7937
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0000	-0.8081

Arithmetic Mean (A.M.) - Excluding Other Mining	0.0225
Standard Deviation (S.D.)	0.0278

Table 7.16

Ranking of Sectors by Other Mining GDP Multipliers	1975 Multiplier	Standard Deviations from Mean
OTHER MINING.	0.6377	Excluded
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	0.1481	3.5490
REAL ESTATE	0.0722	1.4217
TRANSPORT AND STORAGE	0.0634	1.1750
AGRICULTURE, FORESTRY AND FISHING.	0.0550	0.9396
REMUNERATION OF EMPLOYEES	0.0470	0.7154
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.0431	0.6061
ELECTRICITY, GAS AND STEAM	0.0359	0.4043
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.0272	0.1604
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.0243	0.0791
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.0233	0.0511
COMMUNICATION	0.0191	-0.0666
ENGINES,MACHINERY AND EQUIPMENT.	0.0170	-0.1255
BUSINESS SERVICES	0.0163	-0.1451
PAPER, PRINTING AND PUBLISHING.	0.0161	-0.1507
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.0148	-0.1871
OTHER SERVICES, NON-PROFIT SEEKING	0.0122	-0.2600
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.0119	-0.2684
FABRICATED METAL PRODUCTS.	0.0115	-0.2796
COAL MINING.	0.0113	-0.2852
OTHER SERVICES, PROFIT SEEKING	0.0089	-0.3525
CATERING AND ACCOMODATION SERVICES	0.0070	-0.4058
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.0064	-0.4226
ELECTRICAL MACHINERY AND APPLIANCES.	0.0062	-0.4282
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.0060	-0.4338
WATER SUPPLY	0.0054	-0.4506
WOOD AND FURNITURE.	0.0048	-0.4674
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0048	-0.4674
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0041	-0.4870
BUILDING CONSTRUCTION	0.0024	-0.5347
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0018	-0.5515
OTHER MANUFACTURING INDUSTRIES	0.0011	-0.5711
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0009	-0.5767
JEWELLERY AND RELATED ARTICLES	0.0004	-0.5907
GOLD MINING.	0.0003	-0.5935

Arithmetic Mean (A.M.) - Excluding Other Mining	0.0215
Standard Deviation (S.D.)	0.0357

Table 7.17

Ranking of Sectors by Other Mining GDP Multipliers	1978 Multiplier	Standard Deviations from Mean
OTHER MINING.	0.6584	Excluded
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	0.1048	2.9969
TRANSPORT AND STORAGE	0.0602	1.4485
REAL ESTATE	0.0529	1.1950
ELECTRICITY, GAS AND STEAM	0.0474	1.0041
AGRICULTURE, FORESTRY AND FISHING.	0.0471	0.9937
REMUNERATION OF EMPLOYEES	0.0420	0.8166
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.0415	0.7992
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.0231	0.1604
ENGINES,MACHINERY AND EQUIPMENT.	0.0187	0.0077
BUSINESS SERVICES	0.0167	-0.0618
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.0166	-0.0653
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.0163	-0.0757
COMMUNICATION	0.0162	-0.0791
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.0134	-0.1763
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.0133	-0.1798
PAPER, PRINTING AND PUBLISHING.	0.0130	-0.1902
COAL MINING.	0.0114	-0.2458
OTHER SERVICES, NON-PROFIT SEEKING	0.0108	-0.2666
FABRICATED METAL PRODUCTS.	0.0099	-0.2979
OTHER SERVICES, PROFIT SEEKING	0.0070	-0.3985
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0062	-0.4263
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.0058	-0.4402
WATER SUPPLY	0.0057	-0.4437
ELECTRICAL MACHINERY AND APPLIANCES.	0.0052	-0.4610
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.0052	-0.4610
CATERING AND ACCOMODATION SERVICES	0.0047	-0.4784
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0037	-0.5131
WOOD AND FURNITURE.	0.0036	-0.5166
BUILDING CONSTRUCTION	0.0017	-0.5826
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0016	-0.5860
OTHER MANUFACTURING INDUSTRIES	0.0011	-0.6034
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0008	-0.6138
JEWELLERY AND RELATED ARTICLES	0.0005	-0.6242
GOLD MINING.	0.0002	-0.6346

Arithmetic Mean (A.M.) - Excluding Other Mining	0.0185
Standard Deviation (S.D.)	0.0288

Table 7.18

Ranking of Sectors by Other Mining GDP Multipliers	1981 Multiplier	Standard Deviations from Mean
OTHER MINING.	0.5938	Excluded
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	0.1305	3.2541
TRANSPORT AND STORAGE	0.0649	1.2987
AGRICULTURE, FORESTRY AND FISHING.	0.0542	0.9798
REAL ESTATE	0.0541	0.9768
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.0501	0.8576
ELECTRICITY, GAS AND STEAM	0.0491	0.8278
REMUNERATION OF EMPLOYEES	0.0428	0.6400
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.0273	0.1780
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.0246	0.0975
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.0236	0.0677
ENGINES,MACHINERY AND EQUIPMENT.	0.0208	-0.0158
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.0198	-0.0456
COMMUNICATION	0.0171	-0.1261
BUSINESS SERVICES	0.0151	-0.1857
COAL MINING.	0.0144	-0.2065
PAPER, PRINTING AND PUBLISHING.	0.0139	-0.2215
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.0137	-0.2274
FABRICATED METAL PRODUCTS.	0.0123	-0.2691
OTHER SERVICES, NON-PROFIT SEEKING	0.0122	-0.2721
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0086	-0.3794
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.0085	-0.3824
OTHER SERVICES, PROFIT SEEKING	0.0080	-0.3973
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.0070	-0.4271
ELECTRICAL MACHINERY AND APPLIANCES.	0.0059	-0.4599
WATER SUPPLY	0.0058	-0.4629
WOOD AND FURNITURE.	0.0053	-0.4778
CATERING AND ACCOMODATION SERVICES	0.0052	-0.4808
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0046	-0.4987
BUILDING CONSTRUCTION	0.0018	-0.5821
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0016	-0.5881
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0011	-0.6030
JEWELLERY AND RELATED ARTICLES	0.0007	-0.6149
GOLD MINING.	0.0005	-0.6209
OTHER MANUFACTURING INDUSTRIES	0.0001	-0.6328

Arithmetic Mean (A.M.) - Excluding Other Mining	0.0213
Standard Deviation (S.D.)	0.0335

Table 7.19

Ranking of Sectors by Other Mining GDP Multipliers	1984 Multiplier	Standard Deviations from Mean
OTHER MINING.	0.5817	Excluded
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	0.1417	3.0332
TRANSPORT AND STORAGE	0.0754	1.3159
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.0710	1.2020
REAL ESTATE	0.0682	1.1294
ELECTRICITY, GAS AND STEAM	0.0662	1.0776
REMUNERATION OF EMPLOYEES	0.0510	0.6839
AGRICULTURE, FORESTRY AND FISHING.	0.0459	0.5518
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.0371	0.3239
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.0318	0.1866
COMMUNICATION	0.0315	0.1789
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.0289	0.1115
ENGINES,MACHINERY AND EQUIPMENT.	0.0180	-0.1708
BUSINESS SERVICES	0.0175	-0.1837
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.0168	-0.2019
PAPER, PRINTING AND PUBLISHING.	0.0151	-0.2459
COAL MINING.	0.0145	-0.2614
OTHER SERVICES, NON-PROFIT SEEKING	0.0116	-0.3366
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.0114	-0.3417
FABRICATED METAL PRODUCTS.	0.0113	-0.3443
OTHER SERVICES, PROFIT SEEKING	0.0096	-0.3884
WATER SUPPLY	0.0091	-0.4013
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.0090	-0.4039
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0082	-0.4246
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.0075	-0.4428
CATERING AND ACCOMODATION SERVICES	0.0069	-0.4583
ELECTRICAL MACHINERY AND APPLIANCES.	0.0055	-0.4946
WOOD AND FURNITURE.	0.0052	-0.5023
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0039	-0.5360
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0021	-0.5826
BUILDING CONSTRUCTION	0.0016	-0.5956
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0014	-0.6008
JEWELLERY AND RELATED ARTICLES	0.0006	-0.6215
OTHER MANUFACTURING INDUSTRIES	0.0005	-0.6241
GOLD MINING.	0.0002	-0.6318

Arithmetic Mean (A.M.) - Excluding Other Mining	0.0246
Standard Deviation (S.D.)	0.0386

Table 7.20

Ranking of Sectors by Other Mining GDP Multipliers	1989 Multiplier	Standard Deviations from Mean
OTHER MINING.	0.6470	Excluded
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	0.1160	2.9840
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.0582	1.1780
REMUNERATION OF EMPLOYEES	0.0571	1.1437
ELECTRICITY, GAS AND STEAM	0.0551	1.0820
TRANSPORT AND STORAGE	0.0543	1.0566
REAL ESTATE	0.0526	1.0027
AGRICULTURE, FORESTRY AND FISHING.	0.0425	0.6881
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.0286	0.2530
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.0277	0.2250
COMMUNICATION	0.0264	0.1847
ENGINES,MACHINERY AND EQUIPMENT.	0.0160	-0.1405
PAPER, PRINTING AND PUBLISHING.	0.0157	-0.1498
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.0154	-0.1590
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.0151	-0.1692
OTHER SERVICES, NON-PROFIT SEEKING	0.0121	-0.2626
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.0112	-0.2920
FABRICATED METAL PRODUCTS.	0.0107	-0.3058
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.0100	-0.3286
COAL MINING.	0.0093	-0.3512
BUSINESS SERVICES	0.0087	-0.3699
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.0077	-0.3998
ELECTRICAL MACHINERY AND APPLIANCES.	0.0063	-0.4442
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0063	-0.4447
CATERING AND ACCOMODATION SERVICES	0.0063	-0.4453
OTHER SERVICES, PROFIT SEEKING	0.0061	-0.4499
WATER SUPPLY	0.0053	-0.4750
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0051	-0.4822
WOOD AND FURNITURE.	0.0047	-0.4933
BUILDING CONSTRUCTION	0.0025	-0.5642
OTHER MANUFACTURING INDUSTRIES	0.0016	-0.5902
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0013	-0.5993
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0010	-0.6091
JEWELLERY AND RELATED ARTICLES	0.0003	-0.6325
GOLD MINING.	0.0000	-0.6396

Arithmetic Mean (A.M.) - Excluding Other Mining	0.0205
Standard Deviation (S.D.)	0.0320

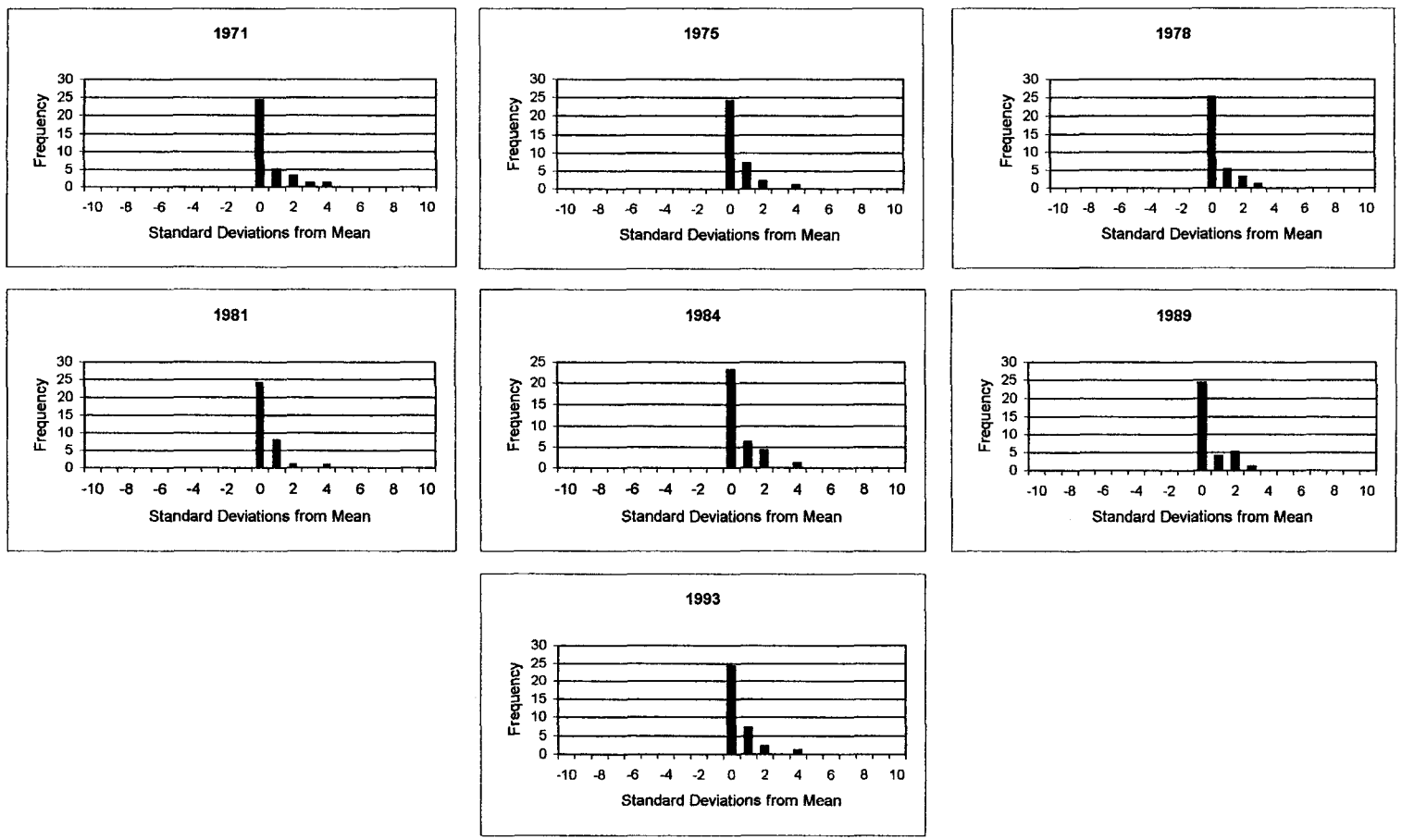
Table 7.21

Ranking of Sectors by Other Mining GDP Multipliers	1993 Multiplier	Standard Deviations from Mean
OTHER MINING.	0.5511	Excluded
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	0.1533	3.2459
REAL ESTATE	0.0752	1.2750
ELECTRICITY, GAS AND STEAM	0.0740	1.2427
REMUNERATION OF EMPLOYEES	0.0641	0.9926
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.0636	0.9807
TRANSPORT AND STORAGE	0.0608	0.9104
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.0361	0.2877
AGRICULTURE, FORESTRY AND FISHING.	0.0359	0.2825
COMMUNICATION	0.0293	0.1142
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.0263	0.0385
ENGINES,MACHINERY AND EQUIPMENT.	0.0213	-0.0879
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.0184	-0.1604
PAPER, PRINTING AND PUBLISHING.	0.0154	-0.2351
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.0154	-0.2359
OTHER SERVICES, NON-PROFIT SEEKING	0.0154	-0.2370
FABRICATED METAL PRODUCTS.	0.0133	-0.2892
BUSINESS SERVICES	0.0129	-0.2996
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.0116	-0.3318
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0116	-0.3328
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.0113	-0.3405
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.0111	-0.3440
COAL MINING.	0.0095	-0.3844
ELECTRICAL MACHINERY AND APPLIANCES.	0.0086	-0.4063
OTHER SERVICES, PROFIT SEEKING	0.0079	-0.4245
CATERING AND ACCOMODATION SERVICES	0.0073	-0.4411
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0067	-0.4565
WATER SUPPLY	0.0065	-0.4614
WOOD AND FURNITURE.	0.0057	-0.4798
BUILDING CONSTRUCTION	0.0048	-0.5034
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0031	-0.5454
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0029	-0.5522
OTHER MANUFACTURING INDUSTRIES	0.0018	-0.5799
JEWELLERY AND RELATED ARTICLES	0.0003	-0.6176
GOLD MINING.	0.0001	-0.6233

Arithmetic Mean (A.M.) - Excluding Other Mining	0.0247
Standard Deviation (S.D.)	0.0396

Figure 7.3

TOTAL GDP MULTIPLIERS - OTHER MINING FREQUENCY DISTRIBUTIONS



7.6 Coal Mining Sectoral Total Employment Multipliers

These multipliers show the number of jobs created, for every R1m increase in coal mining output, in sectors that supply intermediate input to the coal mining industry.

Tables 7.22 to 7.28 show:

(i) Coal mining sectoral multipliers for each of the years discussed in this thesis.
(ii) An arithmetic mean for each set.
(iii) The standard deviation of each set.
(iv) The distance, expressed in standard deviations, of each multiplier from its mean.

In 1993 the maximum multiplier was 2.9917 and the minimum was 0.0013, with a mean of 0.5071. The standard deviation was 0.7150. The multipliers of twenty-five sectors were between –1 and 0 standard deviations from this mean, five sectors were between 0 and +1 standard deviations, one sectors was between +1 and +2 standard deviations, two sectors were between +2 and +3 standard deviation, and one sector was further than +3 standard deviations from the mean.

Figure 7.4 shows the frequency distributions of multipliers around the mean in terms of standard deviations for each of the seven years. Increased coal mining output did not affect employment in those suppliers of intermediate input concentrated in the mode to any significantly different degree.

Deviations of more than two standard deviations indicate a significant difference from the mean. In 1993 coal mining created significantly more employment in three sectors supplying its intermediate input than in the rest of the economy, i.e.:

(i) Wholesale and retail trade and motor trade
(ii) Remuneration of employees (households)

(iii) Agriculture, forestry and fishing.

In no year, except 1971, were more than five jobs created, per R1m of output, in any sector supplying intermediate input to the coal mining sector. The average number of -jobs created has steadily declined since 1971, and in 1993 less than 1 job per R1m output was created in 29 sectors.

The sector that, for five of the seven years under review, benefited most from increased other mining production was "households". This situation changed in 1989 and 1993 when employment in "wholesale and retail trade and motor trade" benefited the most from coal mining output. Its employment multiplier was 3.4749, i.e., for every R1 million increase in coal mining output, employment in "wholesale and retail trade and motor trade" increased by 3.4749 jobs.

The employment multipliers maintain the pattern established in the preceding Sections, i.e., that the chief beneficiary of increased mining output is "wholesale trade and motor trade". This is discussed in Section 7.9.

Table 7.22

Ranking of Sectors by Coal Mining Total Employment Multipliers	1971 Multiplier	Standard Deviations from Mean
COAL MINING.	42.3912	Excluded
REMUNERATION OF EMPLOYEES	5.9529	3.7192
AGRICULTURE, FORESTRY AND FISHING.	5.1429	3.1349
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	4.0335	2.3346
OTHERS,SCRAP AND GOVERNMENT SERVICES	1.2679	0.3396
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	1.1649	0.2653
TRANSPORT AND STORAGE	1.1574	0.2599
COMMUNICATION	1.0457	0.1793
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.8432	0.0332
CATERING AND ACCOMODATION SERVICES	0.7053	-0.0663
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.7052	-0.0663
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.6667	-0.0941
FABRICATED METAL PRODUCTS.	0.4664	-0.2386
PAPER, PRINTING AND PUBLISHING.	0.3736	-0.3055
WOOD AND FURNITURE.	0.3600	-0.3154
ENGINES,MACHINERY AND EQUIPMENT.	0.3521	-0.3211
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.3220	-0.3428
ELECTRICITY, GAS AND STEAM	0.3207	-0.3437
BUSINESS SERVICES	0.3112	-0.3506
ELECTRICAL MACHINERY AND APPLIANCES.	0.2471	-0.3968
OTHER SERVICES, NON-PROFIT SEEKING	0.2299	-0.4092
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.2087	-0.4245
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.1901	-0.4379
REAL ESTATE	0.1854	-0.4413
OTHER MINING.	0.1612	-0.4588
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.1525	-0.4650
OTHER SERVICES, PROFIT SEEKING	0.1401	-0.4740
WATER SUPPLY	0.0981	-0.5043
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0801	-0.5173
BUILDING CONSTRUCTION	0.0793	-0.5178
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0524	-0.5373
OTHER MANUFACTURING INDUSTRIES	0.0401	-0.5461
GOLD MINING.	0.0253	-0.5568
JEWELLERY AND RELATED ARTICLES	0.0140	-0.5650
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0076	-0.5696

Arithmetic Mean (A.M.) - Excluding Coal	0.7972
Standard Deviation (S.D.)	1.3862

Table 7.23

Ranking of Sectors by Coal Mining Total Employment Multipliers	1975 Multiplier	Standard Deviations from Mean
COAL MINING.	34.4415	Excluded
REMUNERATION OF EMPLOYEES	5.0037	3.8769
AGRICULTURE, FORESTRY AND FISHING.	3.7517	2.7659
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	3.4391	2.4885
TRANSPORT AND STORAGE	1.1976	0.4993
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	1.0501	0.3684
OTHERS,SCRAP AND GOVERNMENT SERVICES	1.0290	0.3497
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.7232	0.0783
CATERING AND ACCOMODATION SERVICES	0.6102	-0.0220
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.5269	-0.0959
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.5105	-0.1105
COMMUNICATION	0.5101	-0.1108
FABRICATED METAL PRODUCTS.	0.3117	-0.2869
PAPER, PRINTING AND PUBLISHING.	0.2690	-0.3248
BUSINESS SERVICES	0.2611	-0.3318
WOOD AND FURNITURE.	0.2442	-0.3468
ELECTRICITY, GAS AND STEAM	0.2366	-0.3535
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.2357	-0.3543
ENGINES,MACHINERY AND EQUIPMENT.	0.2082	-0.3787
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.2002	-0.3858
OTHER SERVICES, NON-PROFIT SEEKING	0.1757	-0.4076
ELECTRICAL MACHINERY AND APPLIANCES.	0.1618	-0.4199
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.1581	-0.4232
REAL ESTATE	0.1491	-0.4312
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.1423	-0.4372
OTHER MINING.	0.0996	-0.4751
OTHER SERVICES, PROFIT SEEKING	0.0912	-0.4826
BUILDING CONSTRUCTION	0.0869	-0.4864
WATER SUPPLY	0.0791	-0.4933
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0396	-0.5284
OTHER MANUFACTURING INDUSTRIES	0.0297	-0.5372
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0293	-0.5375
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0132	-0.5518
GOLD MINING.	0.0090	-0.5555
JEWELLERY AND RELATED ARTICLES	0.0063	-0.5579

Arithmetic Mean (A.M.) - Excluding Coal	0.6350
Standard Deviation (S.D.)	1.1268

Table 7.24

Ranking of Sectors by Coal Mining Total Employment Multipliers	1978 Multiplier	Standard Deviations from Mean
COAL MINING.	20.6765	Excluded
REMUNERATION OF EMPLOYEES	3.9096	3.5607
AGRICULTURE, FORESTRY AND FISHING.	3.2036	2.8047
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	3.0782	2.6704
OTHERS,SCRAP AND GOVERNMENT SERVICES	1.2264	0.6875
TRANSPORT AND STORAGE	1.2201	0.6808
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.9314	0.3717
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.7287	0.1546
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.5551	-0.0313
CATERING AND ACCOMODATION SERVICES	0.4908	-0.1001
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.4780	-0.1138
COMMUNICATION	0.4498	-0.1440
FABRICATED METAL PRODUCTS.	0.3968	-0.2008
ENGINES,MACHINERY AND EQUIPMENT.	0.3701	-0.2294
ELECTRICITY, GAS AND STEAM	0.2875	-0.3178
BUSINESS SERVICES	0.2804	-0.3254
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.2784	-0.3276
PAPER, PRINTING AND PUBLISHING.	0.2675	-0.3392
ELECTRICAL MACHINERY AND APPLIANCES.	0.2496	-0.3584
WOOD AND FURNITURE.	0.2309	-0.3784
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.1752	-0.4381
OTHER SERVICES, NON-PROFIT SEEKING	0.1676	-0.4462
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.1491	-0.4660
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.1320	-0.4843
OTHER MINING.	0.1142	-0.5034
REAL ESTATE	0.1122	-0.5055
OTHER SERVICES, PROFIT SEEKING	0.0782	-0.5419
WATER SUPPLY	0.0780	-0.5422
BUILDING CONSTRUCTION	0.0647	-0.5564
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0549	-0.5669
OTHER MANUFACTURING INDUSTRIES	0.0391	-0.5838
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0349	-0.5883
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0264	-0.5974
GOLD MINING.	0.0042	-0.6212
JEWELLERY AND RELATED ARTICLES	0.0031	-0.6224

Arithmetic Mean (A.M.) - Excluding Coal	0.5843
Standard Deviation (S.D.)	0.9339

Table 7.25

Ranking of Sectors by Coal Mining Total Employment Multipliers	1981 Multiplier	Standard Deviations from Mean
COAL MINING.	13.3671	Excluded
REMUNERATION OF EMPLOYEES	3.1841	3.4366
AGRICULTURE, FORESTRY AND FISHING.	2.6789	2.7883
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.6190	2.7114
OTHERS,SCRAP AND GOVERNMENT SERVICES	1.2779	0.9904
TRANSPORT AND STORAGE	1.0409	0.6862
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.8028	0.3807
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.6097	0.1329
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.5100	0.0049
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.4494	-0.0728
CATERING AND ACCOMODATION SERVICES	0.4157	-0.1161
COMMUNICATION	0.3885	-0.1510
ENGINES,MACHINERY AND EQUIPMENT.	0.3047	-0.2585
FABRICATED METAL PRODUCTS.	0.3019	-0.2621
BUSINESS SERVICES	0.2671	-0.3068
ELECTRICITY, GAS AND STEAM	0.2653	-0.3091
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.2315	-0.3525
WOOD AND FURNITURE.	0.2218	-0.3649
PAPER, PRINTING AND PUBLISHING.	0.2207	-0.3663
ELECTRICAL MACHINERY AND APPLIANCES.	0.2010	-0.3916
BUILDING CONSTRUCTION	0.1690	-0.4327
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.1501	-0.4569
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.1493	-0.4580
OTHER SERVICES, NON PROFIT SEEKING	0.1399	-0.4700
OTHER MINING	0.1369	-0.4739
POTTERY,GLASS,REFRACTORIES, AND OTHER NON-METALLICS	0.1118	-0.5061
REAL ESTATE	0.0889	-0.5355
WATER SUPPLY	0.0652	-0.5659
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0638	-0.5677
OTHER SERVICES, PROFIT SEEKING	0.0624	-0.5695
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0282	-0.6134
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0281	-0.6135
JEWELLERY AND RELATED ARTICLES	0.0101	-0.6366
GOLD MINING.	0.0090	-0.6380
OTHER MANUFACTURING INDUSTRIES	0.0059	-0.6420

Arithmetic Mean (A.M.) - Excluding Coal	0.5062
Standard Deviation (S.D.)	0.7792

Table 7.26

Ranking of Sectors by Coal Mining Total Employment Multipliers	1984 Multiplier	Standard Deviations from Mean
COAL MINING.	11.0068	Excluded
REMUNERATION OF EMPLOYEES	3.0392	3.2550
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.8905	3.0628
AGRICULTURE, FORESTRY AND FISHING.	2.5496	2.6222
TRANSPORT AND STORAGE	1.1485	0.8113
OTHERS,SCRAP AND GOVERNMENT SERVICES	1.1363	0.7955
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.7383	0.2811
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.6526	0.1704
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.5878	0.0866
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.5462	0.0329
COMMUNICATION	0.4511	-0.0901
ENGINES,MACHINERY AND EQUIPMENT.	0.4361	-0.1094
CATERING AND ACCOMODATION SERVICES	0.4045	-0.1503
FABRICATED METAL PRODUCTS.	0.3669	-0.1989
BUSINESS SERVICES	0.3587	-0.2095
ELECTRICITY, GAS AND STEAM	0.3262	-0.2515
WOOD AND FURNITURE.	0.2318	-0.3735
ELECTRICAL MACHINERY AND APPLIANCES.	0.2210	-0.3875
PAPER, PRINTING AND PUBLISHING.	0.2175	-0.3920
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.2106	-0.4009
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.1578	-0.4691
OTHER MINING.	0.1448	-0.4859
BUILDING CONSTRUCTION	0.1423	-0.4892
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.1400	-0.4921
OTHER SERVICES, NON-PROFIT SEEKING	0.1224	-0.5149
REAL ESTATE	0.1102	-0.5307
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.1000	-0.5438
OTHER SERVICES, PROFIT SEEKING	0.0602	-0.5953
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0580	-0.5981
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0554	-0.6015
WATER SUPPLY	0.0477	-0.6114
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0239	-0.6422
OTHER MANUFACTURING INDUSTRIES	0.0190	-0.6485
JEWELLERY AND RELATED ARTICLES	0.0087	-0.6618
GOLD MINING.	0.0027	-0.6696

Arithmetic Mean (A.M.) - Excluding Coal	0.5208
Standard Deviation (S.D.)	0.7737

Table 7.27

Ranking of Sectors by Coal Mining Total Employment Multipliers	1989 Multiplier	Standard Deviations from Mean
COAL MINING.	11.3551	Excluded
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.8348	3.2237
REMUNERATION OF EMPLOYEES	2.5413	2.8170
AGRICULTURE, FORESTRY AND FISHING.	2.3278	2.5211
OTHERS,SCRAP AND GOVERNMENT SERVICES	1.5054	1.3814
TRANSPORT AND STORAGE	1.1577	0.8994
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.7072	0.2752
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.6628	0.2137
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.6595	0.2090
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.6580	0.2070
COMMUNICATION	0.4702	-0.0533
ENGINES,MACHINERY AND EQUIPMENT.	0.4094	-0.1375
FABRICATED METAL PRODUCTS.	0.3896	-0.1650
ELECTRICITY, GAS AND STEAM	0.3501	-0.2198
CATERING AND ACCOMODATION SERVICES	0.3460	-0.2254
ELECTRICAL MACHINERY AND APPLIANCES.	0.2633	-0.3401
PAPER, PRINTING AND PUBLISHING.	0.2429	-0.3683
BUSINESS SERVICES	0.2256	-0.3923
WOOD AND FURNITURE.	0.2101	-0.4138
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.2037	-0.4226
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.1732	-0.4649
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.1404	-0.5104
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.1356	-0.5170
OTHER SERVICES, NON-PROFIT SEEKING	0.1296	-0.5253
REAL ESTATE	0.1096	-0.5530
OTHER MINING.	0.1093	-0.5536
BUILDING CONSTRUCTION	0.0668	-0.6123
OTHER SERVICES, PROFIT SEEKING	0.0545	-0.6294
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0513	-0.6339
OTHER MANUFACTURING INDUSTRIES	0.0434	-0.6448
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0426	-0.6459
WATER SUPPLY	0.0394	-0.6504
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0241	-0.6716
JEWELLERY AND RELATED ARTICLES	0.0081	-0.6937
GOLD MINING.	0.0014	-0.7031

Arithmetic Mean (A.M.) - Excluding Coal	0.5087
Standard Deviation (S.D.)	0.7216

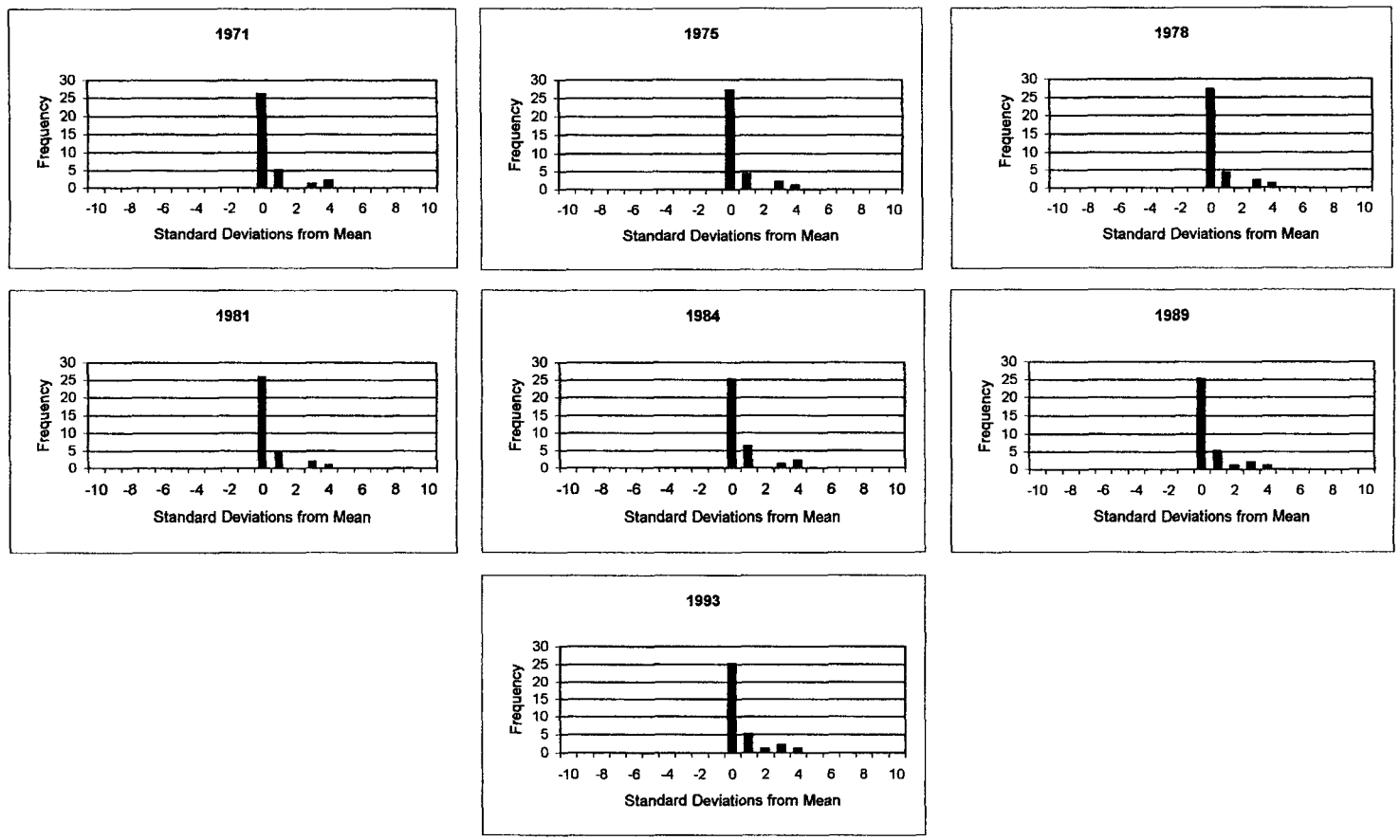
Table 7.28

Ranking of Sectors by Coal Mining Total Employment Multipliers	1993 Multiplier	Standard Deviations from Mean
COAL MINING.	7.5957	Excluded
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.9917	3.4749
REMUNERATION OF EMPLOYEES	2.2583	2.4491
AGRICULTURE, FORESTRY AND FISHING.	2.1949	2.3605
OTHERS,SCRAP AND GOVERNMENT SERVICES	1.7363	1.7192
TRANSPORT AND STORAGE	1.0099	0.7032
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.9364	0.6004
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.7448	0.3325
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.5850	0.1090
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.5669	0.0836
ELECTRICAL MACHINERY AND APPLIANCES.	0.4366	-0.0985
FABRICATED METAL PRODUCTS.	0.4115	-0.1337
ELECTRICITY, GAS AND STEAM	0.3715	-0.1897
COMMUNICATION	0.3713	-0.1899
ENGINES,MACHINERY AND EQUIPMENT.	0.3403	-0.2332
PAPER, PRINTING AND PUBLISHING.	0.2585	-0.3477
WOOD AND FURNITURE.	0.2503	-0.3592
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.1976	-0.4329
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.1865	-0.4484
BUSINESS SERVICES	0.1808	-0.4564
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.1530	-0.4952
OTHER MINING.	0.1468	-0.5038
CATERING AND ACCOMODATION SERVICES	0.1454	-0.5058
OTHER SERVICES, NON-PROFIT SEEKING	0.1435	-0.5085
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.1200	-0.5413
BUILDING CONSTRUCTION	0.1175	-0.5449
REAL ESTATE	0.1048	-0.5626
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0845	-0.5911
OTHER SERVICES, PROFIT SEEKING	0.0501	-0.6391
OTHER MANUFACTURING INDUSTRIES	0.0451	-0.6461
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0382	-0.6558
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0286	-0.6692
WATER SUPPLY	0.0231	-0.6769
JEWELLERY AND RELATED ARTICLES	0.0104	-0.6947
GOLD MINING.	0.0013	-0.7074

Arithmetic Mean (A.M.) - Excluding Coal	0.5071
Standard Deviation (S.D.)	0.7150

Figure 7.4

TOTAL EMPLOYMENT MULTIPLIERS - COAL MINING FREQUENCY DISTRIBUTIONS



7.7 Gold Mining Sectoral Total Employment Multipliers

These multipliers show the number of jobs created, for every R1m increase in gold mining output, in sectors that supply intermediate input to the gold mining industry.

