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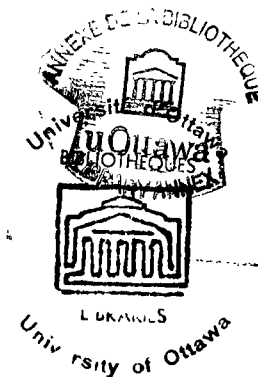


THE PURCHASING FUNCTION OF THE DEPARTMENT OF DEFENCE PRODUCTION

ON BEHALF OF

THE DEPARTMENT OF NATIONAL DEFENCE

A QUALITATIVE AND A QUANTITATIVE APPROACH



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ON BEHALF OF THE DEPARTMENT OF NATIONAL DEFENCE:

A QUALITATIVE AND A QUANTITATIVE APPROACH

A B S T R A C T

The Department of Defence Production (DDP) was established on April 1, 1951, as an exclusive authority to procure the goods and services required by the Department of National Defence (DND). Since that date substantial funds have been committed to implement defence programs planned in accordance with the international military situation.

This thesis has two purposes: First to describe the frame of public expenditures within which DDP purchases take place; and second to develop econometric models to forecast the behaviour of purchasing activities.

The descriptive part points out three main aspects of DDP procurement activity; the first is the Department of Defence Production's share of defence expenditures and other relevant components of National accounts; the second is the economic consequence of defence production; and the third is the allocation of funds committed for these purchases for the past nineteen years.

The econometric model is a distributed lag model based on a priori information about procedures followed in purchasing. DDP function starts upon receiving contract demands from DND. Specialists study these requests and place contracts against them. Expenditures are made either upon completion of contracts or, in the case of progress payments, from the time the contract is signed. These three milestones of purchasing, namely contract demands, contracts and expenditures, are used as variables in building up a model to forecast and explain patterns of purchasing for groups of commodities called procurement programs. The quarterly values of these components are broken down by homogeneous strata of these programs.

The model forecasts value of contracts from value of contract demands and expenditures from value of contracts. The estimated value of contracts of all programs are aggregated to give a total estimated value of contracts. The quarterly expenditures are estimated in a similar way.

In this model it is assumed that the dependent variable is related to the independent variable in the current period and on a number of previous periods. For example, the value of contracts of the aircraft program in any quarter depends on the value of contract demands placed in the current quarter and on those placed in previous quarters. The number of previous quarters lagged differs from one procurement program to another in accordance with the purchasing specifics of the program.

Analysis of data gives the following conclusions:

1. Funds committed for defence production are a substantial portion of the federal expenditures on goods and related services. They constitute a potential area worth to study from economic point of view.
2. The model can be used to forecast, on a quarterly basis, the value of contracts from the value of contract demands, and expenditures from the value of contracts. The original values of variables are separated into homogeneous groups of commodities called procurement programs. The model is applied to each program in accordance with its purchasing specifics, then the estimated values are aggregated to obtain the estimated value of the dependent variable.
3. The model allows a determination of the impact on the economy and on federal expenditures.

## ACKNOWLEDGEMENTS

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My greatest debt is to Professor P.J. Crabbé who has directed this research. Professor Crabbé has examined several drafts of this study and has devoted many hours to the discussion of its contents. His suggestions were valuable in dealing with theoretical and technical problems.

The staff of the Computer Centre of the University of Ottawa has also assisted in preparing the programs and in making their research facilities available.

It is difficult to express in writing my debt to my supervisors and colleagues at the Department of Supply and Services, not only for assistance in gathering the data but also for the encouragement which have enabled the completion of this work.

Needless to mention is the responsibility for errors and weaknesses in the document which are mine alone.

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PART A  
DEPARTMENT OF DEFENCE PRODUCTION PURCHASING FUNCTION  
A GENERAL OUTLOOK

## I. INTRODUCTION

This thesis investigates the purchasing function of the Department of Defence Production (DDP) as the exclusive authority to procure goods and related services on behalf of the Department of National Defence (DND). The purchasing function is reviewed from two points of view which constitute the two parts of the thesis. The first describes the frame of Public Expenditures within which DDP purchases take place; and the second develops an econometric model to forecast the behaviour of these purchases.