Tables 7.29 to 7.35 show, for gold mining, the same information found in tables 7.21 to 7.28.

In 1993 the maximum multiplier was 2.6167 and the minimum was 0.00883, with a mean of 0.4518. The standard deviation was 0.6855. The multipliers of twenty-four sectors were between –1 and 0 standard deviations from this mean, seven sectors were between 0 and +1 standard deviations, one sector was between +2 and +3 standard deviations, and one sector was further than +3 standard deviations from the mean.

Figure 7.5 shows the frequency distributions of multipliers around the mean in terms of standard deviations for each of the seven years. Increases in gold mining output did not affect those suppliers of intermediate input with multipliers concentrated in the mode to any significantly different degree.

Deviations of more than two standard deviations indicate a significant difference from the mean. In 1993 gold mining created significantly more employment in three sectors supplying its intermediate input than in the rest of the economy, i.e.:

(i) Wholesale and retail trade and motor trade.
(ii) Remuneration of employees (households)
(iii) Agriculture, forestry and fishing.

This pattern is the same that was observed for the coal mining sector, and is discussed in Section 7.9

In no year except 1971 were more than 3.4 jobs created, per R1m of output, in any

sector supplying intermediate input to the other mining sector, and less than 1 job per R1m output was created in 30 sectors.

The sector that, for six of the seven years under review, benefited most from increased other mining production was "households". "Wholesale and retail trade and motor trade" replaced "households" in 1993. Its multiplier was 3.1582, i.e., for every R1 million increase in other mining output, employment in "wholesale and retail and motor trade" increased by 2.6508 jobs.

Table 7.29

Ranking of Sectors by Gold Mining Total Employment Multipliers	1971 Multiplier	Standard Deviations from Mean
GOLD MINING.	30.2767	Excluded
REMUNERATION OF EMPLOYEES	5.1475	3.5976
AGRICULTURE, FORESTRY AND FISHING.	5.0138	3.4897
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	3.3195	2.1221
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	1.0214	0.2671
TRANSPORT AND STORAGE	0.9541	0.2128
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.7898	0.0802
COMMUNICATION	0.7684	0.0629
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.7296	0.0316
CATERING AND ACCOMODATION SERVICES	0.5794	-0.0897
COAL MINING.	0.5495	-0.1138
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.5388	-0.1224
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.5361	-0.1246
ELECTRICITY, GAS AND STEAM	0.4061	-0.2295
FABRICATED METAL PRODUCTS.	0.3786	-0.2517
WOOD AND FURNITURE.	0.2899	-0.3233
PAPER, PRINTING AND PUBLISHING.	0.2872	-0.3255
BUSINESS SERVICES	0.2569	-0.3500
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.2306	-0.3712
ENGINES,MACHINERY AND EQUIPMENT.	0.2172	-0.3820
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.1805	-0.4116
OTHER SERVICES, NON-PROFIT SEEKING	0.1635	-0.4254
REAL ESTATE	0.1585	-0.4294
OTHER MINING.	0.1456	-0.4398
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.1337	-0.4494
ELECTRICAL MACHINERY AND APPLIANCES.	0.1119	-0.4670
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.1087	-0.4696
OTHER SERVICES, PROFIT SEEKING	0.1064	-0.4715
WATER SUPPLY	0.1008	-0.4760
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0859	-0.4880
BUILDING CONSTRUCTION	0.0657	-0.5043
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0502	-0.5168
OTHER MANUFACTURING INDUSTRIES	0.0319	-0.5316
JEWELLERY AND RELATED ARTICLES	0.0117	-0.5479
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0069	-0.5518

Arithmetic Mean (A.M.) - Excluding gold	0.6905
Standard Deviation (S.D.)	1.2389

Table 7.30

Ranking of Sectors by Gold Mining Total Employment Multipliers	1975 Multiplier	Standard Deviations from Mean
GOLD MINING.	19.0277	Excluded
REMUNERATION OF EMPLOYEES	3.3341	3.7381
AGRICULTURE, FORESTRY AND FISHING.	2.9161	3.1990
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.1730	2.2405
TRANSPORT AND STORAGE	0.7828	0.4474
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.6979	0.3379
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.5750	0.1794
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.4845	0.0627
CATERING AND ACCOMODATION SERVICES	0.3959	-0.0516
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.3315	-0.1347
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.3281	-0.1391
COAL MINING.	0.3254	-0.1425
COMMUNICATION	0.3111	-0.1610
ELECTRICITY, GAS AND STEAM	0.2740	-0.2088
FABRICATED METAL PRODUCTS.	0.1950	-0.3107
PAPER, PRINTING AND PUBLISHING.	0.1706	-0.3422
BUSINESS SERVICES	0.1695	-0.3436
WOOD AND FURNITURE.	0.1607	-0.3550
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.1584	-0.3579
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.1333	-0.3903
ENGINES,MACHINERY AND EQUIPMENT.	0.1136	-0.4157
OTHER SERVICES, NON-PROFIT SEEKING	0.1124	-0.4173
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.1059	-0.4257
REAL ESTATE	0.0994	-0.4340
ELECTRICAL MACHINERY AND APPLIANCES.	0.0781	-0.4615
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0746	-0.4660
WATER SUPPLY	0.0640	-0.4797
OTHER MINING.	0.0630	-0.4810
OTHER SERVICES, PROFIT SEEKING	0.0604	-0.4843
BUILDING CONSTRUCTION	0.0471	-0.5015
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0403	-0.5103
OTHER MANUFACTURING INDUSTRIES	0.0197	-0.5368
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0140	-0.5442
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0075	-0.5526
JEWELLERY AND RELATED ARTICLES	0.0041	-0.5570

Arithmetic Mean (A.M.) - Excluding gold	0.4359
Standard Deviation (S.D.)	0.7753

Table 7.31

Ranking of Sectors by Gold Mining Total Employment Multipliers	1978 Multiplier	Standard Deviations from Mean
GOLD MINING.	18.3307	Excluded
REMUNERATION OF EMPLOYEES	3.4225	3.5495
AGRICULTURE, FORESTRY AND FISHING.	3.1789	3.2544
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.4095	2.3223
TRANSPORT AND STORAGE	0.9855	0.5971
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.8011	0.3737
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.7761	0.3434
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.6375	0.1755
CATERING AND ACCOMODATION SERVICES	0.4003	-0.1118
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.3980	-0.1146
ELECTRICITY, GAS AND STEAM	0.3662	-0.1531
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.3647	-0.1550
COAL MINING.	0.3430	-0.1813
COMMUNICATION	0.3243	-0.2039
FABRICATED METAL PRODUCTS.	0.2497	-0.2943
BUSINESS SERVICES	0.2155	-0.3357
PAPER, PRINTING AND PUBLISHING.	0.2035	-0.3503
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.1937	-0.3621
WOOD AND FURNITURE.	0.1854	-0.3722
ENGINES,MACHINERY AND EQUIPMENT.	0.1768	-0.3826
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.1501	-0.4149
OTHER SERVICES, NON-PROFIT SEEKING	0.1341	-0.4343
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.1109	-0.4624
ELECTRICAL MACHINERY AND APPLIANCES.	0.0993	-0.4765
REAL ESTATE	0.0947	-0.4821
WATER SUPPLY	0.0919	-0.4855
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0887	-0.4893
OTHER MINING.	0.0747	-0.5063
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0745	-0.5065
OTHER SERVICES, PROFIT SEEKING	0.0673	-0.5153
BUILDING CONSTRUCTION	0.0526	-0.5331
OTHER MANUFACTURING INDUSTRIES	0.0347	-0.5548
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0275	-0.5635
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0131	-0.5809
JEWELLERY AND RELATED ARTICLES	0.0026	-0.5936

Arithmetic Mean (A.M.) - Excluding gold	0.4926
Standard Deviation (S.D.)	0.8254

Table 7.32

Ranking of Sectors by Gold Mining Total Employment Multipliers	1981 Multiplier	Standard Deviations from Mean
GOLD MINING.	14.2774	Excluded
REMUNERATION OF EMPLOYEES	2.4736	3.4003
AGRICULTURE, FORESTRY AND FISHING.	2.4485	3.3596
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	1.8082	2.3210
TRANSPORT AND STORAGE	0.7409	0.5898
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.6867	0.5019
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.6296	0.4092
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.4769	0.1615
ELECTRICITY, GAS AND STEAM	0.3279	-0.0801
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.3239	-0.0866
CATERING AND ACCOMODATION SERVICES	0.3063	-0.1152
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.3005	-0.1246
COMMUNICATION	0.2460	-0.2130
FABRICATED METAL PRODUCTS.	0.2249	-0.2472
COAL MINING.	0.2016	-0.2850
BUSINESS SERVICES	0.1827	-0.3157
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.1550	-0.3606
PAPER, PRINTING AND PUBLISHING.	0.1519	-0.3656
WOOD AND FURNITURE.	0.1513	-0.3666
ENGINES,MACHINERY AND EQUIPMENT.	0.1315	-0.3987
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.1143	-0.4266
OTHER SERVICES, NON-PROFIT SEEKING	0.0997	-0.4503
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.0972	-0.4544
OTHER MINING.	0.0895	-0.4668
WATER SUPPLY	0.0696	-0.4991
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0694	-0.4994
ELECTRICAL MACHINERY AND APPLIANCES.	0.0689	-0.5003
REAL ESTATE	0.0662	-0.5046
OTHER SERVICES, PROFIT SEEKING	0.0476	-0.5348
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0395	-0.5479
BUILDING CONSTRUCTION	0.0382	-0.5501
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0244	-0.5724
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0242	-0.5728
JEWELLERY AND RELATED ARTICLES	0.0072	-0.6003
OTHER MANUFACTURING INDUSTRIES	0.0046	-0.6046

Arithmetic Mean (A.M.) - Excluding gold	0.3773
Standard Deviation (S.D.)	0.6165

Table 7.33

Ranking of Sectors by Gold Mining Total Employment Multipliers	1984 Multiplier	Standard Deviations from Mean
GOLD MINING.	15.6432	Excluded
REMUNERATION OF EMPLOYEES	2.6661	3.2733
AGRICULTURE, FORESTRY AND FISHING.	2.5649	3.1247
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.2058	2.5972
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.9786	0.7945
TRANSPORT AND STORAGE	0.9242	0.7146
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.6571	0.3222
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.5749	0.2015
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.4473	0.0140
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.4122	-0.0375
ELECTRICITY, GAS AND STEAM	0.3926	-0.0663
COMMUNICATION	0.3749	-0.0923
CATERING AND ACCOMODATION SERVICES	0.3490	-0.1304
BUSINESS SERVICES	0.2722	-0.2432
FABRICATED METAL PRODUCTS.	0.2388	-0.2923
COAL MINING.	0.1881	-0.3667
WOOD AND FURNITURE.	0.1823	-0.3753
PAPER, PRINTING AND PUBLISHING.	0.1769	-0.3832
ENGINES,MACHINERY AND EQUIPMENT.	0.1664	-0.3986
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.1337	-0.4466
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.1228	-0.4627
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.1190	-0.4682
OTHER SERVICES, NON-PROFIT SEEKING	0.1069	-0.4860
OTHER MINING.	0.0986	-0.4982
REAL ESTATE	0.0901	-0.5107
ELECTRICAL MACHINERY AND APPLIANCES.	0.0798	-0.5258
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0669	-0.5448
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0582	-0.5576
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0538	-0.5640
OTHER SERVICES, PROFIT SEEKING	0.0517	-0.5671
WATER SUPPLY	0.0478	-0.5728
BUILDING CONSTRUCTION	0.0369	-0.5888
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0217	-0.6112
OTHER MANUFACTURING INDUSTRIES	0.0160	-0.6195
JEWELLERY AND RELATED ARTICLES	0.0076	-0.6319

Arithmetic Mean (A.M.) - Excluding gold	0.4378
Standard Deviation (S.D.)	0.6808

Table 7.34

Ranking of Sectors by Gold Mining Total Employment Multipliers	1989 Multiplier
GOLD MINING.	18.3066
REMUNERATION OF EMPLOYEES	2.7436
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.6359
AGRICULTURE, FORESTRY AND FISHING.	2.5236
OTHERS,SCRAP AND GOVERNMENT SERVICES	1.1871
TRANSPORT AND STORAGE	0.8923
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.7667
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.7087
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.6205
ELECTRICITY, GAS AND STEAM	0.5791
WOOD AND FURNITURE.	0.5776
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.5386
COMMUNICATION	0.4210
FABRICATED METAL PRODUCTS.	0.3583
CATERING AND ACCOMODATION SERVICES	0.3552
ENGINES,MACHINERY AND EQUIPMENT.	0.2680
PAPER, PRINTING AND PUBLISHING.	0.2318
BUSINESS SERVICES	0.2210
COAL MINING.	0.2065
BUILDING CONSTRUCTION	0.1926
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.1556
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.1480
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.1451
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.1367
ELECTRICAL MACHINERY AND APPLIANCES.	0.1361
OTHER SERVICES, NON-PROFIT SEEKING	0.1291
REAL ESTATE	0.1141
OTHER MINING.	0.0923
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0800
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0598
OTHER SERVICES, PROFIT SEEKING	0.0577
WATER SUPPLY	0.0549
OTHER MANUFACTURING INDUSTRIES	0.0412
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0269
JEWELLERY AND RELATED ARTICLES	0.0076

Arithmetic Mean (A.M.) - Excluding gold	0.5122
Standard Deviation (S.D.)	0.7156

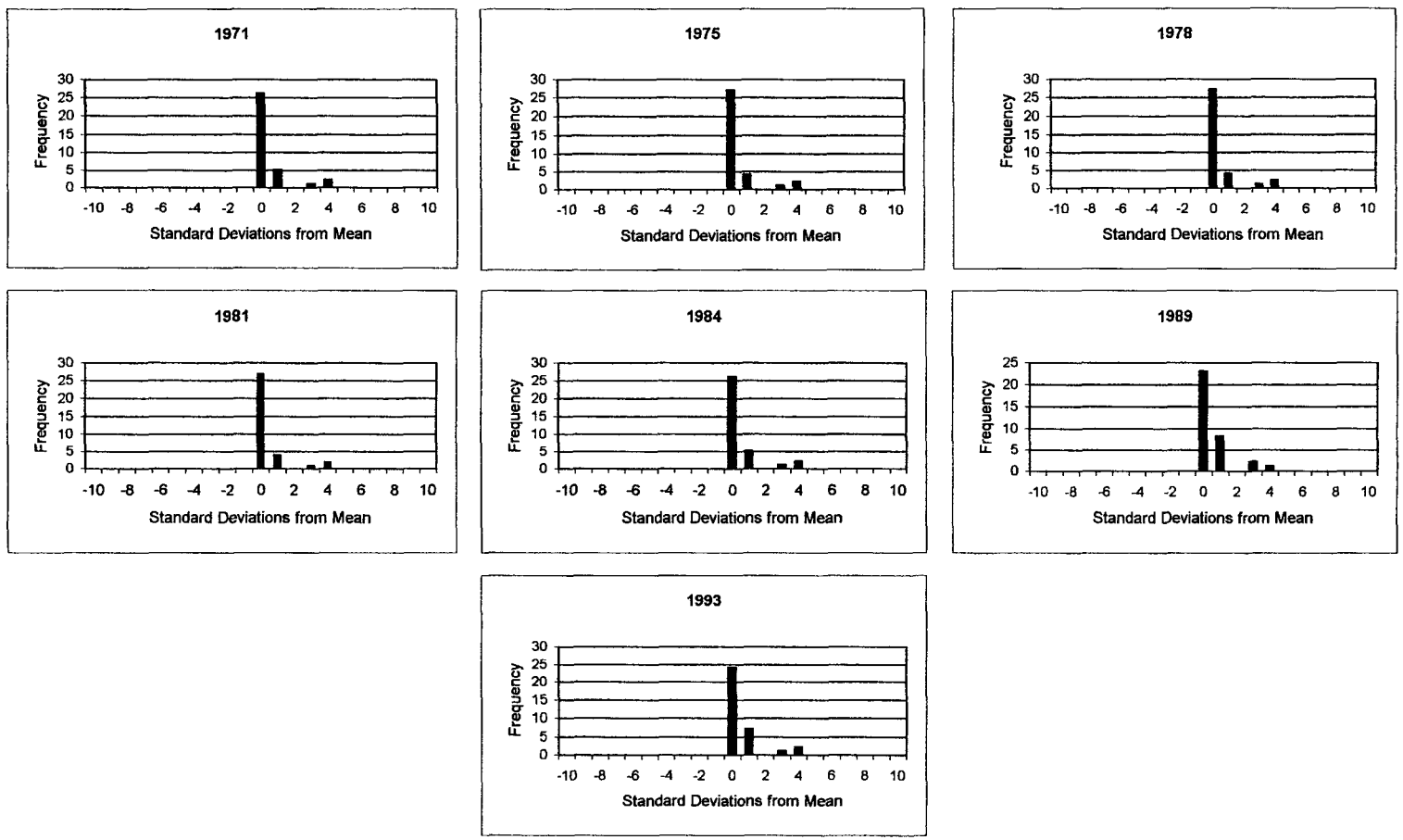
Table 7.35

Ranking of Sectors by Gold Mining Total Employment Multipliers	1993 Multiplier	Standard Deviations from Mean
GOLD MINING.	18.3327	Excluded
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.6167	3.1582
REMUNERATION OF EMPLOYEES	2.5603	3.0759
AGRICULTURE, FORESTRY AND FISHING.	2.3970	2.8377
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.9112	0.6702
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.8122	0.5258
TRANSPORT AND STORAGE	0.6853	0.3406
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.6473	0.2851
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.5713	0.1744
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.4807	0.0422
WOOD AND FURNITURE.	0.4545	0.0040
ELECTRICITY, GAS AND STEAM	0.3879	-0.0932
COMMUNICATION	0.2760	-0.2565
FABRICATED METAL PRODUCTS.	0.2580	-0.2828
PAPER, PRINTING AND PUBLISHING.	0.2299	-0.3237
BUILDING CONSTRUCTION	0.2143	-0.3465
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.1852	-0.3890
BUSINESS SERVICES	0.1697	-0.4115
ELECTRICAL MACHINERY AND APPLIANCES.	0.1602	-0.4255
CATERING AND ACCOMODATION SERVICES	0.1501	-0.4401
ENGINES,MACHINERY AND EQUIPMENT.	0.1473	-0.4442
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.1294	-0.4703
COAL MINING.	0.1262	-0.4750
OTHER SERVICES, NON-PROFIT SEEKING	0.1162	-0.4896
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.1121	-0.4955
REAL ESTATE	0.1069	-0.5032
OTHER MINING.	0.0954	-0.5199
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0889	-0.5294
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.0758	-0.5485
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0544	-0.5797
OTHER SERVICES, PROFIT SEEKING	0.0528	-0.5821
OTHER MANUFACTURING INDUSTRIES	0.0356	-0.6072
WATER SUPPLY	0.0245	-0.6234
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0198	-0.6303
JEWELLERY AND RELATED ARTICLES	0.0083	-0.6470

Arithmetic Mean (A.M.) - Excluding gold	0.4518
Standard Deviation (S.D.)	0.6855

Figure 7.5

TOTAL EMPLOYMENT MULTIPLIERS - GOLD MINING FREQUENCY DISTRIBUTIONS



7.8 Other Mining Sectoral Total Employment Multipliers

These multipliers show the number of jobs created in sectors that supply intermediate input to the other mining industry, for every R1m increase in other mining output.

Tables 7.36 to 7.42 show, for other mining, the same information found in tables 7.21 to 7.28.

In 1993 the maximum multiplier was 2.6508 and the minimum was 0.0013, with a mean of 0.4641. The standard deviation was 0.6610. The multipliers of twenty-five sectors were between –1 and 0 standard deviations from this mean, five sectors were between 0 and +1 standard deviations, three sectors were between +2 and +3 standard deviations, and one sector was further than +3 standard deviations from the mean.

Figure 7.6 shows the frequency distributions of multipliers around the mean in terms of standard deviations for each of the seven years. Increases in other mining output did not affect those suppliers of intermediate input concentrated in the prominent mode to any significantly different degree.

Deviations of more than two standard deviations indicate a significant difference from the mean. In 1993 other mining created significantly more employment in four sectors supplying its intermediate than in the other thirty. In no year except 1971 were more than 4 jobs created, per R1m of output, in any sector supplying intermediate input to the other mining sector, and in 1993 less than 1 job per R1m output was created in 30 sectors.

The sector that, for five of the six years under review, benefited most from increased other mining production was "households". "Wholesale and retail trade and motor trade" replaced "households" in 1993. Its multiplier was 2.6508, i.e., for every R1 million increase in other mining output, employment in "wholesale and retail and motor trade" increased by 2.6508 jobs. Section 7.9 discusses possible reasons.

Table 7.36

Ranking of Sectors by Other Mining Total Employment Multipliers	1971 Multiplier	Standard Deviations from Mean
OTHER MINING.	14.3991	Excluded
REMUNERATION OF EMPLOYEES	4.4855	3.6844
AGRICULTURE, FORESTRY AND FISHING.	3.8815	3.1074
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	3.1455	2.4042
TRANSPORT AND STORAGE	0.9571	0.3134
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.8959	0.2549
OTHERS,SCRAP AND GOVERNMENT SERVICES	0.8896	0.2489
COMMUNICATION	0.7654	0.1303
COAL MINING.	0.6935	0.0616
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.6362	0.0068
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.5451	-0.0802
CATERING AND ACCOMODATION SERVICES	0.5264	-0.0981
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.5212	-0.1030
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.3416	-0.2746
ENGINES,MACHINERY AND EQUIPMENT.	0.3179	-0.2973
FABRICATED METAL PRODUCTS.	0.3071	-0.3076
ELECTRICITY, GAS AND STEAM	0.3066	-0.3081
PAPER, PRINTING AND PUBLISHING.	0.2882	-0.3256
WOOD AND FURNITURE.	0.2814	-0.3321
BUSINESS SERVICES	0.2474	-0.3646
OTHER SERVICES, NON-PROFIT SEEKING	0.166	-0.4424
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.1572	-0.4508
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.147	-0.4605
REAL ESTATE	0.1409	-0.4664
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.1254	-0.4812
ELECTRICAL MACHINERY AND APPLIANCES.	0.1172	-0.4890
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.1125	-0.4935
OTHER SERVICES, PROFIT SEEKING	0.103	-0.5026
BUILDING CONSTRUCTION	0.0977	-0.5076
WATER SUPPLY	0.0858	-0.5190
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0326	-0.5698
OTHER MANUFACTURING INDUSTRIES	0.0307	-0.5717
GOLD MINING.	0.019	-0.5828
JEWELLERY AND RELATED ARTICLES	0.0104	-0.5911
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0091	-0.5923

Arithmetic Mean (A.M.) - Excluding Other mining	0.6290
Standard Deviation (S.D.)	1.0467

Table 7.37

Ranking of Sectors by Other Mining Total Employment Multipliers	1975 Multiplier	Standard Deviations from Mean
OTHER MINING.	13.9203	Excluded
REMUNERATION OF EMPLOYEES	3.7921	3.5857
AGRICULTURE, FORESTRY AND FISHING.	3.0974	2.8160
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.9662	2.6706
TRANSPORT AND STORAGE	1.1532	0.6618
OTHERS,SCRAP AND GOVERNMENT SERVICES	1.0619	0.5607
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.9017	0.3832
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.5582	0.0026
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.5558	-0.0001
COAL MINING.	0.5247	-0.0346
CATERING AND ACCOMODATION SERVICES	0.4958	-0.0666
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.4753	-0.0893
COMMUNICATION	0.4734	-0.0914
ELECTRICITY, GAS AND STEAM	0.3402	-0.2390
FABRICATED METAL PRODUCTS.	0.2602	-0.3276
ENGINES,MACHINERY AND EQUIPMENT.	0.2569	-0.3313
PAPER, PRINTING AND PUBLISHING.	0.2431	-0.3466
BUSINESS SERVICES	0.2278	-0.3635
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.2267	-0.3648
WOOD AND FURNITURE.	0.1953	-0.3995
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.1526	-0.4469
OTHER SERVICES, NON-PROFIT SEEKING	0.1454	-0.4548
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.1260	-0.4763
REAL ESTATE	0.1179	-0.4853
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.1043	-0.5004
ELECTRICAL MACHINERY AND APPLIANCES.	0.1022	-0.5027
WATER SUPPLY	0.0967	-0.5088
OTHER SERVICES, PROFIT SEEKING	0.0710	-0.5373
BUILDING CONSTRUCTION	0.0604	-0.5490
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0360	-0.5760
OTHER MANUFACTURING INDUSTRIES	0.0279	-0.5850
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0231	-0.5903
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0183	-0.5957
GOLD MINING.	0.0076	-0.6075
JEWELLERY AND RELATED ARTICLES	0.0051	-0.6103

Arithmetic Mean (A.M.) - Excluding Other mining	0.5559
Standard Deviation (S.D.)	0.9025

Table 7.38

Ranking of Sectors by Other Mining Total Employment Multipliers	1978 Multiplier	Standard Deviations from Mean
OTHER MINING.	8.2240	Excluded
REMUNERATION OF EMPLOYEES	3.1426	3.4137
AGRICULTURE, FORESTRY AND FISHING.	2.6799	2.8151
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.5797	2.6855
OTHERS,SCRAP AND GOVERNMENT SERVICES	1.2315	0.9414
TRANSPORT AND STORAGE	1.1282	0.8077
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.7550	0.3250
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.5911	0.1129
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.5242	0.0264
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.4249	-0.1021
CATERING AND ACCOMODATION SERVICES	0.4190	-0.1097
COMMUNICATION	0.4168	-0.1126
COAL MINING.	0.3606	-0.1853
ENGINES,MACHINERY AND EQUIPMENT.	0.3441	-0.2066
ELECTRICITY, GAS AND STEAM	0.3124	-0.2476
FABRICATED METAL PRODUCTS.	0.2647	-0.3093
PAPER, PRINTING AND PUBLISHING.	0.2356	-0.3470
BUSINESS SERVICES	0.2330	-0.3503
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.2177	-0.3701
WOOD AND FURNITURE.	0.1913	-0.4043
OTHER SERVICES, NON-PROFIT SEEKING	0.1451	-0.4640
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.1436	-0.4660
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.1303	-0.4832
ELECTRICAL MACHINERY AND APPLIANCES.	0.1065	-0.5140
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0996	-0.5229
WATER SUPPLY	0.0981	-0.5248
REAL ESTATE	0.0906	-0.5345
OTHER SERVICES, PROFIT SEEKING	0.0634	-0.5697
BUILDING CONSTRUCTION	0.0623	-0.5712
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0453	-0.5931
OTHER MANUFACTURING INDUSTRIES	0.0359	-0.6053
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0267	-0.6172
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0233	-0.6216
GOLD MINING.	0.0038	-0.6468
JEWELLERY AND RELATED ARTICLES	0.0026	-0.6484

Arithmetic Mean (A.M.) - Excluding Other mining	0.5038
Standard Deviation (S.D.)	0.7730

Table 7.39

Ranking of Sectors by Other Mining Total Employment Multipliers	1981 Multiplier	Standard Deviations from Mean
OTHER MINING.	8.9983	Excluded
REMUNERATION OF EMPLOYEES	3.1489	3.2649
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.7369	2.7511
AGRICULTURE, FORESTRY AND FISHING.	2.7028	2.7086
OTHERS,SCRAP AND GOVERNMENT SERVICES	1.6106	1.3467
TRANSPORT AND STORAGE	1.1997	0.8343
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.8110	0.3496
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.6068	0.0950
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.5549	0.0302
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.4912	-0.0492
COMMUNICATION	0.4555	-0.0937
CATERING AND ACCOMODATION SERVICES	0.4299	-0.1256
ELECTRICITY, GAS AND STEAM	0.3792	-0.1889
ENGINES,MACHINERY AND EQUIPMENT.	0.3090	-0.2764
COAL MINING.	0.2975	-0.2907
BUSINESS SERVICES	0.2681	-0.3274
FABRICATED METAL PRODUCTS.	0.2431	-0.3586
PAPER, PRINTING AND PUBLISHING.	0.2332	-0.3709
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.2164	-0.3919
WOOD AND FURNITURE.	0.2101	-0.3997
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.1575	-0.4653
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.1513	-0.4730
OTHER SERVICES, NON-PROFIT SEEKING	0.1485	-0.4765
WATER SUPPLY	0.1097	-0.5249
ELECTRICAL MACHINERY AND APPLIANCES.	0.1014	-0.5353
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.1007	-0.5361
REAL ESTATE	0.0893	-0.5503
OTHER SERVICES, PROFIT SEEKING	0.0625	-0.5838
BUILDING CONSTRUCTION	0.0623	-0.5840
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0557	-0.5922
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0392	-0.6128
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0330	-0.6206
JEWELLERY AND RELATED ARTICLES	0.0108	-0.6482
GOLD MINING.	0.0095	-0.6499
OTHER MANUFACTURING INDUSTRIES	0.0059	-0.6543

Arithmetic Mean (A.M.) - Excluding Other mining	0.5307
Standard Deviation (S.D.)	0.8019

Table 7.40

Ranking of Sectors by Other Mining Total Employment Multipliers	1984 Multiplier	Standard Deviations from Mean
OTHER MINING.	7.2120	Excluded
REMUNERATION OF EMPLOYEES	2.9829	2.9743
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.8889	2.8591
AGRICULTURE, FORESTRY AND FISHING.	2.5951	2.4990
OTHERS,SCRAP AND GOVERNMENT SERVICES	2.1057	1.8991
TRANSPORT AND STORAGE	1.2494	0.8494
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.7348	0.2186
COMMUNICATION	0.6617	0.1290
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.6539	0.1195
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.6453	0.1089
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.6024	0.0563
ELECTRICITY, GAS AND STEAM	0.4573	-0.1215
CATERING AND ACCOMODATION SERVICES	0.4285	-0.1568
BUSINESS SERVICES	0.3518	-0.2508
ENGINES,MACHINERY AND EQUIPMENT.	0.3014	-0.3126
FABRICATED METAL PRODUCTS.	0.2722	-0.3484
COAL MINING.	0.2607	-0.3625
PAPER, PRINTING AND PUBLISHING.	0.2377	-0.3907
WOOD AND FURNITURE.	0.2201	-0.4123
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.1724	-0.4708
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.1613	-0.4844
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.1427	-0.5072
OTHER SERVICES, NON-PROFIT SEEKING	0.1420	-0.5080
REAL ESTATE	0.1064	-0.5517
ELECTRICAL MACHINERY AND APPLIANCES.	0.1002	-0.5593
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.0838	-0.5794
WATER SUPPLY	0.0716	-0.5943
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0621	-0.6060
OTHER SERVICES, PROFIT SEEKING	0.0595	-0.6091
BUILDING CONSTRUCTION	0.0479	-0.6234
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0419	-0.6307
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0398	-0.6333
OTHER MANUFACTURING INDUSTRIES	0.0224	-0.6546
JEWELLERY AND RELATED ARTICLES	0.0116	-0.6679
GOLD MINING.	0.0036	-0.6777

Arithmetic Mean (A.M.) - Excluding Other mining	0.5564
Standard Deviation (S.D.)	0.8158

Table 7.41

Ranking of Sectors by Other Mining Total Employment Multipliers	1989 Multiplier	Standard Deviations from Mean
OTHER MINING.	7.5296	Excluded
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.4616	3.0919
REMUNERATION OF EMPLOYEES	2.3294	2.8881
AGRICULTURE, FORESTRY AND FISHING.	2.0713	2.4901
OTHERS,SCRAP AND GOVERNMENT SERVICES	1.5358	1.6643
TRANSPORT AND STORAGE	0.9395	0.7448
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.6289	0.2658
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.6140	0.2428
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.6021	0.2245
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.5765	0.1850
COMMUNICATION	0.4541	-0.0037
ELECTRICITY, GAS AND STEAM	0.3605	-0.1481
CATERING AND ACCOMODATION SERVICES	0.3189	-0.2122
ENGINES,MACHINERY AND EQUIPMENT.	0.3150	-0.2183
FABRICATED METAL PRODUCTS.	0.2591	-0.3044
PAPER, PRINTING AND PUBLISHING.	0.2144	-0.3733
BUSINESS SERVICES	0.2004	-0.3950
WOOD AND FURNITURE.	0.1934	-0.4057
COAL MINING.	0.1876	-0.4146
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.1585	-0.4595
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.1358	-0.4946
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.1298	-0.5038
OTHER SERVICES, NON-PROFIT SEEKING	0.1225	-0.5150
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.1203	-0.5184
ELECTRICAL MACHINERY AND APPLIANCES.	0.1178	-0.5224
REAL ESTATE	0.0987	-0.5518
BUILDING CONSTRUCTION	0.0966	-0.5550
WATER SUPPLY	0.0678	-0.5994
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0528	-0.6225
OTHER SERVICES, PROFIT SEEKING	0.0498	-0.6272
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0394	-0.6433
OTHER MANUFACTURING INDUSTRIES	0.0370	-0.6469
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0229	-0.6686
JEWELLERY AND RELATED ARTICLES	0.0078	-0.6919
GOLD MINING.	0.0013	-0.7019

Arithmetic Mean (A.M.) - Excluding Other mining	0.4565
Standard Deviation (S.D.)	0.6485

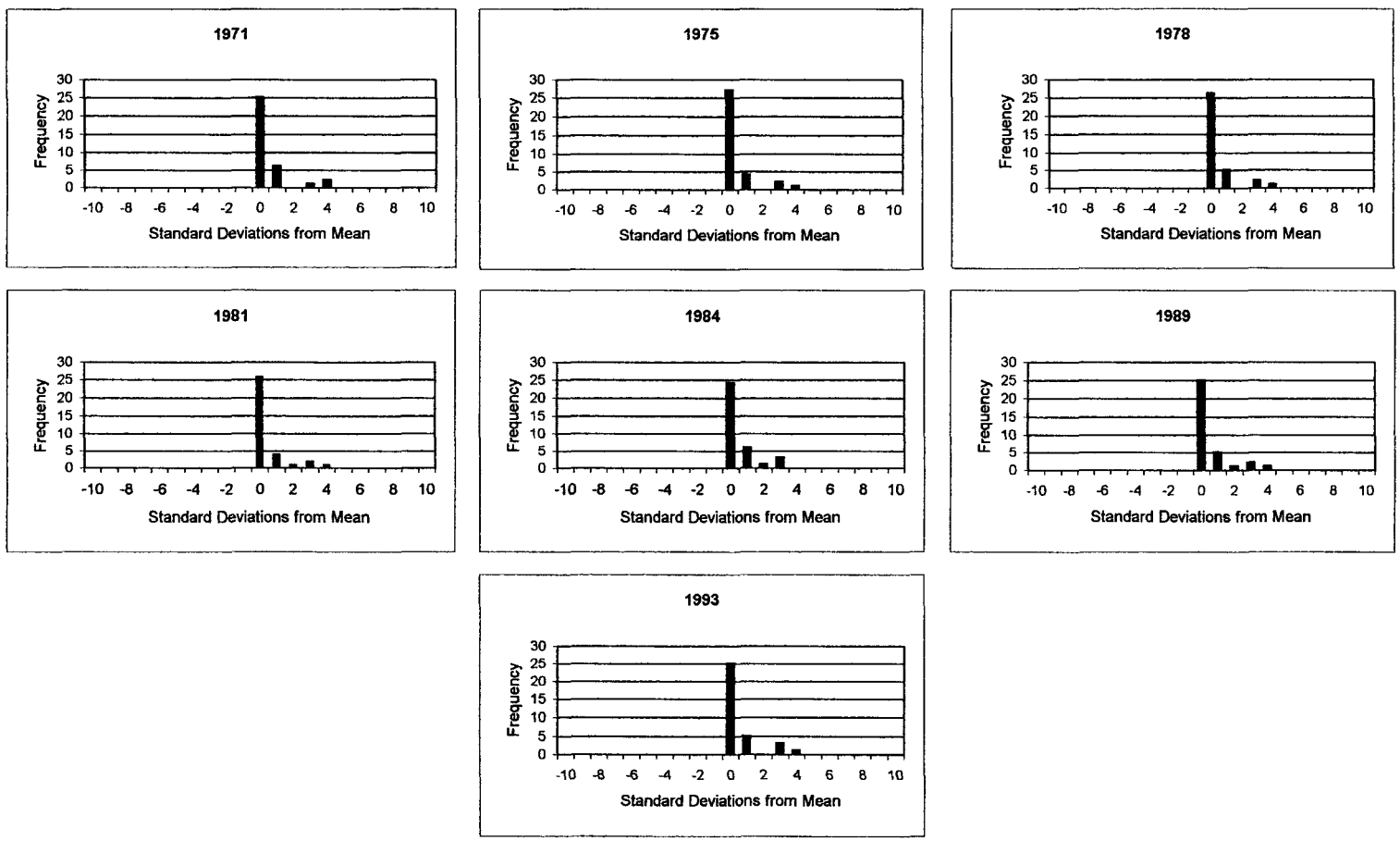
Table 7.42

Ranking of Sectors by Other Mining Total Employment Multipliers	1993 Multiplier	Standard Deviations from Mean
OTHER MINING.	7.0671	Excluded
WHOLESALE AND RETAIL TRADE AND MOTOR TRADE	2.6508	3.3083
REMUNERATION OF EMPLOYEES	2.1140	2.4962
AGRICULTURE, FORESTRY AND FISHING.	1.9954	2.3167
OTHERS,SCRAP AND GOVERNMENT SERVICES	1.8393	2.0806
FINANCIAL INSTITUTIONS AND INSURANCE SERVICES	0.8880	0.6414
TRANSPORT AND STORAGE	0.8343	0.5601
CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.	0.6656	0.3049
FOOD, LIQUOR,BEVERAGES AND TOBACCO.	0.5425	0.1187
TEXTILES,CLOTHING,CORDAGE AND LEATHER.	0.5142	0.0759
ELECTRICITY, GAS AND STEAM	0.3992	-0.0981
COMMUNICATION	0.3652	-0.1496
FABRICATED METAL PRODUCTS.	0.2828	-0.2742
ENGINES,MACHINERY AND EQUIPMENT.	0.2698	-0.2939
WOOD AND FURNITURE.	0.2371	-0.3434
PAPER, PRINTING AND PUBLISHING.	0.2329	-0.3497
ELECTRICAL MACHINERY AND APPLIANCES.	0.2067	-0.3894
MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES	0.1789	-0.4314
BUILDING CONSTRUCTION	0.1734	-0.4397
BUSINESS SERVICES	0.1656	-0.4515
COAL MINING.	0.1567	-0.4650
MOTOR VEHICLES, PARTS AND ACCESSORIES.	0.1514	-0.4730
OTHER SERVICES, NON-PROFIT SEEKING	0.1433	-0.4853
POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.	0.1426	-0.4863
CATERING AND ACCOMODATION SERVICES	0.1368	-0.4951
IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.	0.0967	-0.5558
REAL ESTATE	0.0963	-0.5564
CIVIL ENGINEERING AND OTHER CONSTRUCTION	0.0913	-0.5639
OTHER SERVICES, PROFIT SEEKING	0.0466	-0.6316
WATER SUPPLY	0.0435	-0.6363
OTHER MANUFACTURING INDUSTRIES	0.0390	-0.6431
MACHINERY AND EQUIPMENT RENTING AND LEASING	0.0364	-0.6470
RAILWAY AND OTHER TRANSPORT EQUIPMENT.	0.0300	-0.6567
JEWELLERY AND RELATED ARTICLES	0.0104	-0.6863
GOLD MINING.	0.0013	-0.7001

Arithmetic Mean (A.M.) - Excluding Other mining	0.4641
Standard Deviation (S.D.)	0.6610

Figure 7.6

TOTAL EMPLOYMENT MULTIPLIERS - OTHER MINING FREQUENCY DISTRIBUTIONS



7.9 Summary

Table 7.43 shows those sectors from which supply of intermediate input demanded by an increase in mining industry output is significantly different to the rest of the sectors in the economy. It is a summary of results contained in Tables 7.1 to 7.21, containing sectoral total GDP multipliers.

Table 7.44 shows those sectors in which employment created by increased demand for intermediate input from the mining industries is significantly different to the other sectors in the economy. It is a summary of results contained in Tables 7.22 to 7.42, containing sectoral total employment multipliers.

Table 7.43 Significantly different suppliers of intermediate input to the mining industry

	Coal Mining	Gold Mining	Other Mining
1971	Wholesale Trade etc Real Estate	Wholesale Trade etc Real Estate	Wholesale Trade etc Real Estate
1975	Wholesale Trade etc Real Estate	Wholesale Trade etc Real Estate	Wholesale Trade etc
1978	Wholesale Trade etc	Wholesale Trade etc	Wholesale Trade etc
1981	Wholesale Trade etc	Wholesale Trade etc	Wholesale Trade etc
1984	Wholesale Trade etc	Wholesale Trade etc	Wholesale Trade etc
1989	Wholesale Trade etc	Wholesale Trade etc Electricity etc	Wholesale Trade etc
1993	Wholesale Trade etc	Wholesale Trade etc	Wholesale Trade etc

The pattern established is that "wholesale and retail trade and motor trade" is consistently the sector on which increased output from all three mining sectors has impacted to a significantly greater degree than other activities in the economy. Only two other activities, "real estate" (in 1917 and 1975) and "electricity, gas and steam" (in 1989) benefited significantly differently from an increase in mining output.

"Wholesale and retail trade and motor trade" and "real estate" are tertiary industries, whilst "electricity, gas and steam" is classified by the CSS as a secondary industry. An examination of Tables 7.1 to 7.21 shows that the impact of increased mining output on manufacturing industries is generally less than the mean. These observations indicate that the mining industries are consumers of finished products not manufactured in South Africa, since none of the manufacturing industries, and especially not the heavy industries, show any significantly different benefits.

This observations also suggests that the flow of income generated by increased mining output does not include secondary industries, i.e., those industries that add value to raw materials, but instead passes mainly to the tertiary sectors. This general exclusion of secondary industries from the income flow undermines the industrial base of the economy.

Table 7.44 Sectors in which mining industry creates significantly different employment

	Coal Mining	Gold Mining	Other Mining
1971	Households Agriculture etc Wholesale Trade etc	Households Agriculture etc Wholesale Trade etc	Households Agriculture etc Wholesale trade etc
1975	Households Agriculture etc Wholesale Trade etc	Households Agriculture etc Wholesale Trade etc	Households Agriculture etc Wholesale Trade etc
1978	Households Agriculture etc Wholesale Trade etc	Households Agriculture etc Wholesale Trade etc	Households Agriculture etc Wholesale Trade etc
1981	Households Agriculture etc Wholesale Trade etc	Households Agriculture etc Wholesale Trade etc	Households Wholesale Trade etc Agriculture etc
1984	Households Wholesale Trade etc Agriculture etc	Households Agriculture etc Wholesale Trade etc	Households Wholesale Trade etc Agriculture etc
1989	Wholesale Trade etc Households Agriculture etc	Households Wholesale Trade etc Agriculture etc	Wholesale Trade etc Households Agriculture etc
1993	Wholesale Trade etc Households Agriculture	Wholesale Trade etc Households Agriculture	Wholesale Trade etc Households etc Agriculture Others, Scrap, Gov't

The sectoral total employment multipliers show that increased mining output has created significantly different employment in three sectors , i.e.:

(i) Households

(ii) Agriculture, Forestry and Fishing

(iii) Wholesale and Retail trade and Motor trade

This pattern is consistent with results shown in table 7.43. Households supply labour to meet the demands of the mining industries. The income received from their employment is used firstly to buy food, and secondly to satisfy their needs for consumer products, and the industrial base is excluded.

CHAPTER EIGHT

SUMMARY AND CONCLUSIONS

8.1 Introduction

This Chapter presents conclusions drawn from the results, calculated using established mathematical techniques and official published data, contained in Chapters Six and Seven. Chapter Six described the inter-sector impact of the mining industry, and Chapter Seven described the intra-sector impact.

8.2 Inter-Sector Impact

The inter-sector impact of increased mining output is described in terms of total GDP multipliers, total type II GDP multipliers, total employment multipliers and type II total employment multipliers.

8.2.1 Total GDP Multipliers

Total GDP Multipliers indicate direct, indirect and induced impact on the economy when demand for a specific sector's production increases. The data in Tables 6.2 to 6.8 reveal that, during the period under review, increased demand for mining output did not have a significantly different impact on the economy, compared to the other sectors. The sectors that did have a significantly different impact on the economy, i.e., those whose multipliers were more than two standard deviations from the mean have consistently been:

(i) Financial institutions and insurance services (all years).
(ii) Other services, non profit seeking (all years).

The coal mining multiplier never ranked higher than seventh (in 1971), the gold mining multiplier eighth (in 1993) and the multiplier for other mining seventeenth (in 1989). In 1993 the distances of the mining sector multipliers from the mean were:

(i) Coal mining -0.3575 standard deviations.
(ii) Gold mining +0.6453 standard deviations
(iii) Other mining -0.3336 standard deviations.

Figure 6.1 shows the magnitude of the multipliers relative to the mean, and Figure 6.2 displays the magnitude relative to the largest and smallest multiplier. These results imply that the impact of increased output from the mining industries on the gross domestic product was not significantly different from the average. The conclusion is therefore that increased mining output has about the same impact on GDP as other sectors in the South African economy.

8.2.2 Type II total GDP Multipliers

Type II total GDP multipliers indicate the impact that an increase in the three GDP elements within a sector will have on national GDP. They are different to the total GDP Multipliers, as they express the impact on GDP by income generated within the sector.

The data in Tables 6.11 to 6.17 reveal that, during the period under review, the impact on gross domestic product, from increased income generated by the mining industries, was not greater than the mean from all the sectors in the economy. The sectors that consistently had a significantly more positive impact on the economy than the other sectors, i.e., whose multiplier was more than two standard deviations from the mean were:

(i) Households (all years).
(ii) Others, scrap and government services (all years except 1981).

The coal mining Type II Total GDP multiplier never ranked higher than twentieth (in 1993), the gold mining multiplier thirtieth (in 1971 and 1989) and the multiplier for other mining twenty-fifth (in 1984).

In 1993 the distances of the mining sector multipliers from the mean were:

(i) Coal mining -0.3519 standard deviations.
(ii) Gold mining -0.7734 standard deviations
(iii) Other mining -0.5501 standard deviations.

Figure 6.4 shows the magnitude of the multipliers relative to the mean, and Figure 6.5 displays the magnitude relative to the largest and smallest multiplier. These results imply that the impact of incomes generated within the mining industries on GDP were far below the average, and close to the minimum. The conclusion is therefore that income generated in the mining industry has about the same impact on the economy as most other sectors in the economy.

8.2.3 Total Employment Multipliers

Total employment multipliers relate the number of jobs created in the economy for every R1m increase in a sector's output.

Tables 6.20 to 6.26 reveal that, during the period under review, the mining industries, with the exception of coal mining in 1971 and 1975, had about the same employment impact as other sectors. Sectors that had a significantly positive impact on the economy, i.e., whose multipliers were more than two standard deviations from the mean were;

(i) Catering and accommodation services (in 1975, 1978, 1981).
(ii) Agriculture, forestry and fishing (in 1993).

The coal mining employment multiplier never ranked higher than thirteenth after

1975 and was twenty-second in 1993. The highest ranking by the gold mining employment multiplier was eighth (in 1989) and the employment multiplier for other mining twenty-first (in 1975).

In 1993 the distances of the mining sector multipliers from the mean were:

(i) Coal mining -0.2480 standard deviations.
(ii) Gold mining +0.8304 standard deviations
(iii) Other mining -0.4906 standard deviations.

Figure 6.7 shows the magnitude of the multipliers relative to the mean, and Figure 6.8 displays the magnitude relative to the largest and smallest multiplier. The conclusion is therefore that the mining industries were not, apart from coal mining in 1971 and 1975, the most important generators of employment per unit of GDP in the South African economy, although gold mining has increased in importance since 1981.

8.2.4 Type II total Employment Multipliers

Total employment multipliers relate the number of jobs created in the economy to every job created in a sector.

Tables 6.29 to 6.35 indicate that, during the period under review, employment in the mining industries had about the same impact on other sectors of the economy as other South African economic activity. Sectors in which employment had a positive impact on employment in the rest of the economy were:

(i) Jewellery and related articles (1971, 1975, 1978, 1981)
(ii) Food, liquor, beverages and tobacco (1971, 1975, 1981, 1984, 1989, 1993)
(iii) Machinery and equipment renting and leasing (1975)
(iv) Households (1989, 1993)

The coal mining type II employment multiplier never ranked higher than twentieth (in 1993), the gold mining multiplier thirty-third (in 1971 and 1975) and the multiplier for other mining eighteenth (in 1984).

In 1993 the distance of the mining sector multipliers from the mean were:

(i) Coal mining -0.4432 standard deviations.
(ii) Gold mining -1.3632 standard deviations
(iii) Other mining -0.4949 standard deviations.

Figure 6.10 shows the magnitude of the multipliers relative to the mean, and Figure 6.11 displays the magnitude relative to the largest and smallest multiplier. Of particular note is the position of the gold mining multiplier. The conclusion is therefore that employment in the mining industries had about the same impact on employment as most other activities in the South African economy.

8.3 Tests for Significant Difference

Table 6.37 is a summary tables 6.38 to 6.42, and identifies those sectors whose mean impact on GDP and employment is significantly greater or less than the mining activities. Conclusions reached from these results, which support the conclusions reached in sections 8.2.1 to 8.2.4, i.e., are:

(i) Increased output from mining activities did not have the greatest mean impact on GDP

(ii) Income generated in mining activities had a significantly less mean impact on GDP than did income generated in the majority of other activities.

(iii) Increased output from the mining activities did not have the greatest mean impact on employment.

(iv) Increased employment in the mining industries had a significantly less mean impact on employment than did employment in the majority of other sectors

8.4 Intra-Sector Impact

Total GDP multipliers and total employment multipliers describe the intra-sector impact of increased mining output. These two multipliers express the direct, indirect and induced relationship between a sector and its suppliers of intermediate input.

8.4.1 Impact of increased coal mining output on output of intermediate input suppliers

Tables 7.1 to 7.7 reveal the impact that an increase in coal mining output had on its suppliers of intermediate input, and that:

(i) In order to achieve a R1 increase in output, the input of coal mining to itself was:

R0.6060 in 1971
R0.7390 in 1975
R0.6524 in 1978
R0.6484 in 1981
R0.6117 in 1984
R0.5612 in 1989
R0.4614 in 1993

These results show that there has been a decline in the value of the coal mining sector's input per R1 of coal mining output since 1975.

(ii) Throughout the period under review increased coal mining output consistently had a significant positive impact on only one sector, wholesale

trade and motor trade. There was also a significant positive impact on the real estate sector in 1971 and 1975.

(iii) In 1993 the manufacturing sector that benefited the most from increased coal mining output was chemicals, plastics, petroleum and rubber. This is not surprising, given the total dependence of SASOL on coal mining for its raw input. Coal mining's impact on the heavy manufacturing industries, i.e., iron, steel and non-ferrous basic industries, fabricated metal products, and engines, machinery and equipment, was less than the mean. These industries ranked twentieth, twelfth and eleventh respectively, in order of benefit.

(iv) In 1993, the impact of increased coal mining output, on 24 of the 34 suppliers of intermediate input, was less than the mean.

Figure 7.1 displays the concentration of sectors around the mean, and the noticeable distance of the wholesale and retail trade and motor trade sector from the mean.

8.4.2 Impact of increased gold mining output on output of intermediate input suppliers

Tables 7.8 to 7.14 describe the impact that an increase in gold mining output had on its suppliers of intermediate input, and that:

(i) In order to achieve a R1 increase in output, the input of gold mining to itself was:

R0.7044 in 1971
R0.8245 in 1975
R0.7740 in 1978
R0.7940 in 1981
R0.7636 in 1984
R0.6468 in 1989

R0.7693 in 1993

These results show that the value of the gold mining sector's input per R1 of gold mining output has, throughout the period under review, not shown any significant differences.

(ii) Throughout the period under review increased gold mining output consistently had a significant positive impact on one sector only, wholesale trade and motor trade. There was also a significant positive impact on the real estate sector in 1971 and 1975, and on the electricity, gas and steam sector in 1989.

(iii) In 1993 the manufacturing sector that benefited the most from increased gold mining output was electricity, gas and steam.. This is consistent with the large amount of electrical power required by the gold mining industry. Gold mining's impact on the heavy manufacturing industries, i.e., iron, steel and non-ferrous basic industries, fabricated metal products and engines, machinery and equipment, was less than the mean. These industries ranked twenty-first, fifteenth and seventeenth respectively, in order of benefit.

(iv) In 1993, the impact of increased gold mining output, on 25 of the 34 suppliers of intermediate input, was less than the mean.

Figure 7.2 displays the concentration of sectors around the mean, and the noticeable distance of the wholesale and retail trade and motor trade sector from the mean.

8.4.3 Impact of increased other mining output on output of intermediate input suppliers

Tables 7.15 to 7.21 describe the impact that an increase in other mining output had on its suppliers of intermediate input, and that:

(i) In order to achieve a R1 increase in output, the input of other mining to itself was:

R0.6555 in 1971
R0.6377 in 1975
R0.6584 in 1978
R0.5938 in 1981
R0.5817 in 1984
R0.6470 in 1989
R0.5511 in 1993

As is the case with gold mining, these results show that the value of the other mining sector's input per R1 of other mining output has, throughout the period under review, not shown any significant differences.

(ii) Throughout the period under review increased other mining output consistently had a significant positive impact on one sector only, wholesale and retail trade and motor trade. There was also a significantly different impact on the real estate sector in 1971.

(iii) In 1993 the manufacturing sector to that benefited the most from increased other mining output was electricity, gas and steam. As with gold mining, this is consistent with the large amount of electrical power required by the other mining industry. Other mining's impact on the heavy manufacturing industries, i.e., iron, steel and non-ferrous basic industries, fabricated metal products and engines, machinery and equipment, was less than the mean. These industries ranked twenty-first, sixteenth and eleventh respectively, in order of benefit.

(iv) In 1993, the impact of increased other mining output, on 25 of the 34 suppliers of intermediate input, was less than the mean.

Figure 7.3 displays the concentration of sectors around the mean, and the noticeable

distance of the wholesale and retail trade and motor trade sector from the mean.

8.4.4 Impact of increased coal mining output on employment by its suppliers of intermediate input

Tables 7.22 to 7.28 describes the impact that an increase in coal mining output had on employment by its suppliers of intermediate input, and that:

(i) The number of jobs created within the coal mining sector for each R1million increase in output was:
42.3912 in 1971
34.4415 in 1975
20.6765 in 1978
13.3671 in 1981
11.0068 in 1984
11.3551 in 1989
7.5957 in 1993

These results reveal how employment in the coal mining industry dropped between 1971 and 1993, and reflect the increased mechanisation of the industry. Although the employment multipliers are calculated after applying the producer price index (albeit an average) to sector output, the drop in employment may be partly due to higher prices of the output.

(ii) Throughout the period under review increased coal mining output consistently had a significantly positive impact on employment in three sectors: households; agriculture, forestry and fishing; and wholesale trade and motor trade, between 1971 and 1984. The order of these sectors changed to: wholesale trade and motor trade; households; and agriculture, forestry and fishing in 1989 and 1993..

(iii) In 1993 the manufacturing sector in which increased coal mining output

generated the most jobs was chemicals, plastics petroleum and rubber. Coal mining's impact on employment in the heavy manufacturing industries, i.e.: iron, steel and non-ferrous basic industries; fabricated metal products; and engines, machinery and equipment, was less than the mean. These industries ranked twenty-fourth, eleventh and fourteenth respectively, in order of benefit.

(iv) In 1993, the impact of increased coal mining output, on employment in 25 of the 34 suppliers of intermediate input, was less than the mean.

Figure 7.4 shows the concentration of sectors around the mean, and the noticeable distance of the wholesale and retail trade, households and agriculture, forestry and fishing sectors from the mean.

8.4.5 Impact of increased gold mining output on employment by its suppliers of intermediate input

Tables 7.29 to 7.35 describe the impact that an increase in gold mining output had on employment by its suppliers of intermediate input, and that:

(i) The number of jobs created within the gold mining sector the for each R1million increase in output was:

30.2767 in 1971
19.0277 in 1975
18.3307 in 1978
14.2774 in 1981
15.6432 in 1984
18.3066 in 1989
18.3327 in 1993

These results reveal how employment in the gold mining industry dropped between 1971 and 1981, but rose between 1981 and 1993. Although this result supports the perception of gold mining as an important generator of employment, gold mining does not have the same long-term future as do coal and other mining. As is the case with coal mining, an average annual producer price index adjusts gold mining output before calculation of employment multipliers. Even so, the rising employment trend in gold mining may reflect the falling "real" price of gold.

(ii) Throughout the period under review increased gold mining output consistently had a significant positive impact on employment in three sectors: households; agriculture, forestry and fishing; and wholesale trade and motor trade, between 1971 and 1984. The order of these sectors changed to: households; wholesale trade and motor trade; and agriculture, forestry and fishing in 1989, and to: wholesale trade and motor trade; households; and agriculture, forestry and fishing in 1993.

(iii) In 1993 the manufacturing sector in which increased gold mining output generated the most jobs was chemicals, plastics petroleum and rubber, but this ranked only ninth in order of importance. Gold mining's impact on employment in the heavy manufacturing industries, i.e.: iron, steel and non-ferrous basic industries; fabricated metal products; and engines, machinery and equipment, was less than the mean. These industries ranked twenty-eighth, thirteenth and twentieth respectively, in order of benefit.

(iv) In 1993, the impact of increased gold mining output on employment in 24 of the 34 suppliers of intermediate input was less than the mean.

Figure 7.5 describes the concentration of sectors around the mean, and the noticeable distance of the wholesale and retail trade, households and agriculture, forestry and fishing sectors from the mean.

8.4.6 Impact of increased other mining output on employment by its suppliers of intermediate input

Tables 7.36 to 7.42 reveal the impact that an increase in other mining output had on employment by its suppliers of intermediate input, and that:

(i) The number of jobs created within the other mining sector for each R1million increase in output was:

14.3991 in 1971
13.9203 in 1975
8.2240 in 1978
8.9983 in 1981
7.2120 in 1984
7.5296 in 1989
7.0671 in 1993

These results indicate that employment in the other mining industry dropped sharply between 1975 and 1978, and continued in a downward trend since then. This result, as is the case with coal mining, reflects the increased mechanisation of other mining, and shows that it is an employer of skilled, rather than mass unskilled labour, although the effects of higher price for other mining output must be considered.

(ii) Throughout the period under review increased other mining output consistently had a significant positive impact on employment in three sectors, households, agriculture, forestry and fishing, and wholesale trade and motor trade, between 1971 and 1984. The order of these sectors changed to wholesale trade and motor trade, households, and agriculture, forestry and fishing in 1989, and to wholesale trade and motor trade, households, and agriculture, forestry and fishing in 1993.

(iii) In 1993 the manufacturing sector in which increased other mining output generated the most jobs was chemicals, plastics petroleum and rubber, but this ranked only ninth in order of importance. Other mining's impact on employment in the heavy manufacturing industries, i.e., iron, steel and non-ferrous basic industries, fabricated metal products and engines, machinery and equipment, was less than the mean. These industries ranked twenty-fifth, twelfth and thirteenth respectively, in order of benefit.

(iv) In 1993, the impact of increased other mining output on employment in 25 of the 34 suppliers of intermediate input was less than the mean.

Figure 7.6 displays the concentration of sectors around the mean, and the noticeable distance of the wholesale and retail trade, households and agriculture, forestry and fishing sectors from the mean.

8.5 Future Mining and Minerals policy

The Chamber of Mines of South Africa (1995) regards the country's mining industry as the foundation of, and a substantial contributor to, the national economy. The Minerals Bureau (1997) is even more eulogistic, crediting the development of an extensive physical infrastructure, and the country's secondary industries, to the minerals industry. The Department of Minerals and Energy (Green Paper, 1997) is convinced that, since its inception, the mining industry has been the cornerstone of the South African economy.

The White Paper (R.S.A., 1998) on future minerals policy is based on two premises; "that the mining industries have the capacity to generate (both) wealth and employment on a large scale". It seems to elevate the mining industry above all other economic activities. This may well be an idealistic truth, but the findings of this thesis indicate that it is far from the truth in reality. The White Paper also fails to address a

fundamental issue in the economics of non-renewable resources, the development of alternate economic activities as mining depletes South Africa's mineral resources.

Results contained in this thesis show that both the premises indicated above are misplaced. Although the industry without doubt does generate large flows of income, the effects per rand of output on the national economy are less than or equal to the same effects for most other sectors of the South African economy, i.e., mining's linkages with the rest of the South African economy are certainly not more important than those in other South African economic activities. Furthermore, employment multipliers for the three mining sectors are equal to or less than those of most other sectors of the South African economy. Mining is not a larger generator of employment per rand of output than other sectors of the South African economy.

The government proposes, in its White Paper (R.S.A., 1998) to stimulate the mining industry, and presumably, those sectors linked to it, by incentives from the fiscal authorities. This appears to be another way of promoting state subsidies, a policy which has been unsuccessful in the past, and which has been severely criticised by, amongst others, Davis (1994) and Sachs & Warner (1995).

South Africa has abundant resources of minerals other than gold. Although the gold mining industry has a limited life (72 years) in relation to these other minerals (from 176 to 1200 years), gold mining still contributes the highest percentage, of the three mining industries, to national GDP. It ranked fifth overall in 1993, other mining twelfth and coal mining twenty-fifth (See Table 1.5).

The State must not control or finance the mining industry. Mining is a highly technical industry, requiring vast amounts of capital, invested for long periods at considerable risk. The South African government possesses neither the technical expertise, nor the financial resources to successfully control one of the largest mining industries in the world. The government should direct its efforts towards creating an economic structure in which value is added to the nation's mineral resources. Edwards (1985) estimated in 1985 that income from the minerals industry could be

increased eightfold over a ten year period. By 1995 there could have been a flourishing industry, increasing the value of the national production by millions of Rands. Instead, exports of raw minerals totalled billions of Rands. Although it cannot be denied that export of raw minerals is a prime market in mineral-rich, developing economy, prudent re-investment of the rent is necessary.

The problem of optimally exploiting a mineral reserve can have no general solution. Why did the United States of America, for instance, not remain primarily a producer of raw agricultural and mineral products, and instead became the world's leading industrialised nation? Why has Saudi Arabia remained a producer of crude oil, and not become an industrial giant? Why is Japan, with virtually no mineral reserves, a major producer of consumable goods? These questions are very difficult to answer, and this thesis does not attempt to do so. They merely to illustrate the point that each country in which minerals are found is unique, with its own characteristic economy and idiosyncratic society.

8.6 Future Studies

This thesis has defined the relationships that existed between the Mining industry and the rest of the economy from 1971 to 1993. However, a number of topics require further study. These are:

8.6.1 Update the model when the Central Statistical Service publishes the next set of input-output tables in the near future. It is especially important to discover

if there has been any change to the relationships described in this thesis during the transition to a fully democratic system in South Africa..

8.6.2 The classification of the mining sector in terms of coal mining, gold

mining and other mining is a legacy of the days when gold was all important, and any other mining activities were considered secondary. This system makes it impossible to determine the importance of the individual minerals grouped under other mining.

Although gold mining is still the single most important mineral produced, it now contributes less than 50% of all mineral revenue. The roles of diamonds, chrome, copper, iron, manganese, platinum, titanium vanadium and zircon, at the very least, must be identified so their linkages to the rest of the economy can be established. This task has already been identified by the Central Statistical Service as requiring attention, but when it will be completed is not clear.

8.6.3 Gross domestic product does not account for the loss of natural resources, This must be done in future national accounts

8.6.4 The recently published White Paper (R.S.A., 1998) is based on the premise that the South African mining industry has the capacity to generate wealth and employment on a large scale. The findings of this thesis suggest this premise may be misguided. That such a document, upon which far-reaching decisions will be based, accepts a flawed premise as its starting point is alarming. The impact of the three mining sectors on the economy is not significantly different on either the GDP or employment than the impact of other economic activities, and the importance of mining in the economy is declining. To reverse this trend it is necessary either to locate new reserves of gold, or to direct more attention to the huge reserves of other minerals, and the industries which their exploitation can spawn.

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ANNEXURE I

NATIONAL ACCOUNTS

NATIONAL ACCOUNTS

1.1 Introduction

This chapter contains selected information from the work published by the United Nations (1993) and information published by the Central Statistical Service in South Africa. It is included purely as supporting material to the main theme of the thesis, and can be considered, together with Chapters Three and Four, to be a survey of the literature researched for the thesis.

The *System of National Accounts*, or SNA, is "a comprehensive, consistent and flexible set of macroeconomic accounts" (United Nations, 1993) first published in 1963. It provides a comprehensive and detailed record of the complex economic activities within an economy, and of the interaction between the different sectors. An extensive revision of the system was undertaken in the mid 1980's and was published in 1993. The complete work is available from the Statistical Division of the United Nations. The organisations which undertook the revision, and under whose auspices the revised system was published, are:

(i) the United Nations,

(ii) the International Monetary Fund,

(iii) the Commission of the European Communities,

(iv) the Organisation for Economic Co-operation and Development, and

(v) the World Bank.

The System is designed for use in countries with market economies, whatever their stage of development, and provides a comprehensive accounting framework within which economic data can be compiled and presented in a format that is designed for purposes of economic analysis, decision taking and policy-making.