### PART A - DEPARTMENT OF DEFENCE PRODUCTION PURCHASING FUNCTION - A GENERAL OUTLOOK

This part deals with DDP purchases from a number of perspectives: First, expenditures against defence purchases are compared to relevant components of the National Accounts such as their share of government expenditures on goods and related services and their share of total defence expenditures from the defence funding. Comparative highlights of DDP purchases are shown in Table 1.

Second, discussed briefly, is the influence of defence production on sectors of the economy such as industry, economic regions, and employment.

Third, discussed are the reasons that led to the allocation of funds committed to procure certain types of material and the general problems involved in their acquisition.

Finally, described is the general background that led to the establishment of the Department of Defence Production; the policy the Department followed to achieve its objectives; and some aspects of military procurement policy.

### PART B - FORECASTING MODEL AND DISTRIBUTED LAG ANALYSIS

DDP is considered as an economic unit interested in predicting its purchasing activity on a short-run quarterly basis. A priori information about the purchasing process serves as a background to build the model.

Contract demands received from DND result in contracts placed by DDP and the expenditures incurred. These components of the purchasing process, however, are not likely to happen at the same period and, therefore, distributed lags are used in

building up the model to find out the effect of past period activity of independent variables on current dependent variables. The model predicts, on quarterly basis, value of contracts from value of contract demands and the value of expenditures from value of contracts. The initial values of these variables are broken down by homogeneous groups of commodities called procurement programs. The model is applied to each program in accordance with the program purchasing specifics, then the estimated values obtained are aggregated to estimate a value of the dependent variable. The model also explains patterns of purchasing for procurement programs.

The analysis and the model are based on quarterly data ranging over a period of eighteen years.

## PART A - DDP PURCHASING FUNCTION - A GENERAL OUTLOOK

Part A describes the background of DDP purchasing on behalf of DND. Firstly, DND expenditures against DDP purchases are shown as shares of relevant National Account indicators, such as total government expenditures, defence expenditures and government expenditures on goods and related services. Secondly, the influence of defence production on sectors of the economy such as industry, region and employment, are discussed. Thirdly, the international military situation which led to defence agreements of Western Nations and the involvement of Canada in these agreements are described. And fourthly, the establishment of DDP, its organization, purchasing practices, and some aspects of military procurement policy are reviewed.

## II HISTORICAL STATISTICS OF PUBLIC EXPENDITURES:

The activities of the state are becoming an increasingly important part in the study of modern economics. This is reflected in the growth of government expenditures and consequently in the great expansion of direct regulation of economic life. The growth of government expenditures arises as governments assume new responsibilities to provide more services to the public. In Canada, the expenditures of the three levels of governments: Federal, Provincial and Municipal, have developed substantially as displayed in Fig. 1 and given in detail in Tables 2(a) and 2(b) of Appendix B. These tables (Historical Statistics of GNP and Government Expenditures in Current Dollar - for all levels of government) show a general upward trend. Before World War II, Federal, Provincial and Municipal government expenditures amounted to \$1.2 billions in 1937 (24% of GNP). During World War II, it became necessary for the government to increase expenditures which amounted to \$4.5 billions in 1942 (44% of GNP). Within a period of 42 years, expenditures of all levels of government in Canada had risen over the long term from \$839 millions in 1926 (16% of GNP) to \$26 billions (38% of GNP) in 1968 - an increase of over 30 times the 1926 level.

Statistical data of National Accounts show that for more than a century world Gross National Products have been rising. At the same time, in almost all countries the trend of government expenditures has been rising, sometimes even faster than GNP. During period of emergency, such as in war and depression, the activity of government expanded. After each emergency had passed, expenditures never seemed to go back to their previous levels. While the rate of growth of government expenditures

receded from its crisis peak, it did not drop down to the pre-war level which was considered high.

For the purpose of this thesis, the important part of government expenditures is on goods and into this category are the expenditures on goods purchased by DDP on behalf of DND. Total government (all levels) expenditures on goods have a general increasing trend. The fluctuation of this trend, however, varies widely among the three levels of governments. While Provincial and Municipal expenditures on goods maintained a general upward trend with little fluctuation, Federal expenditures experienced wide fluctuations because of changes in expenditures on goods during World War II. The peak expenditure reached during the war amounted to \$3.4 billions (27% of GNP) in 1944.