National accounts also show how income is used either for consumption, to pay for goods and services consumed, or for savings, through which capital is created and future consumption may be increased. They also describe how an economy is financed, and includes all foreign transactions in the form of imports and exports. It should be perused for a full understanding of the SNA.

The CSS information is available from the CSS Library in Pretoria.

The essential feature of a free market economy, such as exists in South Africa, is the demand for goods and services from groups of consumers, on the one side, and the supply of these goods and services from producers of the goods and services, on the other side. These are generally known as the forces of supply and demand which operate between the component sectors of the economy.

Demand for goods and services originates from four categories of consumers:

(i) Households, whose demand is defined as private consumption expenditure;

(ii) Industries, whose demand is defined as Intermediate Input expenditure. Industries generate income in a society;

(iii) Demand for Infrastructure is defined as Capital Formation. Infrastructure by itself does not create wealth, but is the means of production; and

(iv) Government Consumption Expenditure is the result of demands for goods and services from all levels of government. Government is not a producer of income nor is it a creator of wealth.(Central Statistical Services, 1996).

As may be imagined, even in the moderately sized South African economy, many millions of transactions occur between the component sectors.

Recording and quantification of these forces is necessary for proper management of the economy, but it would be impossible to capture every single transaction as it happens. The concept of national accounts is the best solution to this problem. The economy is classified into sectors that represent, as closely as possible, the general nature of the economy. The transactions recorded are averages, usually annualized. Thus a comprehensive description and quantification of the whole economic system is presented, by which an analysis of the inter-relationships between the various sectors becomes possible.

1.2 The Accounting Sequence

The SNA is built around a sequence of interconnected flow accounts, each of which relates to a particular kind of economic activity, such as production or the generation, distribution or use of income. Each account is based on the traditional double entry concept, and is balanced by introducing an item defined as the difference between the total resources, (those areas of the economy which add value) and uses, (those areas of the economy which reduce value).

Almost all free market economies have developed systems of national accounts which follow, as closely as possible, the sequence set out in the United Nations publication, *A System of National Accounts*.

The System requires that all economic transactions within an economy be consolidated into five basic accounts, namely:

(i) a current account;

(ii) a production account;

(iii) a distribution and use of income account;

(iv) accumulation accounts; and

(v) balance sheets.

1.2.1 Current Accounts

Current accounts record the production of goods and services, the generation

of incomes by production, the subsequent distribution and re-distribution of incomes among the institutional units, and the use of incomes for purposes of consumption or saving.

1.2.2 Production Account

The production account records the activity of producing goods and services within the system. The balancing item, called Gross Value Added, is defined as the value of output less the value of intermediate consumption. GVA is a measure of the contribution made to Gross Domestic Product by an individual producer, industry or sector. Gross Value Added is the source from which the primary incomes of the System are generated and is therefore carried forward into the primary distribution of incomes account. Net Value Added may also be measured by deducting the consumption of fixed capital.

1.2.3 Distribution and use of incomes account

The distribution and use of incomes accounts are a set of articulated accounts which show how incomes are:

(i) generated by production,

(ii) distributed to institutional units with claims on the value added by production,

(iii) re-distributed among institutional units, mainly by government units through social security contributions, benefits and taxes,

(iv) eventually used by households, government units or non-profit institutions serving households as either final consumption or saving.

The balancing item in the complete set of incomes accounts is savings. The incomes accounts are necessary to explain the behaviour of institutional units as final consumers, i.e. users of the goods and services produced. This balancing item, savings, is carried forward to the Capital accumulation account.

1.2.4 Accumulation accounts

Accumulation accounts are accounts that record the acquisition and disposal of non-financial assets and liabilities by institutions. There are three such accumulation accounts:

(i) the capital account, which records acquisitions and disposals of non-financial assets, changes in inventories and consumption of fixed capital;

(ii) the financial account, which records acquisitions and disposals of financial assets and liabilities; and

(iii) the third is called the "other changes in assets account", and itself has two sub-accounts. The first records changes in the value of assets and liabilities held by institutional units, or sectors, other than by way of transactions, and the second records changes in the value of assets and liabilities that result from changes in their prices.

The link between accumulation accounts and the incomes accounts is saving.

Disposable income that is not spent on consumption goods or services must be used to acquire financial or non financial assets of one kind or another. When saving is negative, the excess of consumption over disposable income must be financed either by the disposal of assets or by incurring liabilities. The financial accounts show how funds are channelled from one group of units to another.

1.2.5 Balance sheets

The balance sheet in the SNA has the same function as a conventional balance sheet, i.e. it shows the value of assets and liabilities held by institutional units, or sectors of the economy, at the beginning and end of an accounting period.

The objective of these flow accounts is to provided a complete description and measurement of the whole economic system, the production and processing of goods and services, as well as the generation and distribution of income.

1.3 The South African System of National Accounts

The System of National Accounts, as used in South Africa, consists of four basic accounts. These do not completely comply with the framework set out by the United Nation, and can be described as follows:

(i) a consolidated production account, which combines the united Nations current and production accounts;

(ii) an income and appropriation account, which is the equivalent of the

United Nations distribution and use of income account;

(iii) a capital finance account, which fulfils the same function as the United Nations accumulation account; and

(iv) an external account, which is a derivative of the United Nations current account devoted to all foreign dealings.

1.3.1 The consolidated production account.

This is also known as the gross domestic product and expenditure account, in which emphasis is laid on the generation of domestic income. It is the cornerstone of the system of national accounts and measures the Gross Domestic Product, or GDP, from both the production or supply aspect, and from the expenditure or demand aspect of the economy. The two sides should be equal to each other, since they are merely different aspects of the same whole.

The Central Statistical Service calculates GDP by the production method, i.e. by summing the factors of production, which are Renumeration of Employees, Gross Operating Profit and Net Indirect Taxes.

A more detailed discussion on GDP is given in paragraph 1.4.

1.3.2 The national income and expenditure account.

This is a consolidation of income and expenditure from the institutional sectors of the economy, which are:

(i) the business sector;

(ii) the government sector; and

(iii) households.

It includes such items as income received from business transactions, taxes paid to, and received by, the government, appropriation of profits and dividends, transfers to and from the government, salaries and wages, and profits of non-corporate enterprises. Private consumption expenditure is by far the most important component of expenditure. That part of available income that is not spent is called savings, and this is an important source of investment finance.

1.3.3 The capital transaction account

This shows the accumulation and financing of capital goods. Accumulation of gross fixed capital, and changes in capital inventory, are the most important methods of capital accumulation. These capital accumulations are largely financed through domestic savings and net loans from the rest of the world.

1.3.4 The external account

This account records all transactions between South Africa and the rest of the world.

1.4 The Production Account

The Model developed in this thesis is based on Input-Output tables, which are an integral part of the Production Accounts. It is therefore considered necessary to discuss the Production Account, which is also known as the Gross Domestic Product and Expenditure account, in more detail than the other Flow Accounts.

Production can be described in general terms as an activity in which an enterprise uses inputs to produce outputs. Convention of the SNA requires that the output of a production enterprise must be equal to the sum of the inputs of its constituent parts.

There are two kinds of output, namely goods and services. In order to achieve the fundamental requirement of trading in a market economy, which is to make a gain or profit, output from one enterprise must become the input to another, thereby allowing the division of labour and specialization of production, identified, by Adam Smith (Smith, 1776) two hundred and twenty years ago, as a basic requirement for wealth in a nation.

Goods are physical objects for which a demand exists, over which ownership rights can be established, and which ownership can be transferred through trade. When the demand for goods comes from households and government, the demand is said to be final, but when the demand comes from industries in order to produce other goods, the demand is said to be intermediate. An important characteristic of goods is that their production and sale are economically separate.

Services fall into two categories, firstly those that cannot be traded separately from their production, and over which ownership cannot be established, and secondly those over which ownership can be established.

The production of services are confined to activities that are carried out by one

enterprise for the benefit of another.

Services that fall into the first category can take a number of forms:

(i) the producer of the service works directly on goods owned by the consumer of the service, by transporting, cleaning, repairing or processing the goods;

(ii) the producer of the service changes the physical condition of the consumer, by accommodating, clothing, or otherwise caring for them;

(iii) the producer of the service changes the mental condition of the consumer, by offering education, information, advice, entertainment or similar services; or,

(iv) the producer of the service changes the economic state of an enterprise by providing insurance, finance, protection etc.

Producers of services that fall into the second category are generally classified as service industries, and their output has many of the characteristics of goods. These are industries that are concerned with the provision, storage, communication and dissemination of information, advice and entertainment, in the broadest sense. These outputs are usually stored on physical objects such as paper or magnetic discs, which are traded as physical goods.

1.5. Gross National Product

Gross National Product or G.N.P. measures the economic performance of the whole economy. It is the money measure of the over-all annual flow of goods and services, and is one of the most important concepts in all economics. Gross National Product differs from Gross Domestic Product by including net income from abroad.

Net National Product, N.N.P., which is Gross National Product less depreciation of capital equipment and buildings, is defined as the total money value of the flow of products of the community, or as the total of factor earnings (wages, interest, rents, and accruing profits) that are the costs of production of a society's final goods.

National Product is measured in one of two ways, either the Flow of Product approach, or the Earnings, or Income, approach.

1.5.1 The Flow of Product approach

This is the total money value of the flow of final products of the community.

1.5.2 The Earnings or Income approach

NNP is also definable as the total of factor earnings (wages, interest, rents, and accruing profits) that are the costs of production of a society's final goods.

To avoid double counting the Value Added approach is also used. Only final goods are included, and not the intermediate goods bought from other firms.

Because of the difficulty in measuring depreciation, GNP is calculated before NNP.

GNP is defined by the Central Statistical Service as the sum of the final products such as consumption goods and gross investment.

$$GNP = C + I + G + N \tag{1.1}$$

Where:

C	=	Consumption Product
I	=	Private Investment Product
G	=	All government expenditure on goods and services
N	=	Net Exports

or

$$GNP = NNP + Depreciation \tag{1.2}$$

1.6 Gross Domestic Product

The value of all final goods and services produced in the economy is called the Gross Domestic Product or GDP.

Gross Domestic Product, GDP, is defined as the GNP less income from foreign investments, i.e.

$$GDP = GNP\text{-}Net\ Income\ from\ Abroad \tag{1.3}$$

so

$$Net\ Income\ from\ abroad = GNP\text{-}GDP \tag{1.4}$$

Final goods and services are goods and services that are not used as inputs in the production of other goods and services, but are bought by their final user (Parkin and King, page 595).

Intermediate goods and services are those used as input in the production of other goods and services. The value of these intermediate goods and services are not included in the GDP.

In the South African national accounts, GDP is calculated from the incomes of the various factors, and is shown as the sum of remuneration of employees (ROE), the gross operating surplus (GOS) and net indirect taxation, (NIT), i.e.

$$GDP = ROE + GOS + NIT \tag{1.5}$$

In 1988, for example, the GDP is reported in the Input-Output table as 207945 million current Rands, being the sum of 104768 million Rands (remuneration of employees), 82754 million Rands (gross operating surplus) and 20423 million Rands (net indirect taxes).

In the 1993 tables the GDP is shown as 384290 million Rands, the sum of 210024, 136113 and 38153 million Rands.

Because it is the GDP, and not the GNP, which measures domestic production, GDP is used in the Input-Output Tables which are the basis of this thesis.

ANNEXURE II

MATRIX ALGEBRA

MATRIX ALGEBRA

2.1 Introduction

In a demand driven market economy the division of labour (Smith, 1776) finds its most practical application. No single sector of the economy can exist on its own, and each is dependant on the other sectors, both to supply the raw material, or input, necessary for the production of its produce, or output, and to consume that output in the production of their own produce.

Input-Output Tables show how outputs from each sector of the economy are used as inputs by the other sectors. All the sectors are shown in a column on the left hand side of a matrix, and in a row on the top of the same matrix. Each sector in the column supplies input to each of the sectors in the row, including itself. In this way an array, or matrix, is developed which shows the input and output between every sector in the economy. Since there are as many columns as there are rows, the matrix is always a square. The South African economy, in 1993 for example, had ninety such sectors, so that 8100 different transactions between the various sectors were recorded. Each row is in fact a linear equation with ninety variables and coefficients with the general form;

$$\begin{aligned} &a_{11}x_1 + a_{12}x_2 + \ldots\ldots\ldots\ldots a_{1j}x_j = d_1 \\ &a_{21}x_1 + a_{22}x_2 + \ldots\ldots\ldots + a_{2j}x_j = d_2 \\ &\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \\ &a_{i1}x_1 + a_{i2}x_2 + \ldots\ldots\ldots + a_{ij}x_j = d_i \end{aligned} \qquad (2.1)$$

The whole Input-Output table is a system of ninety simultaneous linear equations, and is depicted as an array with ninety rows and ninety columns, called a matrix.

This system of simultaneous linear equations has three essential ingredients:

(i) the set of coefficients a_{ij}, which are the values of the transactions between the sector in row *i* and the sector in column *j*;

(ii) the set of variables $x_1 \ldots\ldots x_j$, which are each sector in turn; and

(iii) the set of constants $d_1 \ldots\ldots d_i$, which are the final demand from each row sector, or, put another way the sum of all the intermediate inputs into each column sector. from the row sector.

The three sets can be called A, x and d respectively, and can be arranged as rectangular arrays, i.e.,

$$A = \begin{vmatrix} a_{11}\ a_{12} \ldots \\ a_{1j} \\ a_{21}\ a_{22} \ldots\ a_{2j} \\ a_{31}\ a_{32} \ldots\ a_{3j} \\ \ldots\ldots\ldots\ldots \\ a_{i1}\ a_{i2} \ldots\ldots a_{ij} \end{vmatrix} \qquad x = \begin{vmatrix} x_1 \\ x_2 \\ x_3 \\ .. \\ x_i \end{vmatrix} \qquad d = \begin{vmatrix} d_1 \\ d_2 \\ d_3 \\ .. \\ d_I \end{vmatrix}$$

To use a simple example, the simultaneous linear equations

$$\begin{aligned} 6x_1 + 3x_2 + x_3 &= 22 \\ x_1 + 4x_2 - 2x_3 &= 12 \\ 4x_1 - x_2 + 5x_3 &= 10 \end{aligned} \qquad (2.2)$$

can take the form:

$$A = \begin{vmatrix} 6 & 3 & 1 \\ 1 & 4 & -2 \\ 4 & -1 & 5 \end{vmatrix} \qquad x = \begin{vmatrix} x_1 \\ x_2 \\ x_3 \end{vmatrix} \qquad d = \begin{vmatrix} 22 \\ 12 \\ 10 \end{vmatrix}$$

A is known as the coefficient matrix and can also be written;

$$A = [a_{ij}] \tag{2.3}$$

where

$$i = 1,2,.....n$$

and

$$j = 1,2,.....n$$

When i=j the matrix is known as a square matrix. This is important when dealing with Input-Output table, which must have a square dimension.

The variable and constant matrices, *x* and *d* respectively, have only one column, and are known as *column vectors*. Likewise, a matrix with only one row is known as a *row vector*.

By using this notation, it is possible to express the set of simultaneous equations in a very simple form, i.e;

$$A.x = d \tag{2.4}$$

This equation, which can apply to a simultaneous system of any size, that makes possible the solution of the set of simultaneous equations that make up an Input-Output table.

Even though the South African economy is not exceptionally large, the solution of such a complex system of simultaneous equations is simplified using matrix algebra and the concept of matrix inversion. Calculation of inverse coefficients requires a good knowledge of matrix algebra and, when large matrices are involved, substantial computing facilities.

The basic rules of matrix algebra differ from normal algebra, and cover such matters as addition, subtraction, scalar multiplication, matrix multiplication, matrix division and matrix inversion. Although it is beyond the scope of this thesis to provide a detailed treatment of matrix algebra, which is available from many textbooks, the basic operations of multiplication and inversion are briefly discussed.

2.2 Multiplication

A point that should be noted, as it will be used later in the discussions on Output Multipliers, is that the multiplication of two matrices, *A* and *B*, is conditional that the column dimension of *A* must equal the row dimension of *B*. If *A* has dimensions (1x2) and *B* has dimensions (2x3), then *AB* exists, but *BA* will not exist.

In general, $A_{(m \times n)}B_{(p \times q)}$ will exist only if $n=p$, and furthermore AB will have dimensions *(m x q)* (Chiang, 61).

Although a good knowledge of these rules is necessary to understand the manipulation of data in an Input-Output table, the powerful software now available on personal computers makes the actual calculations a relatively simple task. In the days before personal computers became commonplace, extremely tedious and difficult manual calculations were necessary.

Three further aspects of matrix algebra, which are used in the manipulation of Input-Output data, need to be discussed. These are *Identity Matrices, Transposes and Inverses.*

2.3 Identity Matrices

An Identity Matrix is a square matrix in which the Principal Matrix consists of 1's, and every other element is a zero, i.e.;

$$I_2 = \begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix} \quad \text{or} \quad I_3 = \begin{vmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{vmatrix}$$

The important property of the identity matrix,

$$IA = AI = A \tag{2.5}$$

makes it possible, during the multiplication process, to insert or delete an identity matrix without affecting the matrix product, and this property is used during the calculation of inverse coefficients. It is the key to understanding the calculation of Leontief Inverses.

2.4. Transposes

When the rows and columns of a matrix A are interchanged, so that the first row becomes the first column, and vice-versa, the transpose of A is obtained. If A has the dimensions (3,2), i.e. three rows and two columns, then the transpose, A′, will have dimensions (2,3), two rows and three columns.

Transposes have the following properties;

$(A')' = A$ i.e. the transpose of a transpose is the original matrix.

$(A + B)' = A' + B'$ i.e. the transpose of a sum is the sum of the transposes.

$(AB)' = B'A'$ i.e. the transpose of a product is the product of the transposes in reverse order.

2.5. Inverses

The Inverse of a matrix, A, is analogous to the reciprocal of scalar algebra, and is denoted by A^{-1}.

However, where in scalar algebra;

$$X.X^{-1} = X^{-1}.X = 1 \tag{2.6}$$

in matrix algebra;

$$A.A^{-1} = A^{-1}.A = I \tag{2.7}$$

where *I* is the Identity matrix.

For A^{-1} to exist, A must be square, i.e. it must have the same number of rows as columns. If A^{-1} does exist, then A is said to be non-singular, and it will have the same dimensions as A, and it will be unique. Inverses have the following properties;

$(A^{-1})^{-1} = A$ i.e. the inverse of a matrix is the original matrix, i.e. A and A^{-1} are inverses of each other;

$(AB)^{-1} = B^{-1}.A^{-1}$ i.e. the inverse of a product is the product of the inverses in reverse order,

$(A')^{-1} = (A^{-1})'$ i.e. the inverse of the transpose is the transpose of the inverse.

Inverse matrices have a direct application to the solution of a system of simultaneous equations.

The equation

$$A.x = d \tag{2.8}$$

describes any system of simultaneous equations. If the inverse of A exists, then

$$A^{-1}.A.x = A^{-1}.d \tag{2.9}$$

or, because

$$A^{-1}.A = I$$

$$x = A^{-1}.d \tag{2.10}$$

and because an identity matrix can be inserted or deleted during a multiplication process without affecting the matrix product (Chiang, 79)

$$x = A^{-1}.d \tag{2.11}$$

The left side of this equation is a column vector of the variables of the simultaneous system. The right side of the equation contains a column vector of known numbers as well as the inverse of the coefficient matrix. Therefore, by multiplying d and A^{-1} it is possible to obtain the matrix of the variables, which is the solution to the simultaneous system.

The value of this application is useful for the discussion of Leontief Inverses.

ANNEXURE III

1993 INPUT-OUTPUT TABLES

&

MULTIPLIERS

SIC CODE	DESCRIPTION OF SECTOR
1100	AGRICULTURE, FORESTRY AND FISHING.
2100	COAL MINING.
2400	GOLD MINING.
2800	OTHER MINING.
3111-3140	FOOD, LIQUOR,BEVERAGES AND TOBACCO.
3211-3240	TEXTILES,CLOTHING,CORDAGE AND LEATHER.
3310-3320	WOOD AND FURNITURE.
3411-3420	PAPER, PRINTING AND PUBLISHING.
3511-3560	CHEMICALS, PLASTICS,PETROLEUM AND RUBBER.
3610-3699	POTTERY,GLASS,REFRACTORIES AND OTHER NON-METALLICS.
3710-3720	IRON,STEEL AND NON-FERROUS BASIC INDUSTRIES.
3811-3819	FABRICATED METAL PRODUCTS.
3821-3829	ENGINES,MACHINERY AND EQUIPMENT.
3831-3839	ELECTRICAL MACHINERY AND APPLIANCES.
38400-38409	MOTOR VEHICLES, PARTS AND ACCESSORIES.
3852-3859	RAILWAY AND OTHER TRANSPORT EQUIPMENT.
3901	JEWELLERY AND RELATED ARTICLES
386,3902,3903,3909	OTHER MANUFACTURING INDUSTRIES
4100	ELECTRICITY, GAS AND STEAM
4200	WATER SUPPLY
5100	BUILDING CONSTRUCTION
5200,5300	CIVIL ENGINEERING AND OTHER CONSTRUCTION
61,620,621,622	WHOLESALE AND RETAIL TRADE AND MOTOR TRADE
6300	CATERING AND ACCOMODATION SERVICES
7100	TRANSPORT AND STORAGE
7200	COMMUNICATION
81,8200	FINANCIAL INSTITUTIONS AND INSURANCE SERVICES
8310	REAL ESTATE
8320	BUSINESS SERVICES
8330	MACHINERY AND EQUIPMENT RENTING AND LEASING
9330	MEDICAL, DENTAL AND OTHER HEALTH AND VETERINARY SERVICES
9700	OTHER SERVICES, PROFIT SEEKING
9800	OTHER SERVICES, NON-PROFIT SEEKING
9900	OTHERS,SCRAP AND GOVERNMENT SERVICES
CP	REMUNERATION OF EMPLOYEES

1993 CLOSED MODEL

1. TRANSACTION TABLE

SIC_CODE	1100	2100	2400	2800	3111-3140	3211-3240	3310-3320	3411-3420	3511-3560	3610-3699	3710-3720	3811-3819	3821-3829	3831-3839	38400-38409	3852-3859	3901	386/390
1100	2050	15	12	3	15823	178	535	493	258	8	4	2	16	20	11	1	1	3
2100	1	1	6	68	58	13	3	53	972	105	524	0	0	3	1	0	0	0
2400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0
2800	36	7	7	3	9	1	1	8	4481	198	701	26	22	3	19	0	401	2
3111-3140	3229	8	6	2	8678	400	0	74	272	3	0	0	0	0	0	5	0	0
3211-3240	144	39	75	61	140	3867	179	360	285	48	127	85	59	25	186	22	4	92
3310-3320	89	26	332	54	106	16	894	20	66	26	16	45	15	72	14	6	1	16
3411-3420	162	8	6	1	1751	280	112	3630	654	149	15	68	37	64	96	5	1	59
3511-3560	3364	728	532	1261	1809	1244	359	1057	9084	366	497	806	478	500	575	62	7	159
3610-3699	94	22	24	37	503	5	29	34	541	598	8	281	24	60	116	10	1	5
3710-3720	36	14	40	57	5	9	91	38	329	100	1364	2956	983	904	647	220	173	65
3811-3819	196	223	268	226	947	37	172	50	478	58	251	669	783	184	499	26	86	52
3821-3829	109	386	281	581	342	139	34	157	453	103	276	100	672	34	261	62	2	16
3831-3839	0	238	98	137	8	2	4	2	11	1	60	36	254	764	175	36	0	66
38400-38409	206	156	16	172	0	1	0	0	0	0	0	0	2	0	3875	0	0	0
3852-3859	24	41	249	91	0	0	0	0	13	0	0	0	0	0	0	265	0	0
3901	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	54	0
386,3902,3903,3909	0	8	10	9	4	68	11	1	15	0	0	13	13	8	1	0	0	50
4100	289	450	1436	1098	584	234	109	356	1589	326	1716	248	105	94	140	40	4	16
4200	65	15	52	140	155	24	3	31	71	10	16	13	4	2	5	1	1	1
5100	156	2	192	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5200,5300	0	3	19	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61,620,621,622	2058	427	270	586	2059	749	358	1054	1994	293	505	507	625	388	1886	76	47	126
6300	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7100	681	333	81	390	1313	142	104	267	2727	262	657	374	179	111	166	32	16	25
7200	22	9	20	15	111	56	24	66	126	22	23	57	50	28	36	12	3	18
81,8200	206	0	0	0	595	175	94	237	820	68	198	192	109	92	90	26	7	36
8310	4	16	34	29	243	199	101	167	260	41	45	215	117	62	136	27	9	39
8320	0	0	0	0	214	66	26	85	372	48	99	79	62	33	42	108	1	16
8330	6	67	22	138	114	32	13	89	232	21	33	59	37	26	76	14	1	8
9330	306	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9700	0	0	0	0	156	14	9	19	144	5	2	11	9	9	34	2	0	6
9800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9900	168	674	609	1564	2200	529	233	1018	1665	293	1291	526	371	270	770	313	20	94
REM	3746	1982	9242	4016	6064	4473	1636	3542	7957	1975	4476	4041	3449	2535	2926	1118	126	589
SUB_TOT:II	17448	5897	13939	10841	43991	12952	5132	12909	35870	5128	12906	11412	8475	6292	12782	2489	1024	1561
T_IMPORTS	1096	937	778	1357	3105	2400	528	1143	11515	658	2079	1535	1546	1107	2395	350	648	267
TOT_II	18544	6834	14717	12199	47096	15352	5660	14052	47385	5785	14985	12947	10022	7398	15178	2839	1672	1828
GOS	11329	1941	7900	5478	5367	2258	823	3371	9233	1902	5230	1688	1534	1422	2444	165	116	475
NIT	554	101	1112	158	28	369	33	37	723	73	67	73	71	60	55	107	1	19
SUB_TOT	30427	8876	23728	17834	52491	17979	6516	17460	57341	7760	20282	14707	11627	8881	17676	3111	1788	2323
TR_FROM	76	0	0	2460	1842	2138	181	1122	7023	377	1852	1852	2935	929	1320	60	7	290
TR_TO	0	0	-1541	0	-1982	-2011	-160	-1992	-9006	-358	-734	-3314	-2556	-982	-1578	-54	-8	-353
TOT_I	30503	8876	22187	20294	52350	18106	6537	16590	55358	7779	21400	13245	12006	8828	17418	3117	1788	2260
					0	0	0	0	0	0	0	0	0	0	0	0		
EMPLOYMENT	868000	66261	434976	123764	236689	237061	102977	104897	187529	84566	85056	123501	64156	96031	70789	13270	8974	23842

1993 CLOSED MODEL

1. TRANSACTION TABL (continued)

SIC_CODE	4100	4200	5100	5200/53	6100/62	6300	7100	7200	8100/82	8310	8320	8330	9330	9700	9800	9900	CP_TOTAL
1100	15	1	0	4	17	378	65	0	0	25	4	0	18	0	59	0	8549
2100	1481	13	2	0	0	4	12	0	0	50	0	0	0	0	13	0	1443
2400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2800	0	1	155	164	0	2	36	0	0	2	0	1	0	0	2	0	0
3111-3140	59	0	0	0	195	2317	80	0	0	3	40	0	59	0	159	0	30510
3211-3240	5	2	201	3	277	19	221	53	7	13	5	0	31	8	40	66	7323
3310-3320	2	3	574	55	359	32	72	8	48	26	26	11	9	33	85	23	2089
3411-3420	5	4	76	11	2308	36	309	112	678	68	236	0	97	126	249	355	2367
3511-3560	252	169	905	623	3029	157	3163	121	153	158	88	18	504	117	198	1153	12859
3610-3699	50	37	2625	737	66	54	242	6	1	41	0	12	2	3	36	0	398
3710-3720	87	25	381	189	53	0	79	0	0	1	0	0	0	0	3	0	2
3811-3819	6	31	1027	645	159	28	132	34	9	33	6	11	15	3	42	122	1619
3821-3829	103	9	108	60	214	3	57	32	2	3	3	71	0	0	16	0	1624
3831-3839	262	57	882	240	74	10	138	203	3	15	1	5	5	25	14	0	1088
38400-38409	33	5	0	0	292	0	229	11	26	2	9	0	5	1	20	318	5117
3852-3859	0	0	0	0	0	0	306	0	0	0	0	0	0	0	0	0	55
3901	0	0	0	0	33	0	1	0	0	0	0	0	176	0	0	107	149
386,3902,3903,3909	1	13	0	0	39	10	84	3	43	6	53	0	42	12	45	78	408
4100	5398	210	30	130	1120	370	1257	164	189	244	15	2	100	91	292	167	4428
4200	32	712	10	113	98	95	76	21	47	174	4	0	2	14	48	12	519
5100	0	0	5146	0	1583	43	180	0	128	224	22	0	0	36	114	0	0
5200,5300	822	2	0	1236	21	0	269	0	0	198	0	0	7	0	13	0	0
61,620,621,622	399	71	963	684	8646	127	2332	494	836	134	420	64	432	76	267	1524	51924
6300	10	1	0	0	365	5	215	0	271	12	128	0	47	59	163	172	5095
7100	646	29	502	266	4263	83	1512	321	328	45	427	6	141	93	144	738	11835
7200	50	4	171	89	1747	26	79	1209	866	19	373	0	121	71	180	2154	2073
81,8200	336	6	229	131	2239	39	779	13	5727	429	187	18	29	95	133	1657	6988
8310	22	19	151	83	6306	596	329	106	1467	87	647	9	298	372	21	0	17759
8320	15	2	187	244	1019	64	237	38	728	477	322	42	49	432	160	0	1852
8330	5	2	266	829	678	164	617	2	119	18	182	42	166	29	2	0	0
9330	2	0	0	0	0	0	45	0	390	1	61	0	11	0	233	399	4628
9700	1	17	0	0	420	92	10	0	235	19	153	0	84	355	23	0	3307
9800	6	0	0	0	119	0	48	7	39	0	57	0	4	24	57	1702	4371
9900	161	97	356	423	420	25	910	46	81	154	52	0	3	39	17	111	1817
REM	3589	373	5664	3209	33486	2167	11417	3778	14077	1432	4383	118	1638	1919	3415	1403	3598
SUB_TOT:II	13853	1915	20610	10167	69646	6946	25538	6781	26496	4113	7907	431	4095	4033	6263	12261	195794
T_IMPORTS	408	144	1376	641	2576	261	1294	434	682	146	305	92	306	197	342	1058	14983
TOT_II	14261	2059	21986	10808	72222	7207	26832	7215	27178	4259	8212	523	4401	4229	6605	13319	210777
GOS	9405	614	1183	1123	18752	947	7815	3687	-557	19704	3729	780	2212	1042	228	696	
NIT	156	56	275	222	218	-38	1152	8	164	5592	25	1	39	82	75	-84	19853
SUB_TOT	23822	2729	23445	12153	91192	8117	35799	10910	26786	29554	11967	1304	6652	5354	6908	13930	230630
TR_FROM	0	0	0	0	2001	0	0	0	0	1226	0	3221	0	0	0	0	0
TR_TO	0	0	0	0	-1226	-28	-15	0	-2982	-22	0	-10	0	0	0	0	0
TOT_I	23822	2729	23445	12153	91967	8089	35785	10910	23804	30759	11967	4515	6652	5354	6908	13930	230630
EMPLOYMENT	70980	7020	257280	144720	907100	57900	279750	93250	336273	34202	104698	2827	61795	17899	34709	201597	774000

1. TRANSACTION TABLE (continued)

SIC_CODE	INTM_TOT	CG_TOTAL	IK_TOTAL	IC_TOTAL	T_EXPORTS	FIND_TOT	PROD_TOT
1100	28573	365	0	-298	1864	1931	30503
2100	4827	10	0	4	4036	4050	8876
2400	60	0	0	-102	22229	22127	22187
2800	6287	47	0	13	13947	14007	20294
3111-3140	46099	616	0	812	4825	6252	52351
3211-3240	14068	255	31	275	3477	4038	18106
3310-3320	5267	241	221	51	758	1270	6537
3411-3420	14136	912	0	109	1434	2454	16590
3511-3560	46556	1574	75	538	6614	8802	55358
3610-3699	6702	162	35	93	788	1077	7779
3710-3720	8852	18	0	61	12469	12548	21400
3811-3819	9126	772	2057	173	1117	4119	13245
3821-3829	6313	475	3367	109	1741	5692	12006
3831-3839	4915	614	2524	100	674	3913	8828
38400-38409	10495	850	4703	177	1192	6922	17418
3852-3859	1044	1216	374	91	392	2073	3117
3901	523	5	0	26	1234	1265	1788
386,3902,3903,3909	1047	502	429	30	253	1213	2260
4100	23042	671	0	0	109	780	23822
4200	2586	143	0	0	0	143	2729
5100	7915	1351	14179	0	0	15530	23445
5200,5300	2603	293	9233	0	24	9549	12153
61,620,621,622	83399	2006	3081	362	3120	8568	91967
6300	6543	379	0	0	1166	1545	8089
7100	29237	1380	121	108	4939	6548	35785
7200	9934	462	0	0	514	977	10910
81,8200	21978	308	0	0	1518	1826	23804
8310	30019	703	25	0	11	740	30759
8320	7120	1962	2094	0	791	4847	11967
8330	4108	407	0	0	0	407	4515
9330	6075	506	0	0	71	577	6652
9700	5138	95	0	0	121	216	5354
9800	6435	400	0	0	73	473	6908
9900	17319	-3389	0	0	0	-3389	13930
REM	159558	50466				50466	210024
SUB_TOT:II	637898	66777	42550	2731	91500	203557	841455
T_IMPORTS	58689	4993	10556	676		16225	74914
TOT_II	696587	71770	53105	3406	91500	219782	916369
GOS	134036	2077				2077	136113
NIT	31437	1564	5732	1149	-1728	6716	38154
SUB_TOT	862061	75411	58837	4555	89772	228575	1090636
TR_FROM	30911	0	0	0	0	0	30911
TR_TO	-30911	0	0	0	0	0	-30911
TOT_I	862061	75411	58837	4555	89772	228575	1090636
EMPLOYMENT	6318339						