Among the three levels of governments, Municipal expenditures on goods are the highest, with the exception of the war period of 1940-47, when the Federal expenditures were the highest. Provincial expenditures are the least in most of the period.

### III. DND EXPENDITURES ON DDP PURCHASINGS:

This section and those that follow show the place of DND expenditures on goods purchased by DDP within the frame of National Accounts.

#### 1. DDP PURCHASES FOR DND AS A SHARE OF GOVERNMENT EXPENDITURES (ALL LEVELS):

Table 6 (Appendix B) shows the expenditures of all levels of government and of the Federal government. Expenditures are distributed further into salaries and goods together, then goods alone. Federal expenditures are also distributed into defence salaries and goods, defence goods and defence goods purchased by DDP. With the exception of expenditures on defence goods, all other expenditures have a slight increasing trend during 1950-1968. In contrast, expenditures on defence goods in this period, while reaching a peak in 1953, during the Korean War, decreased afterwards and fluctuated around one billion dollars during the 1960's.

DND expenditures against DDP purchasing follow the same pattern, though they decrease to a greater degree. The sharpest decrease began in 1965 when the responsibility of defence construction was transferred from DDP to DND (6-1966). Between 1951-1956, DND expenditures on DDP contracts was over 32% of all governments expenditures on goods. However, during the 1960's, this portion decreased and reached, in 1967, a minimum of 7.8% of the same basis.

The percentage of the components of Federal expenditures from GNP follow the same trend as described above. Details of these developments are displayed in Table 7 (Appendix B). It is interesting to note that between 1965-1968 the percentage of defence expenditures on goods becomes stable, around 1.8% of GNP and DDP portion is about 0.8% (less than 1.0%).

#### 2. DDP PURCHASES FOR DND AS A SHARE OF FEDERAL EXPENDITURES:

Among all levels of governments, the Federal government is charged with the defence of Canada. To enable comparison, Federal expenditures are separated and broken by main components: defence, civilian and others - as shown in Table 8 (Appendix B). Within the civilian and defence component, further breakdown is performed: salaries and goods. Defence goods are subdivided further into purchases by DND and by DDP.

Table 9 (Appendix B) enables further comparison by showing the percentage distribution of components from total Federal expenditures. In the 1950's the Federal expenditures on defence (salaries and goods) were approximately twice that of civilian, and during the 1960's defence portion started decreasing and civilian portion increasing, until the late 1960's when the civilian portion exceeded the defence portion. Thus, defence expenditures reached 41.6% in 1953 and were steadily decreasing to 15.1% in 1968. The portion of defence goods was as high as 35% in 1953 during the Korean War, but it decreased steadily to 10.1% in 1967. Within the same period, the share of civilian goods increased steadily: it was 4.4% in 1953 and it increased to 7.8% in 1967. The portion of defence goods purchased by DDP followed the same pattern: while it reached 26.3% of Federal expenditures in 1953 during the Korean War, this portion decreased tremendously during the 1960's and reached a minimum of 4.6% in 1967.

### 3. DDP PURCHASES FOR DND AS A SHARE OF DEFENCE EXPENDITURES:

Between 1950-1968, defence expenditures reached a maximum in 1953 during the Korean War (1.9 billions in current dollars). They started to decrease, later, until they reached \$1.5 billions in 1960. During the 1960's, defence expenditures fluctuated slightly, increasing or decreasing, until they became stabilized when a ceiling of \$1.8 billions was established in 1967 and 1968 (see Table 10 Appendix B). While defence expenditures fluctuated slightly and maintained the same level, other Federal expenditures increased largely. Thus, the slight increase in defence expenditures, as compared to the large increase in other items, is in fact a relative decrease. This is displayed in Table 9.

The major component of defence expenditures is for defence goods. During the Korean War (1953) expenditures on defence goods reached \$1.6 billion, then started decreasing until they reached a minimum of \$972 million in 1965. After that, they fluctuated slightly around one billion dollars. These expenditures on defence goods included the value of DND purchases performed through DDP which is the main concern of this study.