1993 CLOSED MODEL

2. DIRECT COEFFICIENTS [A]

SIC_CODE	1100	2100	2400	2800	3111-	3211-	3310-	3411-	3511-	3610-	3710-	3811-	3821-	3831-	38400-	3852-	3901	386/390
1100	0.0674	0.0017	0.0005	0.0002	0.3014	0.0099	0.0821	0.0282	0.0045	0.0011	0.0002	0.0001	0.0014	0.0023	0.0006	0.0004	0.0007	0.0014
2100	0.0000	0.0001	0.0003	0.0038	0.0011	0.0007	0.0004	0.0030	0.0170	0.0135	0.0258	0.0000	0.0000	0.0003	0.0000	0.0000	0.0000	0.0000
2400	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0336	0.0000
2800	0.0012	0.0008	0.0003	0.0002	0.0002	0.0000	0.0002	0.0004	0.0781	0.0255	0.0346	0.0018	0.0019	0.0004	0.0011	0.0000	0.2240	0.0009
3111-3140	0.1061	0.0009	0.0002	0.0001	0.1653	0.0222	0.0001	0.0043	0.0047	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0015	0.0000	0.0001
3211-3240	0.0047	0.0043	0.0032	0.0034	0.0027	0.2151	0.0274	0.0206	0.0050	0.0062	0.0063	0.0058	0.0051	0.0029	0.0105	0.0069	0.0020	0.0397
3310-3320	0.0029	0.0030	0.0140	0.0030	0.0020	0.0009	0.1371	0.0011	0.0011	0.0033	0.0008	0.0031	0.0013	0.0081	0.0008	0.0021	0.0006	0.0070
3411-3420	0.0053	0.0009	0.0003	0.0001	0.0334	0.0156	0.0172	0.2079	0.0114	0.0192	0.0008	0.0046	0.0032	0.0072	0.0054	0.0016	0.0006	0.0255
3511-3560	0.1106	0.0820	0.0224	0.0707	0.0345	0.0692	0.0551	0.0605	0.1584	0.0471	0.0245	0.0548	0.0411	0.0563	0.0325	0.0199	0.0038	0.0685
3610-3699	0.0031	0.0025	0.0010	0.0021	0.0096	0.0003	0.0044	0.0019	0.0094	0.0771	0.0004	0.0191	0.0021	0.0068	0.0066	0.0032	0.0007	0.0020
3710-3720	0.0012	0.0016	0.0017	0.0032	0.0001	0.0005	0.0140	0.0022	0.0057	0.0128	0.0673	0.2010	0.0845	0.1018	0.0366	0.0708	0.0969	0.0280
3811-3819	0.0064	0.0251	0.0113	0.0127	0.0180	0.0021	0.0264	0.0028	0.0083	0.0075	0.0124	0.0455	0.0673	0.0208	0.0282	0.0084	0.0478	0.0224
3821-3829	0.0036	0.0435	0.0119	0.0326	0.0065	0.0077	0.0052	0.0090	0.0079	0.0132	0.0136	0.0068	0.0578	0.0038	0.0147	0.0200	0.0009	0.0071
3831-3839	0.0000	0.0268	0.0041	0.0077	0.0002	0.0001	0.0006	0.0001	0.0002	0.0002	0.0030	0.0025	0.0218	0.0861	0.0099	0.0115	0.0002	0.0284
38400-38409	0.0068	0.0176	0.0007	0.0096	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.2192	0.0000	0.0000	0.0000
3852-3859	0.0008	0.0046	0.0105	0.0051	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0851	0.0000	0.0000
3901	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0302	0.0001
386,3902,3903,3909	0.0000	0.0009	0.0004	0.0005	0.0001	0.0038	0.0016	0.0001	0.0003	0.0000	0.0000	0.0009	0.0011	0.0009	0.0000	0.0001	0.0001	0.0216
4100	0.0095	0.0507	0.0605	0.0616	0.0111	0.0130	0.0167	0.0204	0.0277	0.0421	0.0846	0.0168	0.0090	0.0106	0.0079	0.0127	0.0020	0.0069
4200	0.0021	0.0016	0.0022	0.0079	0.0029	0.0013	0.0005	0.0018	0.0012	0.0013	0.0008	0.0009	0.0004	0.0002	0.0003	0.0004	0.0005	0.0003
5100	0.0051	0.0002	0.0081	0.0050	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5200,5300	0.0000	0.0003	0.0008	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
61,620,621,622	0.0676	0.0481	0.0114	0.0328	0.0392	0.0417	0.0549	0.0604	0.0348	0.0378	0.0249	0.0345	0.0537	0.0437	0.1067	0.0244	0.0262	0.0540
6300	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7100	0.0224	0.0375	0.0034	0.0219	0.0250	0.0079	0.0159	0.0153	0.0476	0.0337	0.0324	0.0254	0.0154	0.0125	0.0094	0.0103	0.0088	0.0109
7200	0.0007	0.0010	0.0008	0.0009	0.0021	0.0031	0.0037	0.0038	0.0022	0.0029	0.0012	0.0039	0.0043	0.0032	0.0020	0.0038	0.0019	0.0078
81,8200	0.0068	0.0000	0.0000	0.0000	0.0113	0.0097	0.0144	0.0136	0.0143	0.0088	0.0097	0.0131	0.0094	0.0103	0.0051	0.0083	0.0038	0.0156
8310	0.0001	0.0018	0.0014	0.0016	0.0046	0.0111	0.0155	0.0096	0.0045	0.0053	0.0022	0.0146	0.0101	0.0070	0.0077	0.0088	0.0049	0.0168
8320	0.0000	0.0000	0.0000	0.0000	0.0041	0.0037	0.0041	0.0049	0.0065	0.0062	0.0049	0.0054	0.0053	0.0037	0.0024	0.0348	0.0006	0.0070
8330	0.0002	0.0075	0.0009	0.0077	0.0022	0.0018	0.0021	0.0051	0.0040	0.0027	0.0016	0.0040	0.0032	0.0029	0.0043	0.0043	0.0004	0.0034
9330	0.0100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9700	0.0000	0.0000	0.0000	0.0000	0.0030	0.0008	0.0013	0.0011	0.0025	0.0006	0.0001	0.0007	0.0008	0.0010	0.0019	0.0005	0.0002	0.0026
9800	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9900	0.0055	0.0759	0.0257	0.0877	0.0419	0.0294	0.0357	0.0583	0.0290	0.0378	0.0637	0.0358	0.0319	0.0304	0.0436	0.1007	0.0113	0.0403
REM	0.1231	0.2233	0.3895	0.2252	0.1155	0.2488	0.2510	0.2029	0.1388	0.2544	0.2207	0.2747	0.2967	0.2855	0.1656	0.3593	0.0702	0.2535
SUB_TOT:II	0.5734	0.6644	0.5874	0.6079	0.8381	0.7204	0.7876	0.7394	0.6256	0.6607	0.6363	0.7759	0.7290	0.7085	0.7232	0.8000	0.5727	0.6719
T_IMPORTS	0.0360	0.1055	0.0328	0.0761	0.0592	0.1335	0.0810	0.0655	0.2008	0.0848	0.1025	0.1044	0.1330	0.1246	0.1355	0.1126	0.3621	0.1151
TOT_II	0.6095	0.7699	0.6202	0.6840	0.8972	0.8539	0.8686	0.8048	0.8264	0.7455	0.7388	0.8803	0.8620	0.8331	0.8587	0.9126	0.9349	0.7870
GOS	0.3723	0.2187	0.3329	0.3071	0.1022	0.1256	0.1263	0.1931	0.1610	0.2451	0.2579	0.1148	0.1319	0.1602	0.1382	0.0529	0.0647	0.2046
NIT	0.0182	0.0114	0.0469	0.0089	0.0005	0.0205	0.0051	0.0021	0.0126	0.0094	0.0033	0.0049	0.0061	0.0068	0.0031	0.0345	0.0004	0.0084
SUB_TOT	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
GDP	0.5137	0.4534	0.7693	0.5412	0.2183	0.3949	0.3824	0.3981	0.3124	0.5089	0.4819	0.3944	0.4347	0.4524	0.3069	0.4467	0.1354	0.4665
EMPLOYMENT	28.52699	7.464814	18.33164	6.939603	4.509173	13.18517	15.80394	6.007825	3.270412	10.89718	4.193629	8.397554	5.518083	10.81338	4.004823	4.265105	5.017707	10.26185
ADJUSTED BY PPI	28.52699	7.464814	18.33164	6.939603	4.509173	13.18517	15.80394	6.007825	3.270412	10.89718	4.193629	8.397554	5.518083	10.81338	4.004823	4.265105	5.017707	10.26185

1993 CLOSED MODEL

2. DIRECT COEFFICIE(continued)

SIC_CODE	4100	4200	5100	5200/53	6100/62	6300	7100	7200	8100/82	8310	8320	8330	9330	9700	9800	9900	CP_TOTAL
1100	0.0006	0.0004	0.0000	0.0004	0.0002	0.0466	0.0018	0.0000	0.0000	0.0008	0.0004	0.0000	0.0028	0.0000	0.0086	0.0000	0.0371
2100	0.0622	0.0049	0.0001	0.0000	0.0000	0.0005	0.0003	0.0000	0.0000	0.0017	0.0000	0.0000	0.0000	0.0000	0.0019	0.0000	0.0063
2400	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2800	0.0000	0.0004	0.0066	0.0135	0.0000	0.0002	0.0010	0.0000	0.0000	0.0001	0.0000	0.0007	0.0000	0.0000	0.0002	0.0000	0.0000
3111-3140	0.0025	0.0000	0.0000	0.0000	0.0021	0.2854	0.0022	0.0000	0.0000	0.0001	0.0034	0.0000	0.0088	0.0000	0.0229	0.0000	0.1323
3211-3240	0.0002	0.0008	0.0086	0.0002	0.0030	0.0023	0.0062	0.0049	0.0003	0.0004	0.0004	0.0000	0.0046	0.0015	0.0057	0.0047	0.0318
3310-3320	0.0001	0.0010	0.0245	0.0045	0.0039	0.0039	0.0020	0.0007	0.0018	0.0009	0.0022	0.0087	0.0013	0.0061	0.0123	0.0016	0.0091
3411-3420	0.0002	0.0014	0.0032	0.0009	0.0253	0.0045	0.0086	0.0103	0.0253	0.0023	0.0197	0.0000	0.0146	0.0235	0.0361	0.0255	0.0103
3511-3560	0.0106	0.0621	0.0386	0.0513	0.0332	0.0194	0.0883	0.0111	0.0057	0.0054	0.0074	0.0140	0.0758	0.0218	0.0287	0.0827	0.0558
3610-3699	0.0021	0.0135	0.1120	0.0607	0.0007	0.0066	0.0068	0.0005	0.0000	0.0014	0.0000	0.0091	0.0002	0.0006	0.0052	0.0000	0.0017
3710-3720	0.0036	0.0093	0.0163	0.0155	0.0006	0.0000	0.0022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0004	0.0000	0.0000
3811-3819	0.0002	0.0113	0.0438	0.0531	0.0017	0.0034	0.0037	0.0031	0.0003	0.0011	0.0005	0.0088	0.0022	0.0005	0.0061	0.0087	0.0070
3821-3829	0.0043	0.0033	0.0046	0.0049	0.0023	0.0004	0.0016	0.0030	0.0001	0.0001	0.0002	0.0545	0.0000	0.0000	0.0023	0.0000	0.0070
3831-3839	0.0110	0.0209	0.0376	0.0198	0.0008	0.0012	0.0039	0.0186	0.0001	0.0005	0.0001	0.0038	0.0008	0.0046	0.0020	0.0000	0.0047
38400-38409	0.0014	0.0017	0.0000	0.0000	0.0032	0.0000	0.0064	0.0010	0.0010	0.0001	0.0008	0.0000	0.0008	0.0003	0.0029	0.0228	0.0222
3852-3859	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0086	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002
3901	0.0000	0.0000	0.0000	0.0000	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0265	0.0000	0.0000	0.0077	0.0006
386,3902,3903,3909	0.0001	0.0047	0.0000	0.0000	0.0004	0.0012	0.0024	0.0003	0.0016	0.0002	0.0044	0.0000	0.0064	0.0022	0.0065	0.0056	0.0018
4100	0.2266	0.0768	0.0013	0.0107	0.0123	0.0456	0.0351	0.0151	0.0071	0.0083	0.0013	0.0012	0.0150	0.0170	0.0423	0.0120	0.0192
4200	0.0013	0.2608	0.0004	0.0093	0.0011	0.0117	0.0021	0.0019	0.0017	0.0059	0.0003	0.0004	0.0002	0.0026	0.0069	0.0009	0.0023
5100	0.0000	0.0000	0.2195	0.0000	0.0174	0.0053	0.0050	0.0000	0.0048	0.0076	0.0019	0.0000	0.0000	0.0067	0.0164	0.0000	0.0000
5200,5300	0.0345	0.0007	0.0000	0.1017	0.0002	0.0000	0.0075	0.0000	0.0000	0.0067	0.0000	0.0000	0.0010	0.0000	0.0019	0.0000	0.0000
61,620,621,622	0.0168	0.0261	0.0411	0.0563	0.0948	0.0156	0.0651	0.0453	0.0312	0.0045	0.0351	0.0492	0.0650	0.0143	0.0387	0.1094	0.2251
6300	0.0004	0.0002	0.0000	0.0000	0.0040	0.0007	0.0060	0.0000	0.0101	0.0004	0.0107	0.0000	0.0070	0.0110	0.0237	0.0123	0.0221
7100	0.0271	0.0105	0.0214	0.0219	0.0468	0.0102	0.0422	0.0294	0.0123	0.0015	0.0357	0.0044	0.0212	0.0174	0.0209	0.0530	0.0513
7200	0.0021	0.0013	0.0073	0.0073	0.0192	0.0032	0.0022	0.1108	0.0323	0.0007	0.0312	0.0000	0.0182	0.0132	0.0260	0.1547	0.0090
81,8200	0.0141	0.0023	0.0098	0.0108	0.0246	0.0048	0.0218	0.0012	0.2138	0.0145	0.0157	0.0138	0.0044	0.0177	0.0193	0.1189	0.0303
8310	0.0009	0.0070	0.0065	0.0069	0.0692	0.0734	0.0092	0.0097	0.0548	0.0029	0.0541	0.0068	0.0448	0.0696	0.0031	0.0000	0.0770
8320	0.0006	0.0008	0.0080	0.0201	0.0112	0.0079	0.0066	0.0035	0.0272	0.0161	0.0269	0.0321	0.0074	0.0806	0.0231	0.0000	0.0080
8330	0.0002	0.0009	0.0113	0.0682	0.0074	0.0201	0.0172	0.0002	0.0045	0.0006	0.0152	0.0321	0.0249	0.0055	0.0003	0.0000	0.0000
9330	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0013	0.0000	0.0146	0.0000	0.0051	0.0000	0.0016	0.0000	0.0338	0.0287	0.0201
9700	0.0001	0.0063	0.0000	0.0000	0.0046	0.0113	0.0003	0.0000	0.0088	0.0006	0.0128	0.0000	0.0126	0.0663	0.0034	0.0000	0.0143
9800	0.0003	0.0000	0.0000	0.0000	0.0013	0.0000	0.0013	0.0006	0.0014	0.0000	0.0047	0.0000	0.0006	0.0045	0.0082	0.1222	0.0190
9900	0.0067	0.0356	0.0152	0.0348	0.0046	0.0031	0.0254	0.0042	0.0030	0.0052	0.0044	0.0000	0.0005	0.0073	0.0025	0.0079	0.0079
REM	0.1507	0.1367	0.2416	0.2641	0.3672	0.2670	0.3189	0.3462	0.5255	0.0484	0.3662	0.0908	0.2462	0.3585	0.4944	0.1007	0.0156
SUB_TOT:II	0.5815	0.7017	0.8791	0.8366	0.7637	0.8558	0.7134	0.6215	0.9892	0.1392	0.6607	0.3304	0.6156	0.7532	0.9067	0.8801	0.8490
T_IMPORTS	0.0171	0.0526	0.0587	0.0527	0.0283	0.0321	0.0361	0.0398	0.0255	0.0049	0.0255	0.0709	0.0461	0.0367	0.0495	0.0759	0.0650
TOT_II	0.5986	0.7544	0.9378	0.8894	0.7920	0.8879	0.7495	0.6613	1.0146	0.1441	0.6863	0.4013	0.6616	0.7900	0.9562	0.9561	0.9139
GOS	0.3948	0.2251	0.0505	0.0924	0.2056	0.1167	0.2183	0.3380	-0.0208	0.6667	0.3117	0.5981	0.3325	0.1947	0.0330	0.0500	0.0000
NIT	0.0066	0.0205	0.0117	0.0183	0.0024	-0.0046	0.0322	0.0007	0.0061	0.1892	0.0021	0.0007	0.0059	0.0153	0.0108	-0.0060	0.0861
SUB_TOT	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
GDP	0.5520	0.3823	0.3038	0.3747	0.5752	0.3791	0.5694	0.6849	0.5109	0.9043	0.6800	0.6895	0.5846	0.5685	0.5383	0.1447	0.1017
EMPLOYMENT	2.979597	2.572521	10.97394	11.9086	9.947129	7.133616	7.814356	8.546863	12.55393	1.157255	8.749072	2.168411	9.289751	3.343159	5.02462	14.47169	3.356025
ADJUSTED BY PPI	2.979597	2.572521	10.97394	11.9086	9.947129	7.133616	7.814356	8.546863	12.55393	1.157255	8.749072	2.168411	9.289751	3.343159	5.02462	14.47169	3.356025

1993 CLOSED MODEL

3. IDENTITY MATRIX [I]

SIC_CODE	1100	2100	2400	2800	3111-3140	3211-3240	3310-3320	3411-3420	3511-3560	3610-3699	3710-3720	3811-3819	3821-3829	3831-3839	38400-38409	3852-3859	3901	386/390
1100	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2100	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2400	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2800	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3111-3140	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
3211-3240	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
3310-3320	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
3411-3420	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
3511-3560	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
3610-3699	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
3710-3720	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
3811-3819	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
3821-3829	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
3831-3839	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
38400-38409	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
3852-3859	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
3901	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
386,3902,3903,3909	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5200,5300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61,620,621,622	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81,8200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8310	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8320	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8330	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9330	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
REM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

1993 CLOSED MODEL

3. IDENTITY MATRIX (continued)

SIC_CODE	4100	4200	5100	5200/53	6100/62	6300	7100	7200	8100/82	8310	8320	8330	9330	9700	9800	9900	CP_TOTAL
1100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3111-3140	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3211-3240	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3310-3320	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3411-3420	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3511-3560	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3610-3699	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3710-3720	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3811-3819	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3821-3829	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3831-3839	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38400-38409	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3852-3859	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3901	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
386,3902,3903,3909	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4100	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4200	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5100	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5200,5300	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
61,620,621,622	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6300	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7100	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7200	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
81,8200	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
8310	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
8320	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
8330	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
9330	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
9700	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
9800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
9900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
REM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

1993 CLOSED MODEL

4. TECHNOLOGY MATRIX [I-A]

SIC_CODE	1100	2100	2400	2800	3111-3140	3211-3240	3310-3320	3411-3420	3511-3560	3610-3699	3710-3720	3811-3819	3821-3829	3831-3839	38400-38409	3852-3859	3901	386/390
1100	0.9326	-0.0017	-0.0005	-0.0002	-0.3014	-0.0099	-0.0821	-0.0282	-0.0045	-0.0011	-0.0002	-0.0001	-0.0014	-0.0023	-0.0006	-0.0004	-0.0007	-0.0014
2100	0.0000	0.9999	-0.0003	-0.0038	-0.0011	-0.0007	-0.0004	-0.0030	-0.0170	-0.0135	-0.0258	0.0000	0.0000	-0.0003	0.0000	0.0000	0.0000	0.0000
2400	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0336	0.0000
2800	-0.0012	-0.0008	-0.0003	0.9998	-0.0002	0.0000	-0.0002	-0.0004	-0.0781	-0.0255	-0.0346	-0.0018	-0.0019	-0.0004	-0.0011	0.0000	-0.2240	-0.0009
3111-3140	-0.1061	-0.0009	-0.0002	-0.0001	0.8347	-0.0222	-0.0001	-0.0043	-0.0047	-0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0015	0.0000	-0.0001
3211-3240	-0.0047	-0.0043	-0.0032	-0.0034	-0.0027	0.7849	-0.0274	-0.0206	-0.0050	-0.0062	-0.0063	-0.0058	-0.0051	-0.0029	-0.0105	-0.0069	-0.0020	-0.0397
3310-3320	-0.0029	-0.0030	-0.0140	-0.0030	-0.0020	-0.0009	0.8629	-0.0011	-0.0011	-0.0033	-0.0008	-0.0031	-0.0013	-0.0081	-0.0008	-0.0021	-0.0006	-0.0070
3411-3420	-0.0053	-0.0009	-0.0003	-0.0001	-0.0334	-0.0156	-0.0172	0.7921	-0.0114	-0.0192	-0.0008	-0.0046	-0.0032	-0.0072	-0.0054	-0.0016	-0.0006	-0.0255
3511-3560	-0.1106	-0.0820	-0.0224	-0.0707	-0.0345	-0.0692	-0.0551	-0.0605	0.8416	-0.0471	-0.0245	-0.0548	-0.0411	-0.0563	-0.0325	-0.0199	-0.0038	-0.0685
3610-3699	-0.0031	-0.0025	-0.0010	-0.0021	-0.0096	-0.0003	-0.0044	-0.0019	-0.0094	0.9229	-0.0004	-0.0191	-0.0021	-0.0068	-0.0066	-0.0032	-0.0007	-0.0020
3710-3720	-0.0012	-0.0016	-0.0017	-0.0032	-0.0001	-0.0005	-0.0140	-0.0022	-0.0057	-0.0128	0.9327	-0.2010	-0.0845	-0.1018	-0.0366	-0.0708	-0.0969	-0.0280
3811-3819	-0.0064	-0.0251	-0.0113	-0.0127	-0.0180	-0.0021	-0.0264	-0.0028	-0.0083	-0.0075	-0.0124	0.9545	-0.0673	-0.0208	-0.0282	-0.0084	-0.0478	-0.0224
3821-3829	-0.0036	-0.0435	-0.0119	-0.0326	-0.0065	-0.0077	-0.0052	-0.0090	-0.0079	-0.0132	-0.0136	-0.0068	0.9422	-0.0038	-0.0147	-0.0200	-0.0009	-0.0071
3831-3839	0.0000	-0.0268	-0.0041	-0.0077	-0.0002	-0.0001	-0.0006	-0.0001	-0.0002	-0.0002	-0.0030	-0.0025	-0.0218	0.9139	-0.0099	-0.0115	-0.0002	-0.0284
38400-38409	-0.0068	-0.0176	-0.0007	-0.0096	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0002	0.0000	0.7808	0.0000	0.0000	0.0000
3852-3859	-0.0008	-0.0046	-0.0105	-0.0051	0.0000	0.0000	0.0000	0.0000	-0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.9149	0.0000	0.0000
3901	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0001	0.0000	0.0000	0.0000	0.0000	0.9698	-0.0001
386,3902,3903,3909	0.0000	-0.0009	-0.0004	-0.0005	-0.0001	-0.0038	-0.0016	-0.0001	-0.0003	0.0000	0.0000	-0.0009	-0.0011	-0.0009	0.0000	-0.0001	-0.0001	0.9784
4100	-0.0095	-0.0507	-0.0605	-0.0616	-0.0111	-0.0130	-0.0167	-0.0204	-0.0277	-0.0421	-0.0846	-0.0168	-0.0090	-0.0106	-0.0079	-0.0127	-0.0020	-0.0069
4200	-0.0021	-0.0016	-0.0022	-0.0079	-0.0029	-0.0013	-0.0005	-0.0018	-0.0012	-0.0013	-0.0008	-0.0009	-0.0004	-0.0002	-0.0003	-0.0004	-0.0005	-0.0003
5100	-0.0051	-0.0002	-0.0081	-0.0050	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5200,5300	0.0000	-0.0003	-0.0008	-0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
61,620,621,622	-0.0676	-0.0481	-0.0114	-0.0328	-0.0392	-0.0417	-0.0549	-0.0604	-0.0348	-0.0378	-0.0249	-0.0345	-0.0537	-0.0437	-0.1067	-0.0244	-0.0262	-0.0540
6300	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7100	-0.0224	-0.0375	-0.0034	-0.0219	-0.0250	-0.0079	-0.0159	-0.0153	-0.0476	-0.0337	-0.0324	-0.0254	-0.0154	-0.0125	-0.0094	-0.0103	-0.0088	-0.0109
7200	-0.0007	-0.0010	-0.0008	-0.0009	-0.0021	-0.0031	-0.0037	-0.0038	-0.0022	-0.0029	-0.0012	-0.0039	-0.0043	-0.0032	-0.0020	-0.0038	-0.0019	-0.0078
81,8200	-0.0068	0.0000	0.0000	0.0000	-0.0113	-0.0097	-0.0144	-0.0136	-0.0143	-0.0088	-0.0097	-0.0131	-0.0094	-0.0103	-0.0051	-0.0083	-0.0038	-0.0156
8310	-0.0001	-0.0018	-0.0014	-0.0016	-0.0046	-0.0111	-0.0155	-0.0096	-0.0045	-0.0053	-0.0022	-0.0146	-0.0101	-0.0070	-0.0077	-0.0088	-0.0049	-0.0168
8320	0.0000	0.0000	0.0000	0.0000	-0.0041	-0.0037	-0.0041	-0.0049	-0.0065	-0.0062	-0.0049	-0.0054	-0.0053	-0.0037	-0.0024	-0.0348	-0.0006	-0.0070
8330	-0.0002	-0.0075	-0.0009	-0.0077	-0.0022	-0.0018	-0.0021	-0.0051	-0.0040	-0.0027	-0.0016	-0.0040	-0.0032	-0.0029	-0.0043	-0.0043	-0.0004	-0.0034
9330	-0.0100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9700	0.0000	0.0000	0.0000	0.0000	-0.0030	-0.0008	-0.0013	-0.0011	-0.0025	-0.0006	-0.0001	-0.0007	-0.0008	-0.0010	-0.0019	-0.0005	-0.0002	-0.0026
9800	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9900	-0.0055	-0.0759	-0.0257	-0.0877	-0.0419	-0.0294	-0.0357	-0.0583	-0.0290	-0.0378	-0.0637	-0.0358	-0.0319	-0.0304	-0.0436	-0.1007	-0.0113	-0.0403
REM	-0.1231	-0.2233	-0.3895	-0.2252	-0.1155	-0.2488	-0.2510	-0.2029	-0.1388	-0.2544	-0.2207	-0.2747	-0.2967	-0.2855	-0.1656	-0.3593	-0.0702	-0.2535

1993 CLOSED MODEL

4. TECHNOLOGY MATRI (continued)

SIC_CODE	4100	4200	5100	5200/53	6100/62	6300	7100	7200	8100/82	8310	8320	8330	9330	9700	9800	9900	CP_TOTAL
1100	-0.0006	-0.0004	0.0000	-0.0004	-0.0002	-0.0466	-0.0018	0.0000	0.0000	-0.0008	-0.0004	0.0000	-0.0028	0.0000	-0.0086	0.0000	-0.0371
2100	-0.0622	-0.0049	-0.0001	0.0000	0.0000	-0.0005	-0.0003	0.0000	0.0000	-0.0017	0.0000	0.0000	0.0000	0.0000	-0.0019	0.0000	-0.0063
2400	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2800	0.0000	-0.0004	-0.0066	-0.0135	0.0000	-0.0002	-0.0010	0.0000	0.0000	-0.0001	0.0000	-0.0007	0.0000	0.0000	-0.0002	0.0000	0.0000
3111-3140	-0.0025	0.0000	0.0000	0.0000	-0.0021	-0.2854	-0.0022	0.0000	0.0000	-0.0001	-0.0034	0.0000	-0.0088	0.0000	-0.0229	0.0000	-0.1323
3211-3240	-0.0002	-0.0008	-0.0086	-0.0002	-0.0030	-0.0023	-0.0062	-0.0049	-0.0003	-0.0004	-0.0004	0.0000	-0.0046	-0.0015	-0.0057	-0.0047	-0.0318
3310-3320	-0.0001	-0.0010	-0.0245	-0.0045	-0.0039	-0.0039	-0.0020	-0.0007	-0.0018	-0.0009	-0.0022	-0.0087	-0.0013	-0.0061	-0.0123	-0.0016	-0.0091
3411-3420	-0.0002	-0.0014	-0.0032	-0.0009	-0.0253	-0.0045	-0.0086	-0.0103	-0.0253	-0.0023	-0.0197	0.0000	-0.0146	-0.0235	-0.0361	-0.0255	-0.0103
3511-3560	-0.0106	-0.0621	-0.0386	-0.0513	-0.0332	-0.0194	-0.0883	-0.0111	-0.0057	-0.0054	-0.0074	-0.0140	-0.0758	-0.0218	-0.0287	-0.0827	-0.0558
3610-3699	-0.0021	-0.0135	-0.1120	-0.0607	-0.0007	-0.0066	-0.0068	-0.0005	0.0000	-0.0014	0.0000	-0.0091	-0.0002	-0.0006	-0.0052	0.0000	-0.0017
3710-3720	-0.0036	-0.0093	-0.0163	-0.0155	-0.0006	0.0000	-0.0022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0004	0.0000	0.0000
3811-3819	-0.0002	-0.0113	-0.0438	-0.0531	-0.0017	-0.0034	-0.0037	-0.0031	-0.0003	-0.0011	-0.0005	-0.0088	-0.0022	-0.0005	-0.0061	-0.0087	-0.0070
3821-3829	-0.0043	-0.0033	-0.0046	-0.0049	-0.0023	-0.0004	-0.0016	-0.0030	-0.0001	-0.0001	-0.0002	-0.0545	0.0000	0.0000	-0.0023	0.0000	-0.0070
3831-3839	-0.0110	-0.0209	-0.0376	-0.0198	-0.0008	-0.0012	-0.0039	-0.0186	-0.0001	-0.0005	-0.0001	-0.0038	-0.0008	-0.0046	-0.0020	0.0000	-0.0047
38400-38409	-0.0014	-0.0017	0.0000	0.0000	-0.0032	0.0000	-0.0064	-0.0010	-0.0010	-0.0001	-0.0008	0.0000	-0.0008	-0.0003	-0.0029	-0.0228	-0.0222
3852-3859	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0086	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0002
3901	0.0000	0.0000	0.0000	0.0000	-0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0265	0.0000	0.0000	-0.0077	-0.0006
386,3902,3903,3909	-0.0001	-0.0047	0.0000	0.0000	-0.0004	-0.0012	-0.0024	-0.0003	-0.0016	-0.0002	-0.0044	0.0000	-0.0064	-0.0022	-0.0065	-0.0056	-0.0018
4100	0.7734	-0.0768	-0.0013	-0.0107	-0.0123	-0.0456	-0.0351	-0.0151	-0.0071	-0.0083	-0.0013	-0.0012	-0.0150	-0.0170	-0.0423	-0.0120	-0.0192
4200	-0.0013	0.7392	-0.0004	-0.0093	-0.0011	-0.0117	-0.0021	-0.0019	-0.0017	-0.0059	-0.0003	-0.0004	-0.0002	-0.0026	-0.0069	-0.0009	-0.0023
5100	0.0000	0.0000	0.7805	0.0000	-0.0174	-0.0053	-0.0050	0.0000	-0.0048	-0.0076	-0.0019	0.0000	0.0000	-0.0067	-0.0164	0.0000	0.0000
5200,5300	-0.0345	-0.0007	0.0000	0.8983	-0.0002	0.0000	-0.0075	0.0000	0.0000	-0.0067	0.0000	0.0000	-0.0010	0.0000	-0.0019	0.0000	0.0000
61,620,621,622	-0.0168	-0.0261	-0.0411	-0.0563	0.9052	-0.0156	-0.0651	-0.0453	-0.0312	-0.0045	-0.0351	-0.0492	-0.0650	-0.0143	-0.0387	-0.1094	-0.2251
6300	-0.0004	-0.0002	0.0000	0.0000	-0.0040	0.9993	-0.0060	0.0000	-0.0101	-0.0004	-0.0107	0.0000	-0.0070	-0.0110	-0.0237	-0.0123	-0.0221
7100	-0.0271	-0.0105	-0.0214	-0.0219	-0.0468	-0.0102	0.9578	-0.0294	-0.0123	-0.0015	-0.0357	-0.0044	-0.0212	-0.0174	-0.0209	-0.0530	-0.0513
7200	-0.0021	-0.0013	-0.0073	-0.0073	-0.0192	-0.0032	-0.0022	0.8892	-0.0323	-0.0007	-0.0312	0.0000	-0.0182	-0.0132	-0.0260	-0.1547	-0.0090
81,8200	-0.0141	-0.0023	-0.0098	-0.0108	-0.0246	-0.0048	-0.0218	-0.0012	0.7862	-0.0145	-0.0157	-0.0138	-0.0044	-0.0177	-0.0193	-0.1189	-0.0303
8310	-0.0009	-0.0070	-0.0065	-0.0069	-0.0692	-0.0734	-0.0092	-0.0097	-0.0548	0.9971	-0.0541	-0.0068	-0.0448	-0.0696	-0.0031	0.0000	-0.0770
8320	-0.0006	-0.0008	-0.0080	-0.0201	-0.0112	-0.0079	-0.0066	-0.0035	-0.0272	-0.0161	0.9731	-0.0321	-0.0074	-0.0806	-0.0231	0.0000	-0.0080
8330	-0.0002	-0.0009	-0.0113	-0.0682	-0.0074	-0.0201	-0.0172	-0.0002	-0.0045	-0.0006	-0.0152	0.9679	-0.0249	-0.0055	-0.0003	0.0000	0.0000
9330	-0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0013	0.0000	-0.0146	0.0000	-0.0051	0.0000	0.9984	0.0000	-0.0338	-0.0287	-0.0201
9700	-0.0001	-0.0063	0.0000	0.0000	-0.0046	-0.0113	-0.0003	0.0000	-0.0088	-0.0006	-0.0128	0.0000	-0.0126	0.9337	-0.0034	0.0000	-0.0143
9800	-0.0003	0.0000	0.0000	0.0000	-0.0013	0.0000	-0.0013	-0.0006	-0.0014	0.0000	-0.0047	0.0000	-0.0006	-0.0045	0.9918	-0.1222	-0.0190
9900	-0.0067	-0.0356	-0.0152	-0.0348	-0.0046	-0.0031	-0.0254	-0.0042	-0.0030	-0.0052	-0.0044	0.0000	-0.0005	-0.0073	-0.0025	0.9921	-0.0079
REM	-0.1507	-0.1367	-0.2416	-0.2641	-0.3672	-0.2670	-0.3189	-0.3462	-0.5255	-0.0484	-0.3662	-0.0908	-0.2462	-0.3585	-0.4944	-0.1007	0.9844