The expenditures for 1950 include purchasing through the Department of Trade and Commerce before the establishment of DDP, however, most of 1950 purchases were carried out by DDP. Though DDP assumed the responsibility of purchasing on behalf of DND, DND continued to purchase various items on its own. The portion of DDP purchasing of DND goods reached a maximum of 75.5% of total defence goods in 1953. Up to 1968, this portion decreased continuously to an average of 50% - a minimum of 44.5% was reached in 1966. The main reason for the decrease is that in 1965, the function of defence construction was transferred from DDP to DND (6-1966).

The percentage of DND expenditures on goods purchased by DDP out of various national accounts indicators are summarized in Table II (Appendix B) and Fig. 4.

#### 4. THE NATURE OF PURCHASES ON BEHALF OF DND:

Between 1950-1967 (3 and 6), DND placed with DDP contract demands for a total value of \$13.99 billion - an average of \$754 million a year. For the same period, the total value of expenditures against these contracts amounts to \$12.93 billion - an average of \$718 million a year.

These values fluctuate from one year to another and from one decade to another, in accordance with defence requirements that were determined by outside factors of the international military situation. Thus a maximum was reached during the Korean War, then a gradual decrease took place and continued consistently during the 1960's. The following are some conclusions about changes in this activity:

##### a. Contract Demands:

###### 1. In actual dollar value:

During the 1950's the average value per year was \$923 million and during the 1960's, \$595 million - a decline of \$328 million or 36%.

###### 2. In constant 1957 dollar:

During the 1950's the average value per year was \$1,075 million and during the 1960's, \$494 million - a decline of \$581 million or 54%.

##### b. Contracts:

###### 1. In actual dollar value:

During the 1950's the average value per year was \$896 million and during the 1960's, \$577 million - a decline of \$319 million or 36%.

###### 2. In constant 1957 dollar:

During the 1950's the average value per year was \$1,036 million and during the 1960's, \$478 million - a decline of \$558 million or 54%.

c. Expenditures:

1. In actual dollar value:

During the 1950's the average value per year was \$856 million and during the 1960's, \$546 million - a decline of \$310 million or 36%.

2. In constant 1957 dollar:

During the 1950's the average value per year was \$961 million and during the 1960's, \$455 million - a decline of \$506 million or 53%.

These indicators show the general decline in the trend of DDP purchases on behalf of DND. Details are shown in Tables 12 and 13 (Appendix B) and Fig. 5.

5. THE ALLOCATION OF THE DEPARTMENT OF DEFENCE PRODUCTION PURCHASES:

The value of expenditures, contracts and contract demands are shown by DDP programs year by year from 1950 to 1968, Tables 14(a), 15(a), 16(a), of Appendix B, with their equivalent percentage distribution in Tables 14(b), 15(b), and 16(b), of Appendix B.

DDP procurement programs are thirteen in number and are defined in Appendix A. With this program classification contracts and expenditures are published in DDP Annual Reports, as well as the Canada Year Book, (3-6). The first five programs are for military equipment: aircraft, armament, electronics and communications, ships and tank-automotive-railway. The remaining eight programs are for auxiliary materials: fuels and lubricants, clothing and equipment, food and other subsistence, construction, construction equipment, production equipment, other programs (miscellaneous items) and purchasing through DDP regional offices in Canada. The five military equipment programs constitute 67% of the total cumulative value of contract demands, contracts and expenditures. In contrast, the remaining eight auxiliary programs constitute 33% of the same basis. This can be seen in Tables 14(b), 15(b) and 16(b) of Appendix B. Out of the equipment programs the aircraft program ranks first (36%), electronics and communications ranks second (14%) and ships ranks third (8%). Of the auxiliary programs, the construction program ranks first (13%), regional offices in Canada ranks second (7%), and fuels and lubricants program ranks third (4%). These programs maintain the same rank, more or less, throughout the period under review.