1993 CLOSED MODEL

5. LEONTIEF INVERSES $[I-A]^{-1}$

SIC_CODE	1100	2100	2400	2800	3111-3140	3211-3240	3310-3320	3411-3420	3511-3560	3610-3699	3710-3720	3811-3819	3821-3829	3831-3839	38400-38409	3852-3859	3901	386/390
1100	1.1739	0.0769	0.0840	0.0699	0.4759	0.1063	0.1931	0.1203	0.0691	0.0785	0.0708	0.0865	0.0882	0.0867	0.0748	0.1014	0.0500	0.0820
2100	0.0124	1.0175	0.0169	0.0210	0.0159	0.0156	0.0170	0.0192	0.0334	0.0312	0.0464	0.0228	0.0178	0.0185	0.0147	0.0185	0.0141	0.0149
2400	0.0000	0.0001	1.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0347	0.0001
2800	0.0222	0.0212	0.0138	1.0184	0.0209	0.0199	0.0211	0.0201	0.1040	0.0445	0.0510	0.0286	0.0230	0.0227	0.0192	0.0198	0.2452	0.0208
3111-3140	0.2368	0.1297	0.1435	0.1203	1.3707	0.1760	0.1627	0.1471	0.1124	0.1326	0.1224	0.1491	0.1501	0.1443	0.1275	0.1763	0.0851	0.1364
3211-3240	0.0351	0.0430	0.0433	0.0390	0.0430	1.3136	0.0834	0.0714	0.0380	0.0461	0.0431	0.0511	0.0497	0.0453	0.0540	0.0584	0.0290	0.0907
3310-3320	0.0133	0.0158	0.0288	0.0150	0.0160	0.0139	1.1729	0.0144	0.0118	0.0162	0.0124	0.0174	0.0156	0.0233	0.0136	0.0184	0.0103	0.0210
3411-3420	0.0454	0.0430	0.0383	0.0388	0.0962	0.0682	0.0725	1.3074	0.0507	0.0658	0.0386	0.0511	0.0488	0.0526	0.0517	0.0549	0.0275	0.0757
3511-3560	0.2447	0.2278	0.1470	0.2035	0.2276	0.2318	0.2293	0.2247	1.3029	0.1869	0.1537	0.2104	0.1924	0.2050	0.1762	0.1859	0.1121	0.2139
3610-3699	0.0147	0.0140	0.0119	0.0131	0.0251	0.0110	0.0176	0.0132	0.0207	1.0935	0.0101	0.0325	0.0144	0.0186	0.0195	0.0154	0.0090	0.0128
3710-3720	0.0139	0.0286	0.0181	0.0231	0.0187	0.0138	0.0376	0.0166	0.0210	0.0297	1.0883	0.2401	0.1271	0.1369	0.0728	0.1023	0.1291	0.0514
3811-3819	0.0248	0.0490	0.0307	0.0337	0.0444	0.0222	0.0530	0.0233	0.0273	0.0277	0.0326	1.0709	0.0956	0.0442	0.0572	0.0344	0.0690	0.0435
3821-3829	0.0170	0.0617	0.0267	0.0489	0.0247	0.0253	0.0233	0.0273	0.0257	0.0311	0.0312	0.0270	1.0788	0.0214	0.0350	0.0415	0.0207	0.0233
3831-3839	0.0072	0.0404	0.0148	0.0191	0.0093	0.0095	0.0110	0.0099	0.0098	0.0106	0.0146	0.0141	0.0356	1.1041	0.0233	0.0258	0.0095	0.0410
38400-38409	0.0283	0.0493	0.0280	0.0378	0.0283	0.0273	0.0300	0.0280	0.0230	0.0269	0.0264	0.0297	0.0296	0.0281	1.3067	0.0355	0.0203	0.0266
3852-3859	0.0023	0.0067	0.0128	0.0070	0.0020	0.0015	0.0017	0.0016	0.0025	0.0019	0.0019	0.0018	0.0016	0.0016	0.0014	1.0947	0.0027	0.0015
3901	0.0015	0.0021	0.0017	0.0021	0.0019	0.0018	0.0020	0.0021	0.0015	0.0018	0.0019	0.0021	0.0019	0.0019	0.0019	0.0028	1.0324	0.0019
386,3902,3903,3909	0.0024	0.0044	0.0035	0.0038	0.0034	0.0081	0.0056	0.0037	0.0031	0.0033	0.0032	0.0046	0.0047	0.0043	0.0033	0.0047	0.0024	1.0255
4100	0.0617	0.1247	0.1302	0.1340	0.0806	0.0784	0.0909	0.0919	0.0973	0.1178	0.1724	0.1090	0.0849	0.0861	0.0743	0.0940	0.0735	0.0705
4200	0.0089	0.0090	0.0095	0.0169	0.0127	0.0094	0.0087	0.0102	0.0085	0.0088	0.0078	0.0090	0.0080	0.0075	0.0072	0.0091	0.0078	0.0074
5100	0.0160	0.0107	0.0195	0.0158	0.0134	0.0108	0.0127	0.0117	0.0094	0.0103	0.0095	0.0113	0.0115	0.0109	0.0123	0.0126	0.0087	0.0108
5200,5300	0.0039	0.0071	0.0075	0.0077	0.0051	0.0048	0.0056	0.0055	0.0056	0.0065	0.0085	0.0063	0.0053	0.0052	0.0047	0.0058	0.0043	0.0046
61,620,621,622	0.2663	0.3008	0.2631	0.2665	0.3149	0.3113	0.3492	0.3369	0.2460	0.2881	0.2596	0.3162	0.3358	0.3141	0.3867	0.3494	0.2001	0.3111
6300	0.0147	0.0204	0.0210	0.0192	0.0194	0.0212	0.0229	0.0214	0.0168	0.0204	0.0194	0.0230	0.0229	0.0219	0.0202	0.0277	0.0133	0.0208
7100	0.0981	0.1292	0.0877	0.1068	0.1276	0.1007	0.1193	0.1127	0.1305	0.1244	0.1190	0.1302	0.1156	0.1090	0.1024	0.1236	0.0760	0.1015
7200	0.0261	0.0434	0.0323	0.0427	0.0419	0.0404	0.0449	0.0485	0.0344	0.0393	0.0403	0.0450	0.0439	0.0409	0.0431	0.0608	0.0284	0.0466
81,8200	0.0617	0.0746	0.0647	0.0707	0.0903	0.0851	0.0982	0.0967	0.0784	0.0798	0.0811	0.0953	0.0881	0.0864	0.0799	0.1054	0.0528	0.0908
8310	0.0698	0.0906	0.0924	0.0832	0.0934	0.1082	0.1208	0.1070	0.0790	0.0948	0.0848	0.1157	0.1130	0.1047	0.1041	0.1262	0.0647	0.1110
8320	0.0166	0.0207	0.0194	0.0189	0.0259	0.0258	0.0282	0.0280	0.0250	0.0268	0.0238	0.0293	0.0287	0.0260	0.0245	0.0646	0.0145	0.0290
8330	0.0087	0.0176	0.0091	0.0168	0.0128	0.0115	0.0128	0.0163	0.0140	0.0126	0.0110	0.0147	0.0136	0.0128	0.0153	0.0161	0.0087	0.0130
9330	0.0247	0.0201	0.0199	0.0193	0.0227	0.0204	0.0228	0.0214	0.0161	0.0195	0.0191	0.0221	0.0217	0.0209	0.0193	0.0275	0.0130	0.0200
9700	0.0120	0.0150	0.0158	0.0139	0.0186	0.0173	0.0190	0.0174	0.0155	0.0159	0.0142	0.0180	0.0182	0.0177	0.0179	0.0208	0.0101	0.0187
9800	0.0157	0.0286	0.0231	0.0285	0.0250	0.0246	0.0269	0.0286	0.0208	0.0245	0.0266	0.0277	0.0265	0.0255	0.0259	0.0387	0.0174	0.0251
9900	0.0452	0.1200	0.0630	0.1271	0.0967	0.0786	0.0883	0.1142	0.0765	0.0839	0.1089	0.0946	0.0839	0.0813	0.0981	0.1610	0.0671	0.0859
REM	0.4923	0.6729	0.7629	0.6299	0.6314	0.7333	0.7805	0.7068	0.5487	0.6946	0.6432	0.7870	0.7941	0.7614	0.6680	0.9204	0.4475	0.7093

1993 CLOSED MODEL

5. LEONTIEF INVERSE: (continued)

SIC_CODE	4100	4200	5100	5200/53	6100/62	6300	7100	7200	8100/82	8310	8320	8330	9330	9700	9800	9900	CP_TOTAL
1100	0.0587	0.0637	0.1004	0.0913	0.0965	0.2516	0.0912	0.0822	0.1397	0.0177	0.0892	0.0361	0.0761	0.0948	0.1443	0.0992	0.1701
2100	0.0896	0.0271	0.0195	0.0179	0.0151	0.0184	0.0177	0.0128	0.0193	0.0050	0.0120	0.0059	0.0128	0.0147	0.0230	0.0177	0.0215
2400	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0000	0.0001	0.0000	0.0010	0.0001	0.0001	0.0004	0.0001
2800	0.0114	0.0196	0.0337	0.0374	0.0165	0.0175	0.0223	0.0122	0.0183	0.0033	0.0121	0.0080	0.0230	0.0145	0.0203	0.0247	0.0198
3111-3140	0.1021	0.1087	0.1681	0.1566	0.1669	0.5078	0.1558	0.1426	0.2429	0.0289	0.1560	0.0610	0.1313	0.1635	0.2459	0.1701	0.2987
3211-3240	0.0279	0.0329	0.0637	0.0453	0.0496	0.0456	0.0503	0.0457	0.0653	0.0086	0.0415	0.0177	0.0394	0.0461	0.0659	0.0551	0.0781
3310-3320	0.0096	0.0121	0.0528	0.0215	0.0200	0.0193	0.0165	0.0134	0.0233	0.0040	0.0159	0.0163	0.0126	0.0220	0.0334	0.0193	0.0243
3411-3420	0.0291	0.0376	0.0595	0.0510	0.0799	0.0640	0.0567	0.0527	0.1032	0.0120	0.0666	0.0202	0.0545	0.0769	0.1053	0.0958	0.0702
3511-3560	0.1152	0.2075	0.2263	0.2207	0.1834	0.1892	0.2424	0.1347	0.2020	0.0333	0.1346	0.0753	0.1963	0.1618	0.2191	0.2613	0.2210
3610-3699	0.0134	0.0294	0.1690	0.0867	0.0149	0.0234	0.0203	0.0098	0.0155	0.0053	0.0101	0.0149	0.0097	0.0123	0.0228	0.0143	0.0160
3710-3720	0.0179	0.0319	0.0581	0.0498	0.0144	0.0155	0.0179	0.0135	0.0162	0.0033	0.0107	0.0139	0.0138	0.0124	0.0191	0.0189	0.0175
3811-3819	0.0186	0.0332	0.0844	0.0853	0.0231	0.0310	0.0250	0.0207	0.0278	0.0058	0.0183	0.0217	0.0197	0.0201	0.0339	0.0336	0.0312
3821-3829	0.0199	0.0186	0.0279	0.0288	0.0190	0.0199	0.0191	0.0168	0.0218	0.0033	0.0148	0.0663	0.0143	0.0155	0.0234	0.0190	0.0246
3831-3839	0.0255	0.0407	0.0642	0.0357	0.0125	0.0123	0.0152	0.0315	0.0151	0.0033	0.0098	0.0096	0.0093	0.0158	0.0172	0.0155	0.0156
38400-38409	0.0230	0.0253	0.0325	0.0310	0.0348	0.0290	0.0374	0.0279	0.0452	0.0056	0.0285	0.0116	0.0233	0.0299	0.0423	0.0611	0.0537
3852-3859	0.0017	0.0014	0.0020	0.0019	0.0019	0.0017	0.0112	0.0015	0.0021	0.0003	0.0016	0.0006	0.0014	0.0016	0.0021	0.0022	0.0023
3901	0.0012	0.0016	0.0020	0.0020	0.0021	0.0017	0.0019	0.0015	0.0029	0.0004	0.0017	0.0007	0.0286	0.0017	0.0031	0.0107	0.0028
386,3902,3903,3909	0.0024	0.0093	0.0040	0.0039	0.0040	0.0046	0.0059	0.0033	0.0071	0.0010	0.0078	0.0016	0.0091	0.0062	0.0113	0.0107	0.0055
4100	1.3386	0.1858	0.0845	0.0898	0.0798	0.1258	0.1088	0.0735	0.0953	0.0230	0.0569	0.0279	0.0695	0.0830	0.1355	0.0981	0.0928
4200	0.0079	1.3588	0.0094	0.0221	0.0099	0.0254	0.0107	0.0094	0.0143	0.0095	0.0079	0.0036	0.0068	0.0120	0.0197	0.0117	0.0122
5100	0.0074	0.0086	1.2941	0.0125	0.0361	0.0192	0.0185	0.0103	0.0242	0.0119	0.0137	0.0056	0.0101	0.0208	0.0359	0.0179	0.0172
5200,5300	0.0529	0.0098	0.0056	1.1189	0.0061	0.0073	0.0148	0.0047	0.0069	0.0087	0.0046	0.0019	0.0057	0.0057	0.0099	0.0067	0.0065
61,620,621,622	0.2069	0.2449	0.3710	0.3624	1.3928	0.3044	0.3456	0.3020	0.4533	0.0580	0.2984	0.1685	0.2839	0.2973	0.4123	0.4354	0.4943
6300	0.0155	0.0173	0.0255	0.0243	0.0287	1.0226	0.0291	0.0210	0.0479	0.0050	0.0331	0.0097	0.0248	0.0362	0.0547	0.0414	0.0425
7100	0.1000	0.0934	0.1416	0.1313	0.1481	0.1142	1.1411	0.1158	0.1500	0.0204	0.1230	0.0460	0.0984	0.1138	0.1468	0.1717	0.1539
7200	0.0267	0.0352	0.0519	0.0514	0.0571	0.0381	0.0397	1.1526	0.0917	0.0088	0.0657	0.0156	0.0461	0.0512	0.0726	0.2214	0.0491
81,8200	0.0699	0.0656	0.1000	0.0969	0.1065	0.0826	0.1018	0.0633	1.3719	0.0325	0.0852	0.0483	0.0620	0.0955	0.1162	0.2343	0.1138
8310	0.0676	0.0842	0.1240	0.1174	0.1829	0.1729	0.1132	0.1042	0.2258	1.0238	0.1548	0.0535	0.1275	0.1831	0.1435	0.1270	0.1823
8320	0.0166	0.0191	0.0373	0.0499	0.0377	0.0335	0.0310	0.0234	0.0690	0.0215	1.0509	0.0443	0.0279	0.1124	0.0540	0.0335	0.0357
8330	0.0110	0.0096	0.0270	0.0899	0.0191	0.0314	0.0293	0.0088	0.0200	0.0034	0.0255	1.0381	0.0343	0.0171	0.0149	0.0145	0.0136
9330	0.0141	0.0165	0.0239	0.0229	0.0225	0.0219	0.0229	0.0192	0.0504	0.0044	0.0255	0.0087	1.0176	0.0224	0.0625	0.0571	0.0392
9700	0.0113	0.0218	0.0195	0.0186	0.0240	0.0300	0.0180	0.0159	0.0390	0.0043	0.0309	0.0078	0.0273	1.0902	0.0281	0.0214	0.0321
9800	0.0163	0.0223	0.0278	0.0282	0.0250	0.0231	0.0263	0.0210	0.0351	0.0049	0.0260	0.0092	0.0178	0.0284	1.0380	0.1483	0.0396
9900	0.0437	0.0860	0.0789	0.0908	0.0485	0.0605	0.0705	0.0400	0.0596	0.0139	0.0412	0.0195	0.0359	0.0486	0.0592	1.0603	0.0604
REM	0.5185	0.5682	0.8866	0.8272	0.8625	0.7631	0.7941	0.7606	1.2723	0.1503	0.7862	0.3214	0.6188	0.8436	1.0977	0.8399	1.6100

1993 CLOSED MODEL

6. GDP DIAGONALS

SIC_CODE	1100	2100	2400	2800	3111-3140	3211-3240	3310-3320	3411-3420	3511-3560	3610-3699	3710-3720	3811-3819	3821-3829	3831-3839	38400-38409	3852-3859	3901	386/390
1100	0.5137	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2100	0.0000	0.4534	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2400	0.0000	0.0000	0.7693	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2800	0.0000	0.0000	0.0000	0.5412	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3111-3140	0.0000	0.0000	0.0000	0.0000	0.2183	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3211-3240	0.0000	0.0000	0.0000	0.0000	0.0000	0.3949	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3310-3320	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3824	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3411-3420	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3981	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3511-3560	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3124	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3610-3699	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.5089	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3710-3720	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.4819	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3811-3819	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3944	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3821-3829	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.4347	0.0000	0.0000	0.0000	0.0000	0.0000
3831-3839	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.4524	0.0000	0.0000	0.0000	0.0000
38400-38409	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3069	0.0000	0.0000	0.0000
3852-3859	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.4467	0.0000	0.0000
3901	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1354	0.0000
386,3902,3903,3909	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.4665
4100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4200	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5200,5300	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
61,620,621,622	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6300	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7200	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
81,8200	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8310	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8320	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8330	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9330	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9700	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9800	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9900	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
REM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

1993 CLOSED MODEL

6. GDP DIAGONALS (continued)

SIC_CODE	4100	4200	5100	5200/53	6100/62	6300	7100	7200	8100/82	8310	8320	8330	9330	9700	9800	9900	CP_TOTAL
1100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2400	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2800	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3111-3140	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3211-3240	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3310-3320	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3411-3420	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3511-3560	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3610-3699	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3710-3720	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3811-3819	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3821-3829	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3831-3839	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
38400-38409	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3852-3859	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3901	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
386,3902,3903,3909	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4100	0.5520	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4200	0.0000	0.3823	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5100	0.0000	0.0000	0.3038	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5200,5300	0.0000	0.0000	0.0000	0.3747	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
61,620,621,622	0.0000	0.0000	0.0000	0.0000	0.5752	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6300	0.0000	0.0000	0.0000	0.0000	0.0000	0.3791	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.5694	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7200	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.6849	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
81,8200	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.5109	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8310	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.9043	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8320	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.6800	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8330	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.6895	0.0000	0.0000	0.0000	0.0000	0.0000
9330	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.5846	0.0000	0.0000	0.0000	0.0000
9700	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.5685	0.0000	0.0000	0.0000
9800	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.5383	0.0000	0.0000
9900	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1447	0.0000
REM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1017

1993 CLOSED MODEL

7. FIRST ROUND IMPACT (GDP DIAGONALS x [A])

SIC_CODE	1100	2100	2400	2800	3111-3140	3211-3240	3310-3320	3411-3420	3511-3560	3610-3699	3710-3720	3811-3819	3821-3829	3831-3839	38400-38409	3852-3859	3901	386/390
1100	0.0346	0.0009	0.0003	0.0001	0.1548	0.0051	0.0422	0.0145	0.0023	0.0005	0.0001	0.0001	0.0007	0.0012	0.0003	0.0002	0.0003	0.0007
2100	0.0000	0.0000	0.0001	0.0017	0.0005	0.0003	0.0002	0.0014	0.0077	0.0061	0.0117	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
2400	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0259	0.0000
2800	0.0006	0.0004	0.0002	0.0001	0.0001	0.0000	0.0001	0.0002	0.0423	0.0138	0.0187	0.0010	0.0010	0.0002	0.0006	0.0000	0.1212	0.0005
3111-3140	0.0232	0.0002	0.0001	0.0000	0.0361	0.0049	0.0000	0.0009	0.0010	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0000	0.0000
3211-3240	0.0019	0.0017	0.0012	0.0014	0.0011	0.0849	0.0108	0.0081	0.0020	0.0024	0.0025	0.0023	0.0020	0.0011	0.0042	0.0027	0.0008	0.0157
3310-3320	0.0011	0.0011	0.0053	0.0012	0.0008	0.0003	0.0524	0.0004	0.0004	0.0013	0.0003	0.0012	0.0005	0.0031	0.0003	0.0008	0.0002	0.0027
3411-3420	0.0021	0.0004	0.0001	0.0000	0.0133	0.0062	0.0068	0.0828	0.0045	0.0076	0.0003	0.0018	0.0013	0.0029	0.0022	0.0006	0.0002	0.0101
3511-3560	0.0345	0.0256	0.0070	0.0221	0.0108	0.0216	0.0172	0.0189	0.0495	0.0147	0.0077	0.0171	0.0128	0.0176	0.0102	0.0062	0.0012	0.0214
3610-3699	0.0016	0.0013	0.0005	0.0010	0.0049	0.0001	0.0023	0.0010	0.0048	0.0392	0.0002	0.0097	0.0011	0.0034	0.0033	0.0016	0.0003	0.0010
3710-3720	0.0006	0.0008	0.0008	0.0015	0.0000	0.0002	0.0068	0.0011	0.0028	0.0062	0.0324	0.0968	0.0407	0.0490	0.0176	0.0341	0.0467	0.0135
3811-3819	0.0025	0.0099	0.0044	0.0050	0.0071	0.0008	0.0104	0.0011	0.0033	0.0030	0.0049	0.0180	0.0265	0.0082	0.0111	0.0033	0.0189	0.0088
3821-3829	0.0016	0.0189	0.0052	0.0142	0.0028	0.0034	0.0022	0.0039	0.0034	0.0058	0.0059	0.0029	0.0251	0.0017	0.0064	0.0087	0.0004	0.0031
3831-3839	0.0000	0.0121	0.0019	0.0035	0.0001	0.0000	0.0003	0.0001	0.0001	0.0001	0.0013	0.0011	0.0099	0.0389	0.0045	0.0052	0.0001	0.0129
38400-38409	0.0021	0.0054	0.0002	0.0030	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0673	0.0000	0.0000	0.0000
3852-3859	0.0004	0.0020	0.0047	0.0023	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0380	0.0000	0.0000
3901	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0041	0.0000
386,3902,3903,3909	0.0000	0.0004	0.0002	0.0002	0.0000	0.0018	0.0008	0.0000	0.0001	0.0000	0.0000	0.0004	0.0005	0.0004	0.0000	0.0000	0.0000	0.0101
4100	0.0052	0.0280	0.0334	0.0340	0.0061	0.0072	0.0092	0.0113	0.0153	0.0232	0.0467	0.0093	0.0050	0.0059	0.0044	0.0070	0.0011	0.0038
4200	0.0008	0.0006	0.0008	0.0030	0.0011	0.0005	0.0002	0.0007	0.0005	0.0005	0.0003	0.0003	0.0001	0.0001	0.0001	0.0002	0.0002	0.0001
5100	0.0016	0.0001	0.0025	0.0015	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5200,5300	0.0000	0.0001	0.0003	0.0003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
61,620,621,622	0.0389	0.0276	0.0066	0.0189	0.0226	0.0240	0.0316	0.0347	0.0200	0.0217	0.0143	0.0198	0.0309	0.0252	0.0614	0.0140	0.0151	0.0311
6300	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7100	0.0127	0.0213	0.0019	0.0125	0.0142	0.0045	0.0091	0.0087	0.0271	0.0192	0.0184	0.0145	0.0088	0.0071	0.0053	0.0059	0.0050	0.0062
7200	0.0005	0.0007	0.0006	0.0006	0.0015	0.0021	0.0025	0.0026	0.0015	0.0020	0.0008	0.0027	0.0030	0.0022	0.0014	0.0026	0.0013	0.0054
81,8200	0.0035	0.0000	0.0000	0.0000	0.0058	0.0050	0.0073	0.0069	0.0073	0.0045	0.0050	0.0067	0.0048	0.0053	0.0026	0.0043	0.0019	0.0080
8310	0.0001	0.0017	0.0013	0.0015	0.0042	0.0100	0.0140	0.0087	0.0041	0.0047	0.0020	0.0132	0.0091	0.0063	0.0070	0.0080	0.0044	0.0152
8320	0.0000	0.0000	0.0000	0.0000	0.0028	0.0025	0.0028	0.0033	0.0044	0.0042	0.0033	0.0037	0.0036	0.0025	0.0016	0.0237	0.0004	0.0048
8330	0.0001	0.0052	0.0006	0.0053	0.0015	0.0012	0.0014	0.0035	0.0028	0.0019	0.0011	0.0028	0.0022	0.0020	0.0030	0.0030	0.0003	0.0024
9330	0.0059	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9700	0.0000	0.0000	0.0000	0.0000	0.0017	0.0004	0.0008	0.0006	0.0014	0.0004	0.0001	0.0004	0.0004	0.0006	0.0011	0.0003	0.0001	0.0015
9800	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9900	0.0008	0.0110	0.0037	0.0127	0.0061	0.0043	0.0052	0.0084	0.0042	0.0055	0.0092	0.0052	0.0046	0.0044	0.0063	0.0146	0.0016	0.0058
REM	0.0125	0.0227	0.0396	0.0229	0.0117	0.0253	0.0255	0.0206	0.0141	0.0259	0.0224	0.0279	0.0302	0.0290	0.0168	0.0365	0.0071	0.0258

1993 CLOSED MODEL

7. FIRST ROUND IMPA (continued)

SIC_CODE	4100	4200	5100	5200/53	6100/62	6300	7100	7200	8100/82	8310	8320	8330	9330	9700	9800	9900	CP_TOTAL
1100	0.0003	0.0002	0.0000	0.0002	0.0001	0.0239	0.0009	0.0000	0.0000	0.0004	0.0002	0.0000	0.0014	0.0000	0.0044	0.0000	0.0190
2100	0.0282	0.0022	0.0000	0.0000	0.0000	0.0002	0.0001	0.0000	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0009	0.0000	0.0028
2400	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2800	0.0000	0.0002	0.0036	0.0073	0.0000	0.0001	0.0005	0.0000	0.0000	0.0000	0.0000	0.0004	0.0000	0.0000	0.0001	0.0000	0.0000
3111-3140	0.0005	0.0000	0.0000	0.0000	0.0005	0.0623	0.0005	0.0000	0.0000	0.0000	0.0007	0.0000	0.0019	0.0000	0.0050	0.0000	0.0289
3211-3240	0.0001	0.0003	0.0034	0.0001	0.0012	0.0009	0.0024	0.0019	0.0001	0.0002	0.0002	0.0000	0.0018	0.0006	0.0023	0.0019	0.0125
3310-3320	0.0000	0.0004	0.0094	0.0017	0.0015	0.0015	0.0008	0.0003	0.0007	0.0003	0.0008	0.0033	0.0005	0.0023	0.0047	0.0006	0.0035
3411-3420	0.0001	0.0006	0.0013	0.0004	0.0101	0.0018	0.0034	0.0041	0.0101	0.0009	0.0078	0.0000	0.0058	0.0093	0.0144	0.0101	0.0041
3511-3560	0.0033	0.0194	0.0121	0.0160	0.0104	0.0060	0.0276	0.0035	0.0018	0.0017	0.0023	0.0044	0.0237	0.0068	0.0090	0.0258	0.0174
3610-3699	0.0011	0.0069	0.0570	0.0309	0.0004	0.0034	0.0034	0.0003	0.0000	0.0007	0.0000	0.0046	0.0001	0.0003	0.0027	0.0000	0.0009
3710-3720	0.0018	0.0045	0.0078	0.0075	0.0003	0.0000	0.0011	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000
3811-3819	0.0001	0.0045	0.0173	0.0209	0.0007	0.0014	0.0015	0.0012	0.0001	0.0004	0.0002	0.0035	0.0009	0.0002	0.0024	0.0034	0.0028
3821-3829	0.0019	0.0014	0.0020	0.0021	0.0010	0.0002	0.0007	0.0013	0.0000	0.0000	0.0001	0.0237	0.0000	0.0000	0.0010	0.0000	0.0031
3831-3839	0.0050	0.0095	0.0170	0.0089	0.0004	0.0006	0.0017	0.0084	0.0000	0.0002	0.0000	0.0017	0.0004	0.0021	0.0009	0.0000	0.0021
38400-38409	0.0004	0.0005	0.0000	0.0000	0.0010	0.0000	0.0020	0.0003	0.0003	0.0000	0.0002	0.0000	0.0003	0.0001	0.0009	0.0070	0.0068
3852-3859	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0038	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001
3901	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0036	0.0000	0.0000	0.0010	0.0001
386,3902,3903,3909	0.0000	0.0022	0.0000	0.0000	0.0002	0.0005	0.0011	0.0001	0.0007	0.0001	0.0021	0.0000	0.0030	0.0010	0.0030	0.0026	0.0008
4100	0.1251	0.0424	0.0007	0.0059	0.0068	0.0252	0.0194	0.0083	0.0039	0.0046	0.0007	0.0006	0.0083	0.0094	0.0233	0.0066	0.0106
4200	0.0005	0.0997	0.0002	0.0036	0.0004	0.0045	0.0008	0.0007	0.0007	0.0023	0.0001	0.0001	0.0001	0.0010	0.0026	0.0003	0.0009
5100	0.0000	0.0000	0.0667	0.0000	0.0053	0.0016	0.0015	0.0000	0.0015	0.0023	0.0006	0.0000	0.0000	0.0020	0.0050	0.0000	0.0000
5200,5300	0.0129	0.0003	0.0000	0.0381	0.0001	0.0000	0.0028	0.0000	0.0000	0.0025	0.0000	0.0000	0.0004	0.0000	0.0007	0.0000	0.0000
61,620,621,622	0.0096	0.0150	0.0236	0.0324	0.0545	0.0090	0.0375	0.0260	0.0180	0.0026	0.0202	0.0283	0.0374	0.0082	0.0223	0.0629	0.1295
6300	0.0002	0.0001	0.0000	0.0000	0.0015	0.0003	0.0023	0.0000	0.0038	0.0002	0.0040	0.0000	0.0027	0.0042	0.0090	0.0047	0.0084
7100	0.0154	0.0060	0.0122	0.0125	0.0266	0.0058	0.0240	0.0167	0.0070	0.0009	0.0203	0.0025	0.0121	0.0099	0.0119	0.0302	0.0292
7200	0.0014	0.0009	0.0050	0.0050	0.0131	0.0022	0.0015	0.0759	0.0221	0.0004	0.0214	0.0000	0.0125	0.0090	0.0178	0.1059	0.0062
81,8200	0.0072	0.0012	0.0050	0.0055	0.0125	0.0025	0.0111	0.0006	0.1092	0.0074	0.0080	0.0071	0.0022	0.0090	0.0098	0.0608	0.0155
8310	0.0008	0.0063	0.0058	0.0062	0.0625	0.0664	0.0083	0.0088	0.0495	0.0027	0.0489	0.0061	0.0405	0.0629	0.0028	0.0000	0.0696
8320	0.0004	0.0005	0.0054	0.0137	0.0076	0.0054	0.0045	0.0024	0.0185	0.0110	0.0183	0.0218	0.0050	0.0548	0.0157	0.0000	0.0055
8330	0.0001	0.0006	0.0078	0.0470	0.0051	0.0139	0.0119	0.0001	0.0031	0.0004	0.0105	0.0221	0.0172	0.0038	0.0002	0.0000	0.0000
9330	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0007	0.0000	0.0085	0.0000	0.0030	0.0000	0.0009	0.0000	0.0198	0.0168	0.0117
9700	0.0000	0.0036	0.0000	0.0000	0.0026	0.0064	0.0002	0.0000	0.0050	0.0004	0.0073	0.0000	0.0072	0.0377	0.0019	0.0000	0.0082
9800	0.0001	0.0000	0.0000	0.0000	0.0007	0.0000	0.0007	0.0003	0.0008	0.0000	0.0026	0.0000	0.0003	0.0024	0.0044	0.0658	0.0102
9900	0.0010	0.0052	0.0022	0.0050	0.0007	0.0004	0.0037	0.0006	0.0004	0.0008	0.0006	0.0000	0.0001	0.0011	0.0004	0.0011	0.0011
REM	0.0153	0.0139	0.0246	0.0269	0.0373	0.0272	0.0324	0.0352	0.0534	0.0049	0.0372	0.0092	0.0250	0.0364	0.0503	0.0102	0.0016

1993 CLOSED MODEL

8. GDP MULTIPLIERS (GDP DIAGONALS x LEONTIEF INVERSES)

SIC_CODE	1100	2100	2400	2800	3111-3140	3211-3240	3310-3320	3411-3420	3511-3560	3610-3699	3710-3720	3811-3819	3821-3829	3831-3839	38400-38409	3852-3859	3901	386/390
1100	0.6030	0.0395	0.0432	0.0359	0.2444	0.0546	0.0992	0.0618	0.0355	0.0403	0.0364	0.0444	0.0453	0.0445	0.0384	0.0521	0.0257	0.0421
2100	0.0056	0.4614	0.0077	0.0095	0.0072	0.0071	0.0077	0.0087	0.0151	0.0142	0.0210	0.0103	0.0081	0.0084	0.0067	0.0084	0.0064	0.0067
2400	0.0000	0.0001	0.7693	0.0001	0.0001	0.0000	0.0001	0.0001	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0001	0.0267	0.0001
2800	0.0120	0.0115	0.0074	0.5511	0.0113	0.0108	0.0114	0.0109	0.0563	0.0241	0.0276	0.0155	0.0124	0.0123	0.0104	0.0107	0.1327	0.0113
3111-3140	0.0517	0.0283	0.0313	0.0263	0.2992	0.0384	0.0355	0.0321	0.0245	0.0289	0.0267	0.0325	0.0328	0.0315	0.0278	0.0385	0.0186	0.0298
3211-3240	0.0138	0.0170	0.0171	0.0154	0.0170	0.5187	0.0329	0.0282	0.0150	0.0182	0.0170	0.0202	0.0196	0.0179	0.0213	0.0230	0.0114	0.0358
3310-3320	0.0051	0.0061	0.0110	0.0057	0.0061	0.0053	0.4486	0.0055	0.0045	0.0062	0.0047	0.0067	0.0060	0.0089	0.0052	0.0070	0.0039	0.0080
3411-3420	0.0181	0.0171	0.0152	0.0154	0.0383	0.0271	0.0289	0.5204	0.0202	0.0262	0.0154	0.0203	0.0194	0.0209	0.0206	0.0218	0.0109	0.0301
3511-3560	0.0764	0.0711	0.0459	0.0636	0.0711	0.0724	0.0716	0.0702	0.4070	0.0584	0.0480	0.0657	0.0601	0.0640	0.0550	0.0581	0.0350	0.0668
3610-3699	0.0075	0.0071	0.0060	0.0067	0.0128	0.0056	0.0089	0.0067	0.0105	0.5565	0.0051	0.0166	0.0073	0.0095	0.0099	0.0079	0.0046	0.0065
3710-3720	0.0067	0.0138	0.0087	0.0111	0.0090	0.0066	0.0181	0.0080	0.0101	0.0143	0.5244	0.1157	0.0612	0.0660	0.0351	0.0493	0.0622	0.0248
3811-3819	0.0098	0.0193	0.0121	0.0133	0.0175	0.0088	0.0209	0.0092	0.0108	0.0109	0.0129	0.4224	0.0377	0.0174	0.0226	0.0136	0.0272	0.0172
3821-3829	0.0074	0.0268	0.0116	0.0213	0.0107	0.0110	0.0101	0.0119	0.0112	0.0135	0.0135	0.0117	0.4690	0.0093	0.0152	0.0180	0.0090	0.0101
3831-3839	0.0033	0.0183	0.0067	0.0086	0.0042	0.0043	0.0050	0.0045	0.0044	0.0048	0.0066	0.0064	0.0161	0.4995	0.0105	0.0117	0.0043	0.0185
38400-38409	0.0087	0.0151	0.0086	0.0116	0.0087	0.0084	0.0092	0.0086	0.0071	0.0082	0.0081	0.0091	0.0091	0.0086	0.4010	0.0109	0.0062	0.0081
3852-3859	0.0010	0.0030	0.0057	0.0031	0.0009	0.0007	0.0008	0.0007	0.0011	0.0008	0.0008	0.0008	0.0007	0.0007	0.0006	0.4890	0.0012	0.0006
3901	0.0002	0.0003	0.0002	0.0003	0.0003	0.0002	0.0003	0.0003	0.0002	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0004	0.1397	0.0003
386,3902,3903,3909	0.0011	0.0021	0.0016	0.0018	0.0016	0.0038	0.0026	0.0017	0.0015	0.0015	0.0015	0.0021	0.0022	0.0020	0.0016	0.0022	0.0011	0.4784
4100	0.0340	0.0688	0.0719	0.0740	0.0445	0.0433	0.0502	0.0507	0.0537	0.0650	0.0951	0.0602	0.0469	0.0475	0.0410	0.0519	0.0406	0.0389
4200	0.0034	0.0034	0.0036	0.0065	0.0049	0.0036	0.0033	0.0039	0.0033	0.0034	0.0030	0.0034	0.0031	0.0029	0.0028	0.0035	0.0030	0.0028
5100	0.0049	0.0033	0.0059	0.0048	0.0041	0.0033	0.0038	0.0036	0.0029	0.0031	0.0029	0.0034	0.0035	0.0033	0.0037	0.0038	0.0027	0.0033
5200,5300	0.0015	0.0027	0.0028	0.0029	0.0019	0.0018	0.0021	0.0021	0.0021	0.0024	0.0032	0.0024	0.0020	0.0019	0.0018	0.0022	0.0016	0.0017
61,620,621,622	0.1532	0.1730	0.1513	0.1533	0.1811	0.1790	0.2009	0.1938	0.1415	0.1657	0.1493	0.1819	0.1931	0.1807	0.2225	0.2010	0.1151	0.1789
6300	0.0056	0.0077	0.0080	0.0073	0.0074	0.0080	0.0087	0.0081	0.0064	0.0077	0.0074	0.0087	0.0087	0.0083	0.0077	0.0105	0.0051	0.0079
7100	0.0559	0.0736	0.0499	0.0608	0.0727	0.0574	0.0679	0.0642	0.0743	0.0708	0.0678	0.0741	0.0658	0.0621	0.0583	0.0704	0.0433	0.0578
7200	0.0179	0.0298	0.0221	0.0293	0.0287	0.0277	0.0308	0.0332	0.0236	0.0269	0.0276	0.0309	0.0301	0.0280	0.0295	0.0416	0.0195	0.0319
81,8200	0.0315	0.0381	0.0331	0.0361	0.0461	0.0435	0.0502	0.0494	0.0400	0.0408	0.0414	0.0487	0.0450	0.0441	0.0408	0.0539	0.0270	0.0464
8310	0.0631	0.0819	0.0835	0.0752	0.0844	0.0979	0.1092	0.0968	0.0715	0.0858	0.0767	0.1047	0.1022	0.0947	0.0941	0.1141	0.0585	0.1004
8320	0.0113	0.0141	0.0132	0.0129	0.0176	0.0176	0.0192	0.0190	0.0170	0.0182	0.0162	0.0199	0.0195	0.0177	0.0167	0.0439	0.0099	0.0197
8330	0.0060	0.0121	0.0063	0.0116	0.0088	0.0080	0.0089	0.0112	0.0097	0.0087	0.0076	0.0102	0.0094	0.0088	0.0105	0.0111	0.0060	0.0090
9330	0.0144	0.0117	0.0117	0.0113	0.0133	0.0119	0.0133	0.0125	0.0094	0.0114	0.0112	0.0129	0.0127	0.0122	0.0113	0.0161	0.0076	0.0117
9700	0.0068	0.0085	0.0090	0.0079	0.0106	0.0098	0.0108	0.0099	0.0088	0.0091	0.0081	0.0102	0.0103	0.0101	0.0102	0.0118	0.0057	0.0107
9800	0.0085	0.0154	0.0124	0.0154	0.0134	0.0133	0.0145	0.0154	0.0112	0.0132	0.0143	0.0149	0.0143	0.0137	0.0139	0.0208	0.0094	0.0135
9900	0.0065	0.0174	0.0091	0.0184	0.0140	0.0114	0.0128	0.0165	0.0111	0.0121	0.0158	0.0137	0.0121	0.0118	0.0142	0.0233	0.0097	0.0124
REM	0.0501	0.0684	0.0776	0.0641	0.0642	0.0746	0.0794	0.0719	0.0558	0.0706	0.0654	0.0800	0.0808	0.0774	0.0679	0.0936	0.0455	0.0721
TOTALS	1.3059	1.3877	1.5809	1.3923	1.3780	1.3957	1.4976	1.4517	1.1771	1.4425	1.3830	1.4810	1.4667	1.4470	1.3292	1.5961	0.9371	1.4144

1993 CLOSED MODEL

8. GDP MULTIPLIERS (continued)

SIC_CODE	4100	4200	5100	5200/53	6100/62	6300	7100	7200	8100/82	8310	8320	8330	9330	9700	9800	9900	CP_TOTAL
1100	0.0301	0.0327	0.0516	0.0469	0.0496	0.1292	0.0469	0.0422	0.0717	0.0091	0.0458	0.0185	0.0391	0.0487	0.0741	0.0510	0.0874
2100	0.0406	0.0123	0.0088	0.0081	0.0068	0.0084	0.0080	0.0058	0.0087	0.0023	0.0055	0.0027	0.0058	0.0067	0.0104	0.0080	0.0097
2400	0.0000	0.0000	0.0001	0.0001	0.0001	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0007	0.0000	0.0001	0.0003	0.0001
2800	0.0062	0.0106	0.0183	0.0203	0.0089	0.0095	0.0121	0.0066	0.0099	0.0018	0.0066	0.0043	0.0125	0.0078	0.0110	0.0134	0.0107
3111-3140	0.0223	0.0237	0.0367	0.0342	0.0364	0.1108	0.0340	0.0311	0.0530	0.0063	0.0341	0.0133	0.0287	0.0357	0.0537	0.0371	0.0652
3211-3240	0.0110	0.0130	0.0251	0.0179	0.0196	0.0180	0.0199	0.0181	0.0258	0.0034	0.0164	0.0070	0.0156	0.0182	0.0260	0.0218	0.0308
3310-3320	0.0037	0.0046	0.0202	0.0082	0.0076	0.0074	0.0063	0.0051	0.0089	0.0015	0.0061	0.0062	0.0048	0.0084	0.0128	0.0074	0.0093
3411-3420	0.0116	0.0150	0.0237	0.0203	0.0318	0.0255	0.0226	0.0210	0.0411	0.0048	0.0265	0.0080	0.0217	0.0306	0.0419	0.0381	0.0279
3511-3560	0.0360	0.0648	0.0707	0.0690	0.0573	0.0591	0.0757	0.0421	0.0631	0.0104	0.0421	0.0235	0.0613	0.0506	0.0684	0.0816	0.0690
3610-3699	0.0068	0.0150	0.0860	0.0441	0.0076	0.0119	0.0103	0.0050	0.0079	0.0027	0.0051	0.0076	0.0049	0.0063	0.0116	0.0073	0.0081
3710-3720	0.0086	0.0154	0.0280	0.0240	0.0069	0.0075	0.0086	0.0065	0.0078	0.0016	0.0052	0.0067	0.0066	0.0060	0.0092	0.0091	0.0084
3811-3819	0.0073	0.0131	0.0333	0.0336	0.0091	0.0122	0.0098	0.0082	0.0110	0.0023	0.0072	0.0086	0.0078	0.0079	0.0134	0.0132	0.0123
3821-3829	0.0086	0.0081	0.0121	0.0125	0.0083	0.0087	0.0083	0.0073	0.0095	0.0014	0.0065	0.0288	0.0062	0.0067	0.0102	0.0083	0.0107
3831-3839	0.0115	0.0184	0.0290	0.0161	0.0056	0.0056	0.0069	0.0143	0.0068	0.0015	0.0044	0.0044	0.0042	0.0072	0.0078	0.0070	0.0071
38400-38409	0.0070	0.0078	0.0100	0.0095	0.0107	0.0089	0.0115	0.0086	0.0139	0.0017	0.0087	0.0035	0.0071	0.0092	0.0130	0.0187	0.0165
3852-3859	0.0007	0.0006	0.0009	0.0008	0.0009	0.0008	0.0050	0.0007	0.0009	0.0001	0.0007	0.0003	0.0006	0.0007	0.0009	0.0010	0.0010
3901	0.0002	0.0002	0.0003	0.0003	0.0003	0.0002	0.0003	0.0002	0.0004	0.0000	0.0002	0.0001	0.0039	0.0002	0.0004	0.0015	0.0004
386,3902,3903,3909	0.0011	0.0043	0.0019	0.0018	0.0019	0.0021	0.0028	0.0015	0.0033	0.0005	0.0036	0.0007	0.0043	0.0029	0.0053	0.0050	0.0026
4100	0.7390	0.1026	0.0467	0.0496	0.0441	0.0694	0.0600	0.0406	0.0526	0.0127	0.0314	0.0154	0.0384	0.0458	0.0748	0.0542	0.0512
4200	0.0030	0.5195	0.0036	0.0085	0.0038	0.0097	0.0041	0.0036	0.0055	0.0036	0.0030	0.0014	0.0026	0.0046	0.0075	0.0045	0.0047
5100	0.0022	0.0026	0.3932	0.0038	0.0110	0.0058	0.0056	0.0031	0.0074	0.0036	0.0042	0.0017	0.0031	0.0063	0.0109	0.0055	0.0052
5200,5300	0.0198	0.0037	0.0021	0.4193	0.0023	0.0027	0.0055	0.0018	0.0026	0.0033	0.0017	0.0007	0.0021	0.0021	0.0037	0.0025	0.0024
61,620,621,622	0.1190	0.1409	0.2134	0.2084	0.8012	0.1751	0.1988	0.1737	0.2607	0.0334	0.1716	0.0969	0.1633	0.1710	0.2371	0.2504	0.2843
6300	0.0059	0.0066	0.0096	0.0092	0.0109	0.3876	0.0110	0.0080	0.0182	0.0019	0.0126	0.0037	0.0094	0.0137	0.0207	0.0157	0.0161
7100	0.0570	0.0532	0.0806	0.0747	0.0843	0.0650	0.6498	0.0659	0.0854	0.0116	0.0700	0.0262	0.0560	0.0648	0.0836	0.0977	0.0876
7200	0.0183	0.0241	0.0356	0.0352	0.0391	0.0261	0.0272	0.7894	0.0628	0.0061	0.0450	0.0107	0.0316	0.0350	0.0497	0.1517	0.0336
81,8200	0.0357	0.0335	0.0511	0.0495	0.0544	0.0422	0.0520	0.0323	0.7009	0.0166	0.0435	0.0247	0.0317	0.0488	0.0594	0.1197	0.0581
8310	0.0612	0.0762	0.1122	0.1062	0.1654	0.1564	0.1023	0.0943	0.2042	0.9258	0.1400	0.0484	0.1153	0.1656	0.1298	0.1149	0.1648
8320	0.0113	0.0130	0.0254	0.0339	0.0256	0.0228	0.0211	0.0159	0.0469	0.0146	0.7146	0.0301	0.0190	0.0764	0.0367	0.0228	0.0243
8330	0.0076	0.0066	0.0186	0.0620	0.0132	0.0217	0.0202	0.0060	0.0138	0.0023	0.0176	0.7158	0.0237	0.0118	0.0103	0.0100	0.0094
9330	0.0083	0.0096	0.0140	0.0134	0.0131	0.0128	0.0134	0.0112	0.0295	0.0026	0.0149	0.0051	0.5949	0.0131	0.0365	0.0334	0.0229
9700	0.0064	0.0124	0.0111	0.0106	0.0136	0.0170	0.0102	0.0091	0.0222	0.0025	0.0176	0.0044	0.0155	0.6198	0.0160	0.0122	0.0183
9800	0.0088	0.0120	0.0150	0.0152	0.0135	0.0124	0.0142	0.0113	0.0189	0.0026	0.0140	0.0049	0.0096	0.0153	0.5587	0.0798	0.0213
9900	0.0063	0.0124	0.0114	0.0131	0.0070	0.0088	0.0102	0.0058	0.0086	0.0020	0.0060	0.0028	0.0052	0.0070	0.0086	0.1534	0.0087
REM	0.0527	0.0578	0.0902	0.0841	0.0877	0.0776	0.0807	0.0773	0.1294	0.0153	0.0799	0.0327	0.0629	0.0858	0.1116	0.0854	0.1637
TOTALS	1.3760	1.3463	1.5902	1.5645	1.6596	1.5390	1.5755	1.5737	2.0132	1.1119	1.6124	1.1699	1.4201	1.6407	1.8258	1.5434	1.3541

1993 CLOSED MODEL

9. TYPE II GDP MULTIPLIERS (GDP MULTIPLIERS DIVIDED BY DIRECT GDP COEFFICIENTS)

SIC_CODE	1100	2100	2400	2800	3111-3140	3211-3240	3310-3320	3411-3420	3511-3560	3610-3699	3710-3720	3811-3819	3821-3829	3831-3839	38400-38409	3852-3859	3901	386/390
1100	1.1739	0.0872	0.0561	0.0664	1.1198	0.1383	0.2594	0.1553	0.1137	0.0792	0.0755	0.1126	0.1042	0.0984	0.1251	0.1166	0.1898	0.0903
2100	0.0109	1.0175	0.0100	0.0176	0.0330	0.0180	0.0202	0.0218	0.0484	0.0278	0.0437	0.0262	0.0186	0.0185	0.0217	0.0188	0.0472	0.0144
2400	0.0001	0.0001	1.0001	0.0001	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.1972	0.0001
2800	0.0233	0.0253	0.0097	1.0184	0.0517	0.0273	0.0299	0.0274	0.1802	0.0474	0.0572	0.0392	0.0286	0.0271	0.0338	0.0240	0.9804	0.0241
3111-3140	0.1006	0.0625	0.0407	0.0485	1.3707	0.0973	0.0929	0.0807	0.0785	0.0569	0.0554	0.0825	0.0754	0.0696	0.0907	0.0861	0.1372	0.0638
3211-3240	0.0270	0.0374	0.0222	0.0285	0.0777	1.3136	0.0861	0.0708	0.0481	0.0358	0.0353	0.0512	0.0451	0.0396	0.0695	0.0516	0.0845	0.0768
3310-3320	0.0099	0.0134	0.0143	0.0106	0.0280	0.0135	1.1729	0.0138	0.0145	0.0122	0.0098	0.0169	0.0137	0.0197	0.0170	0.0157	0.0290	0.0172
3411-3420	0.0352	0.0378	0.0198	0.0285	0.1754	0.0687	0.0755	1.3074	0.0646	0.0514	0.0319	0.0515	0.0447	0.0463	0.0670	0.0489	0.0809	0.0646
3511-3560	0.1488	0.1569	0.0597	0.1175	0.3258	0.1833	0.1873	0.1763	1.3029	0.1147	0.0996	0.1666	0.1382	0.1415	0.1793	0.1300	0.2587	0.1432
3610-3699	0.0146	0.0158	0.0079	0.0123	0.0585	0.0142	0.0234	0.0169	0.0337	1.0935	0.0106	0.0420	0.0168	0.0210	0.0323	0.0176	0.0340	0.0139
3710-3720	0.0131	0.0304	0.0113	0.0205	0.0414	0.0168	0.0473	0.0200	0.0323	0.0281	1.0883	0.2934	0.1409	0.1458	0.1143	0.1103	0.4595	0.0531
3811-3819	0.0191	0.0426	0.0158	0.0245	0.0802	0.0222	0.0547	0.0231	0.0345	0.0215	0.0267	1.0709	0.0868	0.0386	0.0736	0.0304	0.2010	0.0368
3821-3829	0.0144	0.0591	0.0151	0.0393	0.0492	0.0279	0.0265	0.0298	0.0358	0.0266	0.0281	0.0298	1.0788	0.0205	0.0496	0.0404	0.0666	0.0217
3831-3839	0.0064	0.0403	0.0087	0.0160	0.0193	0.0108	0.0130	0.0112	0.0141	0.0094	0.0137	0.0161	0.0371	1.1041	0.0343	0.0261	0.0317	0.0397
38400-38409	0.0169	0.0334	0.0112	0.0214	0.0398	0.0212	0.0241	0.0216	0.0226	0.0162	0.0168	0.0231	0.0209	0.0191	1.3067	0.0244	0.0460	0.0175
3852-3859	0.0020	0.0066	0.0074	0.0058	0.0041	0.0017	0.0020	0.0018	0.0036	0.0016	0.0018	0.0021	0.0017	0.0015	0.0021	1.0947	0.0090	0.0014
3901	0.0004	0.0006	0.0003	0.0005	0.0012	0.0006	0.0007	0.0007	0.0007	0.0005	0.0005	0.0007	0.0006	0.0006	0.0008	0.0008	1.0324	0.0006
386,3902,3903,3909	0.0022	0.0045	0.0021	0.0033	0.0072	0.0096	0.0068	0.0043	0.0047	0.0030	0.0031	0.0054	0.0051	0.0044	0.0051	0.0049	0.0082	1.0255
4100	0.0663	0.1518	0.0934	0.1367	0.2038	0.1096	0.1312	0.1274	0.1719	0.1278	0.1974	0.1526	0.1078	0.1050	0.1337	0.1161	0.2998	0.0834
4200	0.0066	0.0076	0.0047	0.0119	0.0223	0.0091	0.0087	0.0098	0.0104	0.0066	0.0062	0.0087	0.0070	0.0064	0.0090	0.0078	0.0221	0.0061
5100	0.0095	0.0072	0.0077	0.0089	0.0187	0.0083	0.0101	0.0090	0.0092	0.0061	0.0060	0.0087	0.0081	0.0073	0.0121	0.0086	0.0196	0.0070
5200,5300	0.0028	0.0059	0.0036	0.0053	0.0087	0.0046	0.0055	0.0052	0.0068	0.0048	0.0066	0.0060	0.0045	0.0043	0.0057	0.0049	0.0119	0.0037
61,620,621,622	0.2982	0.3815	0.1967	0.2833	0.8297	0.4534	0.5253	0.4869	0.4530	0.3256	0.3098	0.4611	0.4443	0.3993	0.7249	0.4499	0.8505	0.3836
6300	0.0108	0.0170	0.0104	0.0134	0.0337	0.0203	0.0227	0.0204	0.0203	0.0152	0.0153	0.0221	0.0200	0.0184	0.0250	0.0235	0.0374	0.0169
7100	0.1088	0.1623	0.0649	0.1123	0.3329	0.1453	0.1776	0.1612	0.2379	0.1392	0.1406	0.1879	0.1514	0.1373	0.1900	0.1576	0.3196	0.1239
7200	0.0349	0.0656	0.0288	0.0541	0.1315	0.0701	0.0804	0.0835	0.0755	0.0529	0.0573	0.0782	0.0691	0.0619	0.0961	0.0932	0.1439	0.0684
81,8200	0.0614	0.0840	0.0430	0.0668	0.2113	0.1101	0.1312	0.1242	0.1282	0.0802	0.0859	0.1234	0.1036	0.0975	0.1330	0.1206	0.1994	0.0994
8310	0.1228	0.1807	0.1086	0.1390	0.3868	0.2479	0.2856	0.2431	0.2287	0.1685	0.1592	0.2654	0.2351	0.2093	0.3068	0.2555	0.4323	0.2152
8320	0.0220	0.0310	0.0171	0.0238	0.0806	0.0445	0.0501	0.0478	0.0543	0.0358	0.0336	0.0505	0.0450	0.0391	0.0544	0.0983	0.0731	0.0422
8330	0.0116	0.0268	0.0082	0.0214	0.0404	0.0201	0.0231	0.0282	0.0310	0.0171	0.0157	0.0257	0.0215	0.0194	0.0344	0.0248	0.0441	0.0193
9330	0.0281	0.0259	0.0151	0.0208	0.0608	0.0302	0.0349	0.0314	0.0301	0.0224	0.0232	0.0327	0.0292	0.0270	0.0368	0.0360	0.0560	0.0251
9700	0.0133	0.0188	0.0117	0.0147	0.0484	0.0249	0.0283	0.0249	0.0282	0.0178	0.0167	0.0259	0.0237	0.0222	0.0331	0.0265	0.0424	0.0228
9800	0.0165	0.0339	0.0162	0.0284	0.0616	0.0336	0.0378	0.0387	0.0358	0.0260	0.0297	0.0378	0.0328	0.0304	0.0454	0.0466	0.0693	0.0290
9900	0.0127	0.0383	0.0118	0.0340	0.0641	0.0288	0.0334	0.0415	0.0354	0.0238	0.0327	0.0347	0.0279	0.0260	0.0462	0.0521	0.0717	0.0266
REM	0.0975	0.1509	0.1008	0.1184	0.2941	0.1888	0.2075	0.1805	0.1786	0.1388	0.1357	0.2029	0.1858	0.1711	0.2213	0.2095	0.3362	0.1546
TOTALS	2.5423	3.0604	2.0551	2.5727	6.3129	3.5346	3.9162	3.6469	3.7681	2.8343	2.8701	3.7547	3.3742	3.1983	4.3912	3.5730	6.9227	3.0321

1993 CLOSED MODEL

9. TYPE II GDP MULT (continued)

SIC_CODE	4100	4200	5100	5200/53	6100/62	6300	7100	7200	8100/82	8310	8320	8330	9330	9700	9800	9900	CP_TOTAL
1100	0.0546	0.0855	0.1698	0.1252	0.0862	0.3409	0.0823	0.0616	0.1404	0.0100	0.0674	0.0269	0.0669	0.0856	0.1377	0.3523	0.8595
2100	0.0736	0.0321	0.0291	0.0217	0.0119	0.0221	0.0141	0.0085	0.0171	0.0025	0.0080	0.0039	0.0099	0.0117	0.0194	0.0556	0.0958
2400	0.0001	0.0001	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0000	0.0013	0.0001	0.0001	0.0019	0.0007
2800	0.0112	0.0277	0.0601	0.0541	0.0155	0.0250	0.0212	0.0096	0.0194	0.0020	0.0097	0.0063	0.0213	0.0138	0.0204	0.0924	0.1054
3111-3140	0.0404	0.0621	0.1208	0.0912	0.0633	0.2924	0.0597	0.0455	0.1038	0.0070	0.0501	0.0193	0.0490	0.0628	0.0997	0.2566	0.6412
3211-3240	0.0200	0.0340	0.0828	0.0478	0.0341	0.0475	0.0349	0.0264	0.0505	0.0038	0.0241	0.0101	0.0266	0.0320	0.0484	0.1504	0.3032
3310-3320	0.0066	0.0121	0.0664	0.0219	0.0133	0.0195	0.0111	0.0075	0.0175	0.0017	0.0089	0.0090	0.0083	0.0148	0.0237	0.0510	0.0913
3411-3420	0.0210	0.0392	0.0779	0.0542	0.0553	0.0672	0.0397	0.0306	0.0804	0.0053	0.0390	0.0116	0.0371	0.0539	0.0779	0.2636	0.2747
3511-3560	0.0652	0.1696	0.2327	0.1840	0.0996	0.1559	0.1330	0.0615	0.1235	0.0115	0.0619	0.0341	0.1049	0.0889	0.1272	0.5643	0.6790
3610-3699	0.0124	0.0392	0.2831	0.1178	0.0132	0.0314	0.0181	0.0073	0.0154	0.0030	0.0075	0.0110	0.0084	0.0110	0.0215	0.0504	0.0799
3710-3720	0.0156	0.0402	0.0922	0.0641	0.0120	0.0197	0.0152	0.0095	0.0152	0.0018	0.0076	0.0097	0.0113	0.0105	0.0171	0.0631	0.0829
3811-3819	0.0133	0.0342	0.1096	0.0897	0.0158	0.0322	0.0173	0.0119	0.0215	0.0025	0.0106	0.0124	0.0133	0.0140	0.0248	0.0916	0.1210
3821-3829	0.0157	0.0212	0.0400	0.0334	0.0144	0.0228	0.0146	0.0107	0.0186	0.0016	0.0095	0.0418	0.0106	0.0118	0.0189	0.0571	0.1052
3831-3839	0.0209	0.0482	0.0956	0.0431	0.0098	0.0147	0.0121	0.0208	0.0133	0.0016	0.0065	0.0063	0.0072	0.0126	0.0144	0.0484	0.0694
38400-38409	0.0128	0.0203	0.0328	0.0254	0.0185	0.0235	0.0202	0.0125	0.0271	0.0019	0.0129	0.0051	0.0122	0.0161	0.0241	0.1295	0.1619
3852-3859	0.0013	0.0016	0.0029	0.0022	0.0015	0.0020	0.0088	0.0010	0.0018	0.0001	0.0010	0.0004	0.0011	0.0012	0.0017	0.0068	0.0100
3901	0.0003	0.0006	0.0009	0.0007	0.0005	0.0006	0.0004	0.0003	0.0008	0.0001	0.0003	0.0001	0.0066	0.0004	0.0008	0.0100	0.0038
386,3902,3903,3909	0.0020	0.0113	0.0062	0.0049	0.0033	0.0056	0.0049	0.0022	0.0064	0.0005	0.0053	0.0011	0.0073	0.0051	0.0098	0.0346	0.0251
4100	1.3386	0.2683	0.1536	0.1322	0.0766	0.1831	0.1054	0.0592	0.1030	0.0140	0.0462	0.0223	0.0656	0.0806	0.1390	0.3745	0.5039
4200	0.0054	1.3588	0.0118	0.0226	0.0066	0.0256	0.0072	0.0053	0.0107	0.0040	0.0045	0.0020	0.0044	0.0080	0.0140	0.0309	0.0459
5100	0.0041	0.0069	1.2941	0.0102	0.0191	0.0154	0.0099	0.0046	0.0144	0.0040	0.0061	0.0025	0.0052	0.0111	0.0203	0.0377	0.0513
5200,5300	0.0359	0.0096	0.0069	1.1189	0.0040	0.0072	0.0097	0.0026	0.0051	0.0036	0.0025	0.0011	0.0037	0.0038	0.0069	0.0173	0.0240
61,620,621,622	0.2156	0.3685	0.7024	0.5563	1.3928	0.4618	0.3491	0.2537	0.5104	0.0369	0.2524	0.1405	0.2794	0.3008	0.4406	1.7311	2.7964
6300	0.0107	0.0171	0.0318	0.0246	0.0189	1.0226	0.0194	0.0116	0.0356	0.0021	0.0185	0.0053	0.0161	0.0242	0.0385	0.1085	0.1583
7100	0.1032	0.1391	0.2653	0.1995	0.1466	0.1716	1.1411	0.0963	0.1672	0.0128	0.1030	0.0380	0.0959	0.1140	0.1553	0.6757	0.8617
7200	0.0332	0.0630	0.1170	0.0940	0.0679	0.0689	0.0478	1.1526	0.1229	0.0067	0.0662	0.0155	0.0540	0.0616	0.0924	1.0483	0.3305
81,8200	0.0647	0.0877	0.1681	0.1322	0.0946	0.1114	0.0913	0.0472	1.3719	0.0184	0.0640	0.0358	0.0542	0.0858	0.1103	0.8274	0.5716
8310	0.1108	0.1992	0.3692	0.2834	0.2875	0.4125	0.1797	0.1376	0.3997	1.0238	0.2058	0.0702	0.1973	0.2913	0.2411	0.7941	1.6211
8320	0.0204	0.0339	0.0835	0.0906	0.0445	0.0601	0.0371	0.0233	0.0918	0.0162	1.0509	0.0437	0.0325	0.1344	0.0682	0.1575	0.2388
8330	0.0137	0.0173	0.0614	0.1654	0.0229	0.0571	0.0354	0.0088	0.0270	0.0026	0.0258	1.0381	0.0405	0.0207	0.0190	0.0689	0.0925
9330	0.0150	0.0252	0.0459	0.0358	0.0229	0.0338	0.0235	0.0164	0.0577	0.0028	0.0219	0.0074	1.0176	0.0230	0.0679	0.2309	0.2253
9700	0.0117	0.0325	0.0366	0.0282	0.0237	0.0450	0.0180	0.0132	0.0434	0.0027	0.0259	0.0064	0.0266	1.0902	0.0297	0.0841	0.1795
9800	0.0159	0.0314	0.0493	0.0405	0.0234	0.0328	0.0249	0.0165	0.0370	0.0029	0.0206	0.0072	0.0164	0.0269	1.0380	0.5518	0.2098
9900	0.0115	0.0326	0.0376	0.0351	0.0122	0.0231	0.0179	0.0084	0.0169	0.0022	0.0088	0.0041	0.0089	0.0124	0.0159	1.0603	0.0860
REM	0.0955	0.1511	0.2967	0.2245	0.1525	0.2047	0.1418	0.1129	0.2532	0.0169	0.1176	0.0474	0.1076	0.1509	0.2074	0.5904	1.6100
TOTALS	2.4927	3.5215	5.2340	4.1752	2.8851	4.0600	2.7668	2.2975	3.9407	1.2295	2.3712	1.6967	2.4292	2.8860	3.3920	10.6690	13.3165

1993 CLOSED MODEL

10. EMPLOYMENT DIAGONALS

SIC_CODE	1100	2100	2400	2800	3111-3140	3211-3240	3310-3320	3411-3420	3511-3560	3610-3699	3710-3720	3811-3819	3821-3829	3831-3839	38400-38409	3852-3859	3901	386/390
1100	28.5270	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2100	0	7.4648	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2400	0	0	18.3316	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2800	0	0	0	6.9396	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3111-3140	0	0	0	0	4.5092	0	0	0	0	0	0	0	0	0	0	0	0	0
3211-3240	0	0	0	0	0	13.1852	0	0	0	0	0	0	0	0	0	0	0	0
3310-3320	0	0	0	0	0	0	15.8039	0	0	0	0	0	0	0	0	0	0	0
3411-3420	0	0	0	0	0	0	0	6.0078	0	0	0	0	0	0	0	0	0	0
3511-3560	0	0	0	0	0	0	0	0	3.2704	0	0	0	0	0	0	0	0	0
3610-3699	0	0	0	0	0	0	0	0	0	10.8972	0	0	0	0	0	0	0	0
3710-3720	0	0	0	0	0	0	0	0	0	0	4.1936	0	0	0	0	0	0	0
3811-3819	0	0	0	0	0	0	0	0	0	0	0	8.3976	0	0	0	0	0	0
3821-3829	0	0	0	0	0	0	0	0	0	0	0	0	5.5181	0	0	0	0	0
3831-3839	0	0	0	0	0	0	0	0	0	0	0	0	0	10.8134	0	0	0	0
38400-38409	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.0048	0	0	0
3852-3859	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.2651	0	0
3901	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.0177	0
386,3902,3903,3909	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.2619
4100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5200,5300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61,620,621,622	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81,8200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8310	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8320	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8330	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9330	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
REM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

1993 CLOSED MODEL

10. EMPLOYMENT DIAG (continued)

SIC_CODE	4100	4200	5100	5200/53	6100/62	6300	7100	7200	8100/82	8310	8320	8330	9330	9700	9800	9900	CP_TOTAL
1100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3111-3140	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3211-3240	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3310-3320	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3411-3420	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3511-3560	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3610-3699	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3710-3720	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3811-3819	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3821-3829	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3831-3839	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38400-38409	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3852-3859	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3901	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
386,3902,3903,3909	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4100	2.9796	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4200	0	2.5725	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5100	0	0	10.9739	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5200,5300	0	0	0	11.9086	0	0	0	0	0	0	0	0	0	0	0	0	0
61,620,621,622	0	0	0	0	9.9471	0	0	0	0	0	0	0	0	0	0	0	0
6300	0	0	0	0	0	7.1336	0	0	0	0	0	0	0	0	0	0	0
7100	0	0	0	0	0	0	7.8144	0	0	0	0	0	0	0	0	0	0
7200	0	0	0	0	0	0	0	8.5469	0	0	0	0	0	0	0	0	0
81,8200	0	0	0	0	0	0	0	0	12.5539	0	0	0	0	0	0	0	0
8310	0	0	0	0	0	0	0	0	0	1.1573	0	0	0	0	0	0	0
8320	0	0	0	0	0	0	0	0	0	0	8.7491	0	0	0	0	0	0
8330	0	0	0	0	0	0	0	0	0	0	0	2.1684	0	0	0	0	0
9330	0	0	0	0	0	0	0	0	0	0	0	0	9.2898	0	0	0	0
9700	0	0	0	0	0	0	0	0	0	0	0	0	0	3.3432	0	0	0
9800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.0246	0	0
9900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14.4717	0
REM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.3560

1993 CLOSED MODEL

11. EMPLOYMENT MULTIPLIERS (EMPLOYMENT MULTIPIERS x LEONTIEF INVERSES)

SIC_CODE	1100	2100	2400	2800	3111-3140	3211-3240	3310-3320	3411-3420	3511-3560	3610-3699	3710-3720	3811-3819	3821-3829	3831-3839	38400-38409	3852-3859	3901	386/390
1100	33.4870	2.1949	2.3970	1.9954	13.5760	3.0332	5.5089	3.4332	1.9720	2.2388	2.0192	2.4668	2.5147	2.4728	2.1327	2.8933	1.4266	2.3386
2100	0.0925	7.5957	0.1262	0.1567	0.1188	0.1168	0.1272	0.1431	0.2491	0.2330	0.3463	0.1701	0.1329	0.1379	0.1099	0.1384	0.1052	0.1109
2400	0.0009	0.0013	18.3327	0.0013	0.0012	0.0011	0.0012	0.0013	0.0009	0.0011	0.0012	0.0013	0.0012	0.0011	0.0012	0.0017	0.6360	0.0013
2800	0.1537	0.1468	0.0954	7.0671	0.1447	0.1382	0.1467	0.1397	0.7217	0.3091	0.3536	0.1981	0.1593	0.1572	0.1332	0.1376	1.7017	0.1445
3111-3140	1.0677	0.5850	0.6473	0.5425	6.1807	0.7934	0.7336	0.6634	0.5066	0.5979	0.5519	0.6722	0.6769	0.6505	0.5751	0.7948	0.3837	0.6152
3211-3240	0.4623	0.5669	0.5713	0.5142	0.5663	17.3195	1.0996	0.9408	0.5016	0.6084	0.5678	0.6744	0.6547	0.5975	0.7122	0.7695	0.3817	1.1956
3310-3320	0.2103	0.2503	0.4545	0.2371	0.2523	0.2201	18.5372	0.2271	0.1869	0.2567	0.1957	0.2750	0.2463	0.3678	0.2154	0.2905	0.1622	0.3311
3411-3420	0.2726	0.2585	0.2299	0.2329	0.5780	0.4095	0.4355	7.8548	0.3045	0.3950	0.2320	0.3068	0.2934	0.3159	0.3104	0.3296	0.1653	0.4549
3511-3560	0.8003	0.7448	0.4807	0.6656	0.7444	0.7580	0.7498	0.7349	4.2611	0.6112	0.5026	0.6881	0.6291	0.6704	0.5761	0.6081	0.3666	0.6995
3610-3699	0.1603	0.1530	0.1294	0.1426	0.2733	0.1196	0.1916	0.1443	0.2251	11.9163	0.1098	0.3546	0.1566	0.2030	0.2120	0.1681	0.0985	0.1391
3710-3720	0.0584	0.1200	0.0758	0.0967	0.0786	0.0577	0.1576	0.0695	0.0879	0.1245	4.5639	1.0071	0.5329	0.5741	0.3053	0.4289	0.5414	0.2157
3811-3819	0.2085	0.4115	0.2580	0.2828	0.3729	0.1864	0.4455	0.1961	0.2291	0.2328	0.2741	8.9927	0.8032	0.3715	0.4807	0.2888	0.5794	0.3653
3821-3829	0.0937	0.3403	0.1473	0.2698	0.1363	0.1398	0.1286	0.1507	0.1419	0.1717	0.1720	0.1490	5.9531	0.1179	0.1933	0.2290	0.1145	0.1283
3831-3839	0.0781	0.4366	0.1602	0.2067	0.1008	0.1022	0.1185	0.1069	0.1055	0.1141	0.1581	0.1521	0.3851	11.9394	0.2514	0.2785	0.1026	0.4429
38400-38409	0.1132	0.1976	0.1121	0.1514	0.1135	0.1093	0.1202	0.1121	0.0921	0.1076	0.1058	0.1188	0.1185	0.1126	5.2333	0.1422	0.0812	0.1063
3852-3859	0.0099	0.0286	0.0544	0.0300	0.0086	0.0063	0.0075	0.0070	0.0106	0.0080	0.0081	0.0078	0.0070	0.0067	0.0061	4.6691	0.0116	0.0062
3901	0.0074	0.0104	0.0083	0.0104	0.0097	0.0090	0.0100	0.0105	0.0076	0.0089	0.0096	0.0107	0.0097	0.0093	0.0096	0.0140	5.1803	0.0096
386,3902,3903,3909	0.0244	0.0451	0.0356	0.0390	0.0344	0.0831	0.0572	0.0376	0.0321	0.0336	0.0333	0.0468	0.0486	0.0442	0.0342	0.0478	0.0245	10.5238
4100	0.1838	0.3715	0.3879	0.3992	0.2401	0.2337	0.2708	0.2738	0.2898	0.3510	0.5135	0.3249	0.2529	0.2564	0.2215	0.2800	0.2191	0.2101
4200	0.0228	0.0231	0.0245	0.0435	0.0327	0.0242	0.0223	0.0263	0.0219	0.0226	0.0202	0.0232	0.0206	0.0194	0.0186	0.0234	0.0201	0.0190
5100	0.1760	0.1175	0.2143	0.1734	0.1473	0.1190	0.1390	0.1288	0.1036	0.1128	0.1046	0.1240	0.1264	0.1191	0.1347	0.1380	0.0960	0.1183
5200,5300	0.0461	0.0845	0.0889	0.0913	0.0602	0.0577	0.0666	0.0652	0.0673	0.0771	0.1008	0.0756	0.0628	0.0618	0.0559	0.0693	0.0511	0.0544
61,620,621,622	2.6488	2.9917	2.6167	2.6508	3.1321	3.0961	3.4735	3.3516	2.4473	2.8653	2.5818	3.1452	3.3398	3.1243	3.8470	3.4756	1.9907	3.0945
6300	0.1047	0.1454	0.1501	0.1368	0.1385	0.1510	0.1630	0.1530	0.1195	0.1453	0.1385	0.1641	0.1633	0.1564	0.1443	0.1974	0.0952	0.1487
7100	0.7668	1.0099	0.6853	0.8343	0.9974	0.7871	0.9322	0.8803	1.0199	0.9719	0.9300	1.0172	0.9034	0.8521	0.8002	0.9660	0.5937	0.7931
7200	0.2235	0.3713	0.2760	0.3652	0.3583	0.3456	0.3839	0.4146	0.2941	0.3362	0.3444	0.3850	0.3750	0.3495	0.3681	0.5196	0.2431	0.3984
81,8200	0.7744	0.9364	0.8122	0.8880	1.1336	1.0680	1.2327	1.2145	0.9840	1.0024	1.0176	1.1958	1.1064	1.0843	1.0028	1.3233	0.6631	1.1397
8310	0.0807	0.1048	0.1069	0.0963	0.1081	0.1253	0.1398	0.1238	0.0914	0.1098	0.0982	0.1339	0.1308	0.1212	0.1205	0.1461	0.0749	0.1285
8320	0.1454	0.1808	0.1697	0.1656	0.2264	0.2260	0.2465	0.2450	0.2184	0.2345	0.2080	0.2564	0.2515	0.2275	0.2147	0.5650	0.1273	0.2535
8330	0.0188	0.0382	0.0198	0.0364	0.0277	0.0250	0.0278	0.0353	0.0304	0.0273	0.0238	0.0319	0.0294	0.0277	0.0332	0.0348	0.0188	0.0283
9330	0.2290	0.1865	0.1852	0.1789	0.2111	0.1896	0.2119	0.1985	0.1493	0.1808	0.1777	0.2049	0.2020	0.1943	0.1793	0.2553	0.1204	0.1858
9700	0.0402	0.0501	0.0528	0.0466	0.0621	0.0577	0.0636	0.0583	0.0518	0.0533	0.0474	0.0602	0.0607	0.0591	0.0597	0.0696	0.0338	0.0626
9800	0.0791	0.1435	0.1162	0.1433	0.1255	0.1237	0.1349	0.1437	0.1044	0.1233	0.1336	0.1393	0.1333	0.1282	0.1300	0.1944	0.0876	0.1262
9900	0.6541	1.7363	0.9112	1.8393	1.3992	1.1370	1.2780	1.6534	1.1068	1.2142	1.5764	1.3691	1.2140	1.1767	1.4198	2.3303	0.9715	1.2435
REM	1.6523	2.2583	2.5603	2.1140	2.1191	2.4610	2.6193	2.3719	1.8415	2.3312	2.1585	2.6412	2.6652	2.5552	2.2418	3.0890	1.5019	2.3804
TOTALS	45.1475	24.8371	33.6941	22.8451	33.8100	33.8308	39.9823	26.3111	18.5779	28.1279	20.3802	27.5841	24.3606	29.2630	22.4840	25.9067	18.9713	28.2138

1993 CLOSED MODEL

11. EMPLOYMENT MULT (continued)

SIC_CODE	4100	4200	5100	5200/53	6100/62	6300	7100	7200	8100/82	8310	8320	8330	9330	9700	9800	9900	CP_TOTAL
1100	1.6743	1.8160	2.8649	2.6046	2.7530	7.1774	2.6023	2.3442	3.9847	0.5036	2.5441	1.0287	2.1723	2.7030	4.1168	2.8307	4.8536
2100	0.6686	0.2021	0.1456	0.1337	0.1125	0.1376	0.1325	0.0959	0.1438	0.0373	0.0898	0.0442	0.0954	0.1095	0.1715	0.1325	0.1604
2400	0.0007	0.0010	0.0012	0.0013	0.0013	0.0011	0.0012	0.0009	0.0018	0.0002	0.0010	0.0004	0.0176	0.0010	0.0019	0.0066	0.0017
2800	0.0791	0.1357	0.2341	0.2599	0.1146	0.1214	0.1550	0.0844	0.1268	0.0227	0.0842	0.0555	0.1598	0.1005	0.1411	0.1713	0.1374
3111-3140	0.4602	0.4903	0.7582	0.7061	0.7526	2.2896	0.7027	0.6432	1.0954	0.1305	0.7035	0.2751	0.5920	0.7373	1.1089	0.7669	1.3469
3211-3240	0.3677	0.4341	0.8397	0.5975	0.6545	0.6018	0.6639	0.6031	0.8610	0.1135	0.5474	0.2333	0.5195	0.6080	0.8691	0.7264	1.0295
3310-3320	0.1511	0.1917	0.8338	0.3398	0.3153	0.3058	0.2601	0.2120	0.3686	0.0630	0.2510	0.2571	0.1996	0.3473	0.5273	0.3048	0.3835
3411-3420	0.1748	0.2261	0.3572	0.3066	0.4800	0.3844	0.3409	0.3163	0.6201	0.0723	0.4004	0.1212	0.3276	0.4622	0.6326	0.5756	0.4216
3511-3560	0.3769	0.6787	0.7400	0.7219	0.5998	0.6187	0.7926	0.4407	0.6606	0.1088	0.4403	0.2463	0.6421	0.5293	0.7165	0.8546	0.7228
3610-3699	0.1465	0.3207	1.8418	0.9449	0.1627	0.2552	0.2213	0.1071	0.1685	0.0577	0.1098	0.1623	0.1057	0.1340	0.2482	0.1561	0.1740
3710-3720	0.0750	0.1339	0.2437	0.2090	0.0603	0.0650	0.0751	0.0566	0.0678	0.0139	0.0449	0.0584	0.0577	0.0520	0.0801	0.0794	0.0734
3811-3819	0.1558	0.2786	0.7090	0.7159	0.1938	0.2600	0.2096	0.1740	0.2335	0.0488	0.1537	0.1825	0.1651	0.1689	0.2846	0.2821	0.2619
3821-3829	0.1098	0.1029	0.1542	0.1589	0.1051	0.1098	0.1054	0.0927	0.1204	0.0181	0.0819	0.3656	0.0789	0.0853	0.1292	0.1049	0.1357
3831-3839	0.2757	0.4405	0.6942	0.3857	0.1350	0.1328	0.1644	0.3407	0.1630	0.0356	0.1062	0.1043	0.1008	0.1711	0.1856	0.1672	0.1686
38400-38409	0.0919	0.1014	0.1300	0.1240	0.1392	0.1163	0.1498	0.1119	0.1809	0.0225	0.1141	0.0463	0.0933	0.1196	0.1694	0.2445	0.2149
3852-3859	0.0071	0.0059	0.0085	0.0080	0.0081	0.0074	0.0479	0.0065	0.0090	0.0013	0.0068	0.0027	0.0060	0.0067	0.0088	0.0094	0.0097
3901	0.0058	0.0081	0.0102	0.0103	0.0105	0.0086	0.0095	0.0074	0.0144	0.0018	0.0084	0.0034	0.1437	0.0084	0.0154	0.0538	0.0141
386,3902,3903,3909	0.0247	0.0951	0.0412	0.0400	0.0414	0.0470	0.0608	0.0335	0.0725	0.0103	0.0799	0.0161	0.0938	0.0635	0.1163	0.1101	0.0563
4100	3.9886	0.5536	0.2518	0.2675	0.2379	0.3747	0.3240	0.2189	0.2839	0.0684	0.1696	0.0831	0.2070	0.2473	0.4038	0.2924	0.2766
4200	0.0202	3.4956	0.0241	0.0569	0.0254	0.0654	0.0274	0.0242	0.0368	0.0245	0.0204	0.0093	0.0174	0.0308	0.0506	0.0301	0.0314
5100	0.0812	0.0948	14.2011	0.1374	0.3963	0.2112	0.2027	0.1126	0.2661	0.1308	0.1501	0.0612	0.1105	0.2286	0.3941	0.1969	0.1886
5200,5300	0.6303	0.1171	0.0665	13.3245	0.0730	0.0866	0.1761	0.0564	0.0820	0.1039	0.0542	0.0231	0.0681	0.0678	0.1181	0.0796	0.0774
61,620,621,622	2.0580	2.4362	3.6903	3.6044	13.8548	3.0275	3.4380	3.0045	4.5089	0.5769	2.9680	1.6756	2.8245	2.9572	4.1009	4.3306	4.9172
6300	0.1107	0.1233	0.1816	0.1733	0.2050	7.2945	0.2076	0.1497	0.3420	0.0359	0.2364	0.0689	0.1766	0.2584	0.3904	0.2954	0.3029
7100	0.7618	0.7299	1.1063	1.0257	1.1573	0.8925	8.9173	0.9049	1.1719	0.1593	0.9612	0.3591	0.7690	0.8893	1.1471	1.3414	1.2024
7200	0.2286	0.3006	0.4437	0.4397	0.4877	0.3259	0.3393	9.8509	0.7835	0.0756	0.5619	0.1335	0.3939	0.4372	0.6204	1.8925	0.4193
81,8200	0.8770	0.8234	1.2553	1.2169	1.3376	1.0373	1.2780	0.7948	17.2230	0.4084	1.0695	0.6059	0.7779	1.1986	1.4590	2.9412	1.4283
8310	0.0783	0.0975	0.1435	0.1359	0.2116	0.2001	0.1310	0.1206	0.2613	1.1848	0.1791	0.0620	0.1476	0.2119	0.1660	0.1470	0.2109
8320	0.1450	0.1668	0.3265	0.4368	0.3294	0.2932	0.2716	0.2049	0.6035	0.1884	9.1948	0.3876	0.2444	0.9834	0.4721	0.2932	0.3124
8330	0.0238	0.0208	0.0586	0.1949	0.0415	0.0681	0.0634	0.0190	0.0434	0.0074	0.0553	2.2511	0.0745	0.0370	0.0322	0.0314	0.0296
9330	0.1314	0.1533	0.2218	0.2132	0.2089	0.2036	0.2126	0.1781	0.4686	0.0408	0.2370	0.0807	9.4534	0.2079	0.5807	0.5309	0.3641
9700	0.0379	0.0730	0.0653	0.0621	0.0801	0.1003	0.0601	0.0533	0.1304	0.0145	0.1034	0.0259	0.0914	3.6449	0.0939	0.0716	0.1073
9800	0.0820	0.1120	0.1398	0.1416	0.1257	0.1160	0.1322	0.1056	0.1763	0.0245	0.1308	0.0461	0.0892	0.1427	5.2154	0.7452	0.1992
9900	0.6327	1.2451	1.1415	1.3138	0.7017	0.8756	1.0196	0.5784	0.8629	0.2007	0.5965	0.2828	0.5202	0.7037	0.8571	15.3437	0.8747
REM	1.7402	1.9070	2.9754	2.7761	2.8945	2.5608	2.6649	2.5526	4.2700	0.5044	2.6386	1.0786	2.0767	2.8310	3.6840	2.8188	5.4033
TOTALS	16.4936	18.1127	36.9006	33.7886	29.0082	30.3732	26.1609	24.6008	40.4073	5.0108	25.0943	10.4381	23.6132	21.4852	29.3091	38.9588	26.5115

1993 CLOSED MODEL

12. TYPE II EMPLOYMENT MULTIPLIERS (EMPLOYMENT MULTIPLIERS DIVIDED BY DIRECT EMPLOYMENT COEFFICIENTS)

SIC_CODE	1100	2100	2400	2800	3111-3140	3211-3240	3310-3320	3411-3420	3511-3560	3610-3699	3710-3720	3811-3819	3821-3829	3831-3839	38400-38409	3852-3859	3901	386/390
1100	1.1739	0.2940	0.1308	0.2875	3.0107	0.2300	0.3486	0.5715	0.6030	0.2055	0.4815	0.2938	0.4557	0.2287	0.5325	0.6784	0.2843	0.2279
2100	0.0032	1.0175	0.0069	0.0226	0.0263	0.0089	0.0081	0.0238	0.0762	0.0214	0.0826	0.0203	0.0241	0.0127	0.0274	0.0324	0.0210	0.0108
2400	0.0000	0.0002	1.0001	0.0002	0.0003	0.0001	0.0001	0.0002	0.0003	0.0001	0.0003	0.0002	0.0002	0.0001	0.0003	0.0004	0.1267	0.0001
2800	0.0054	0.0197	0.0052	1.0184	0.0321	0.0105	0.0093	0.0232	0.2207	0.0284	0.0843	0.0236	0.0289	0.0145	0.0333	0.0323	0.3391	0.0141
3111-3140	0.0374	0.0784	0.0353	0.0782	1.3707	0.0602	0.0464	0.1104	0.1549	0.0549	0.1316	0.0800	0.1227	0.0602	0.1436	0.1863	0.0765	0.0599
3211-3240	0.0162	0.0759	0.0312	0.0741	0.1256	1.3136	0.0696	0.1566	0.1534	0.0558	0.1354	0.0803	0.1186	0.0553	0.1778	0.1804	0.0761	0.1165
3310-3320	0.0074	0.0335	0.0248	0.0342	0.0560	0.0167	1.1729	0.0378	0.0571	0.0236	0.0467	0.0327	0.0446	0.0340	0.0538	0.0681	0.0323	0.0323
3411-3420	0.0096	0.0346	0.0125	0.0336	0.1282	0.0311	0.0276	1.3074	0.0931	0.0362	0.0553	0.0365	0.0532	0.0292	0.0775	0.0773	0.0329	0.0443
3511-3560	0.0281	0.0998	0.0262	0.0959	0.1651	0.0575	0.0474	0.1223	1.3029	0.0561	0.1198	0.0819	0.1140	0.0620	0.1438	0.1426	0.0731	0.0682
3610-3699	0.0056	0.0205	0.0071	0.0206	0.0606	0.0091	0.0121	0.0240	0.0688	1.0935	0.0262	0.0422	0.0284	0.0188	0.0529	0.0394	0.0196	0.0136
3710-3720	0.0020	0.0161	0.0041	0.0139	0.0174	0.0044	0.0100	0.0116	0.0269	0.0114	1.0883	0.1199	0.0966	0.0531	0.0762	0.1006	0.1079	0.0210
3811-3819	0.0073	0.0551	0.0141	0.0408	0.0827	0.0141	0.0282	0.0326	0.0701	0.0214	0.0653	1.0709	0.1456	0.0344	0.1200	0.0677	0.1155	0.0356
3821-3829	0.0033	0.0456	0.0080	0.0389	0.0302	0.0106	0.0081	0.0251	0.0434	0.0158	0.0410	0.0177	1.0788	0.0109	0.0483	0.0537	0.0228	0.0125
3831-3839	0.0027	0.0585	0.0087	0.0298	0.0224	0.0078	0.0075	0.0178	0.0323	0.0105	0.0377	0.0181	0.0698	1.1041	0.0628	0.0653	0.0204	0.0432
38400-38409	0.0040	0.0265	0.0061	0.0218	0.0252	0.0083	0.0076	0.0187	0.0282	0.0099	0.0252	0.0142	0.0215	0.0104	1.3067	0.0333	0.0162	0.0104
3852-3859	0.0003	0.0038	0.0030	0.0043	0.0019	0.0005	0.0005	0.0012	0.0033	0.0007	0.0019	0.0009	0.0013	0.0006	0.0015	1.0947	0.0023	0.0006
3901	0.0003	0.0014	0.0005	0.0015	0.0022	0.0007	0.0006	0.0017	0.0023	0.0008	0.0023	0.0013	0.0018	0.0009	0.0024	0.0033	1.0324	0.0009
386,3902,3903,3909	0.0009	0.0060	0.0019	0.0056	0.0076	0.0063	0.0036	0.0063	0.0098	0.0031	0.0080	0.0056	0.0088	0.0041	0.0085	0.0112	0.0049	1.0255
4100	0.0064	0.0498	0.0212	0.0575	0.0532	0.0177	0.0171	0.0456	0.0886	0.0322	0.1225	0.0387	0.0458	0.0237	0.0553	0.0656	0.0437	0.0205
4200	0.0008	0.0031	0.0013	0.0063	0.0073	0.0018	0.0014	0.0044	0.0067	0.0021	0.0048	0.0028	0.0037	0.0018	0.0046	0.0055	0.0040	0.0019
5100	0.0062	0.0157	0.0117	0.0250	0.0327	0.0090	0.0088	0.0214	0.0317	0.0104	0.0250	0.0148	0.0229	0.0110	0.0336	0.0323	0.0191	0.0115
5200,5300	0.0016	0.0113	0.0049	0.0132	0.0133	0.0044	0.0042	0.0109	0.0206	0.0071	0.0240	0.0090	0.0114	0.0057	0.0140	0.0162	0.0102	0.0053
61,620,621,622	0.0929	0.4008	0.1427	0.3820	0.6946	0.2348	0.2198	0.5579	0.7483	0.2629	0.6157	0.3745	0.6052	0.2889	0.9606	0.8149	0.3967	0.3016
6300	0.0037	0.0195	0.0082	0.0197	0.0307	0.0115	0.0103	0.0255	0.0365	0.0133	0.0330	0.0195	0.0296	0.0145	0.0360	0.0463	0.0190	0.0145
7100	0.0269	0.1353	0.0374	0.1202	0.2212	0.0597	0.0590	0.1465	0.3119	0.0892	0.2218	0.1211	0.1637	0.0788	0.1998	0.2265	0.1183	0.0773
7200	0.0078	0.0497	0.0151	0.0526	0.0795	0.0262	0.0243	0.0690	0.0899	0.0309	0.0821	0.0458	0.0680	0.0323	0.0919	0.1218	0.0484	0.0388
81,8200	0.0271	0.1254	0.0443	0.1280	0.2514	0.0810	0.0780	0.2021	0.3009	0.0920	0.2427	0.1424	0.2005	0.1003	0.2504	0.3103	0.1322	0.1111
8310	0.0028	0.0140	0.0058	0.0139	0.0240	0.0095	0.0088	0.0206	0.0280	0.0101	0.0234	0.0160	0.0237	0.0112	0.0301	0.0342	0.0149	0.0125
8320	0.0051	0.0242	0.0093	0.0239	0.0502	0.0171	0.0156	0.0408	0.0668	0.0215	0.0496	0.0305	0.0456	0.0210	0.0536	0.1325	0.0254	0.0247
8330	0.0007	0.0051	0.0011	0.0052	0.0061	0.0019	0.0018	0.0059	0.0093	0.0025	0.0057	0.0038	0.0053	0.0026	0.0083	0.0082	0.0037	0.0028
9330	0.0080	0.0250	0.0101	0.0258	0.0468	0.0144	0.0134	0.0330	0.0456	0.0166	0.0424	0.0244	0.0366	0.0180	0.0448	0.0599	0.0240	0.0181
9700	0.0014	0.0067	0.0029	0.0067	0.0138	0.0044	0.0040	0.0097	0.0158	0.0049	0.0113	0.0072	0.0110	0.0055	0.0149	0.0163	0.0067	0.0061
9800	0.0028	0.0192	0.0063	0.0207	0.0278	0.0094	0.0085	0.0239	0.0319	0.0113	0.0319	0.0166	0.0242	0.0119	0.0325	0.0456	0.0175	0.0123
9900	0.0229	0.2326	0.0497	0.2650	0.3103	0.0862	0.0809	0.2752	0.3384	0.1114	0.3759	0.1630	0.2200	0.1088	0.3545	0.5464	0.1936	0.1212
REM	0.0579	0.3025	0.1397	0.3046	0.4699	0.1866	0.1657	0.3948	0.5631	0.2139	0.5147	0.3145	0.4830	0.2363	0.5598	0.7242	0.2993	0.2320
TOTALS	1.5826	3.3272	1.8380	3.2920	7.4980	2.5658	2.5299	4.3795	5.6806	2.5812	4.8598	3.2848	4.4147	2.7062	5.6142	6.0741	3.7809	2.7494

1993 CLOSED MODEL

12. TYPE II EMPLOYM (continued)

SIC_CODE	4100	4200	5100	5200/53	6100/62	6300	7100	7200	8100/82	8310	8320	8330	9330	9700	9800	9900	CP_TOTAL
1100	0.5619	0.7059	0.2611	0.2187	0.2768	1.0061	0.3330	0.2743	0.3174	0.4352	0.2908	0.4744	0.2338	0.8085	0.8193	0.1956	1.4462
2100	0.2244	0.0786	0.0133	0.0112	0.0113	0.0193	0.0170	0.0112	0.0115	0.0322	0.0103	0.0204	0.0103	0.0328	0.0341	0.0092	0.0478
2400	0.0002	0.0004	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0002	0.0019	0.0003	0.0004	0.0005	0.0005
2800	0.0266	0.0528	0.0213	0.0218	0.0115	0.0170	0.0198	0.0099	0.0101	0.0197	0.0096	0.0256	0.0172	0.0301	0.0281	0.0118	0.0409
3111-3140	0.1545	0.1906	0.0691	0.0593	0.0757	0.3210	0.0899	0.0753	0.0873	0.1128	0.0804	0.1269	0.0637	0.2205	0.2207	0.0530	0.4013
3211-3240	0.1234	0.1687	0.0765	0.0502	0.0658	0.0844	0.0850	0.0706	0.0686	0.0981	0.0626	0.1076	0.0559	0.1819	0.1730	0.0502	0.3067
3310-3320	0.0507	0.0745	0.0760	0.0285	0.0317	0.0429	0.0333	0.0248	0.0294	0.0545	0.0287	0.1186	0.0215	0.1039	0.1049	0.0211	0.1143
3411-3420	0.0587	0.0879	0.0325	0.0257	0.0483	0.0539	0.0436	0.0370	0.0494	0.0625	0.0458	0.0559	0.0353	0.1382	0.1259	0.0398	0.1256
3511-3560	0.1265	0.2638	0.0674	0.0606	0.0603	0.0867	0.1014	0.0516	0.0526	0.0940	0.0503	0.1136	0.0691	0.1583	0.1426	0.0591	0.2154
3610-3699	0.0492	0.1246	0.1678	0.0793	0.0164	0.0358	0.0283	0.0125	0.0134	0.0499	0.0125	0.0749	0.0114	0.0401	0.0494	0.0108	0.0519
3710-3720	0.0252	0.0520	0.0222	0.0176	0.0061	0.0091	0.0096	0.0066	0.0054	0.0120	0.0051	0.0269	0.0062	0.0156	0.0159	0.0055	0.0219
3811-3819	0.0523	0.1083	0.0646	0.0601	0.0195	0.0364	0.0268	0.0204	0.0186	0.0422	0.0176	0.0842	0.0178	0.0505	0.0566	0.0195	0.0780
3821-3829	0.0368	0.0400	0.0141	0.0133	0.0106	0.0154	0.0135	0.0109	0.0096	0.0156	0.0094	0.1686	0.0085	0.0255	0.0257	0.0073	0.0404
3831-3839	0.0925	0.1712	0.0633	0.0324	0.0136	0.0186	0.0210	0.0399	0.0130	0.0308	0.0121	0.0481	0.0108	0.0512	0.0369	0.0116	0.0503
38400-38409	0.0309	0.0394	0.0118	0.0104	0.0140	0.0163	0.0192	0.0131	0.0144	0.0194	0.0130	0.0214	0.0100	0.0358	0.0337	0.0169	0.0640
3852-3859	0.0024	0.0023	0.0008	0.0007	0.0008	0.0010	0.0061	0.0008	0.0007	0.0011	0.0008	0.0013	0.0006	0.0020	0.0018	0.0007	0.0029
3901	0.0020	0.0031	0.0009	0.0009	0.0011	0.0012	0.0012	0.0009	0.0012	0.0015	0.0010	0.0016	0.0155	0.0025	0.0031	0.0037	0.0042
386,3902,3903,3909	0.0083	0.0370	0.0038	0.0034	0.0042	0.0066	0.0078	0.0039	0.0058	0.0089	0.0091	0.0074	0.0101	0.0190	0.0232	0.0076	0.0168
4100	1.3386	0.2152	0.0229	0.0225	0.0239	0.0525	0.0415	0.0256	0.0226	0.0591	0.0194	0.0383	0.0223	0.0740	0.0804	0.0202	0.0824
4200	0.0068	1.3588	0.0022	0.0048	0.0026	0.0092	0.0035	0.0028	0.0029	0.0212	0.0023	0.0043	0.0019	0.0092	0.0101	0.0021	0.0094
5100	0.0272	0.0368	1.2941	0.0115	0.0398	0.0296	0.0259	0.0132	0.0212	0.1130	0.0172	0.0282	0.0119	0.0684	0.0784	0.0136	0.0562
5200,5300	0.2115	0.0455	0.0061	1.1189	0.0073	0.0121	0.0225	0.0066	0.0065	0.0898	0.0062	0.0107	0.0073	0.0203	0.0235	0.0055	0.0231
61,620,621,622	0.6907	0.9470	0.3363	0.3027	1.3928	0.4244	0.4400	0.3515	0.3592	0.4985	0.3392	0.7727	0.3040	0.8845	0.8162	0.2992	1.4652
6300	0.0371	0.0479	0.0165	0.0145	0.0206	1.0226	0.0266	0.0175	0.0272	0.0310	0.0270	0.0318	0.0190	0.0773	0.0777	0.0204	0.0903
7100	0.2624	0.2837	0.1008	0.0861	0.1163	0.1251	1.1411	0.1059	0.0934	0.1377	0.1099	0.1656	0.0828	0.2660	0.2283	0.0927	0.3583
7200	0.0767	0.1168	0.0404	0.0369	0.0490	0.0457	0.0434	1.1526	0.0624	0.0653	0.0642	0.0616	0.0424	0.1308	0.1235	0.1308	0.1249
81,8200	0.2943	0.3201	0.1144	0.1022	0.1345	0.1454	0.1635	0.0930	1.3719	0.3529	0.1222	0.2794	0.0837	0.3585	0.2904	0.2032	0.4256
8310	0.0263	0.0379	0.0131	0.0114	0.0213	0.0281	0.0168	0.0141	0.0208	1.0238	0.0205	0.0286	0.0159	0.0634	0.0330	0.0102	0.0629
8320	0.0487	0.0649	0.0298	0.0367	0.0331	0.0411	0.0348	0.0240	0.0481	0.1628	1.0509	0.1787	0.0263	0.2942	0.0940	0.0203	0.0931
8330	0.0080	0.0081	0.0053	0.0164	0.0042	0.0095	0.0081	0.0022	0.0035	0.0064	0.0063	1.0381	0.0080	0.0111	0.0064	0.0022	0.0088
9330	0.0441	0.0596	0.0202	0.0179	0.0210	0.0285	0.0272	0.0208	0.0373	0.0353	0.0271	0.0372	1.0176	0.0622	0.1156	0.0367	0.1085
9700	0.0127	0.0284	0.0060	0.0052	0.0081	0.0141	0.0077	0.0062	0.0104	0.0125	0.0118	0.0120	0.0098	1.0902	0.0187	0.0049	0.0320
9800	0.0275	0.0436	0.0127	0.0119	0.0126	0.0163	0.0169	0.0124	0.0140	0.0211	0.0149	0.0213	0.0096	0.0427	1.0380	0.0515	0.0593
9900	0.2124	0.4840	0.1040	0.1103	0.0705	0.1227	0.1305	0.0677	0.0687	0.1734	0.0682	0.1304	0.0560	0.2105	0.1706	1.0603	0.2606
REM	0.5840	0.7413	0.2711	0.2331	0.2910	0.3590	0.3410	0.2987	0.3401	0.4359	0.3016	0.4974	0.2236	0.8468	0.7332	0.1948	1.6100
TOTALS	5.5355	7.0408	3.3626	2.8373	2.9162	4.2578	3.3478	2.8783	3.2187	4.3299	2.8682	4.8137	2.5419	6.4266	5.8331	2.6921	7.8997