The percentage distribution of cumulative values of contract demands, contracts and expenditures by program are illustrated in Fig. 6. These percentages maintain almost the same rank in these three variables. In the individual years the percentage distribution of these programs, in the three variables fluctuates smoothly around their cumulative percentage distribution. Fig. 7 shows the range of percentage distribution of these programs, 1950-1967, i.e., the minimum and the maximum portion (in percentages) these programs have in a year. The aircraft program, for instance, reached a maximum of 52% of the total value of contract demands in 1954, a maximum of 55% of the total value of contracts in 1954 and a maximum of 45% of total expenditures in 1958. The minimum share that this program has is 22% of 1950 value of contract demands, 20% of 1961 value of contracts, and 23% of 1950 expenditures.

## 6. THE DISTRIBUTION OF DEFENCE EXPENDITURES AND DEFENCE POLICY:

The breakdown of contract demands, contracts and expenditures by program points out the importance of equipment programs of aircraft, electronics and communications and ships, as these three programs maintain about 58% of the total. The emphasis on purchasing this equipment was a result of a defence policy adopted by Canada after World War II. This was explained in the White Paper on Defence of March 1964: (12-pp. 7)

"The post-war reorganization included, however, a number of important innovations. The R.C.N. and R.C.A.F. achieved real, rather than nominal, equality with the Army. This development reflected lessons of the Second World War, in particular, the importance of both air and sea power. There was a general belief that in any future war Canada's principal contribution might best be made in the air or at sea. It was argued that as a nation possessing a relatively small population but an advanced technology, with an historic objection to conscription and separated by an ocean from any probable theatre of war, Canada was well placed to supply air and naval forces but at a disadvantage in supplying large land forces."

The new policy stresses on air and naval forces - both ensure mobility and speed when required. This direction was rather necessary in developing a system of collective military forces within NATO or NORAD.

John Gellner explained this situation in his article "Problems of Canadian Defence". (23-pp. 1-2)

"Whether or not neutrality is worth anything in our days is a debatable question, as radio-active fallout may kill neutrals and belligerents without impartiality, but many countries in the world have at least the choice of joining one of the two great power blocs or of remaining uncommitted. Canada does not have this choice. The shortest routes between the two main antagonists, the United States and the Soviet Union, traverse our territory. We also form the essential forefield of United States defence. In fact, the latter depends so completely on Canadian cooperation, which includes giving Americans access to ground installations on our territory, and use of our air space that securing this cooperation undoubtedly is an objective of U.S. national policy, an objective which the United States must achieve if it wants to be "secure". In brief we cannot be neutral and we cannot sit out a clash between the two giants on either side of us. These are facts which must decisively influence our national policy."

This attitude adopted by Canada and other Western nations does not mean aggression but it is a shield against it. This requires a continuous assessing of the power of the opponent and the taking of counter-measures to build up enough power to discourage an offensive act by him.

As George Washington put it, "if we desire to secure peace, it must be known that we are at all times ready for war." This readiness for war means that a nation, although seeking peace, must carry its heavy burden, which is reflected in continuous up-dating of military equipment at the expense of civilian requirements.

#### IV DEFENCE MATERIAL AND THE ECONOMY:

Maintaining a reliable source of defence materials is a complicated matter. We need to understand, among other things, the strength of both the economy of the country and its industry, encourage certain industries, and have an economy flexible enough to meet the challenge of survival. This may also require subsidizing home industries which might not be competitive to foreign ones so that in times of emergency, they can be adequately reliable, though expensive. This policy is even justified by advocates of free trade and competition. Adam Smith wrote in 1776: (30-pp. 40)

"The defence of Great Britain ... depends very much upon the number of its sailors and shipping. The act of Navigation, therefore, very properly endeavours to give the sailors and shipping of Great Britain the monopoly of the trade of their own

country. As defence ... is much more important than opulence, the Act of Navigation is, perhaps, the wisest of all the commercial regulations of England."

And again:

"If any particular manufacture was necessary, indeed, for the defence of the society, it might not always be prudent to depend upon our neighbours for the supply; and if such manufacture could not otherwise be supported at home; it might be unreasonable that all the other branches of industry should be taxed in order to support it. The bounties upon the exportation of British-made sail cloth, and British-made gun-powder, may perhaps, both be vindicated upon this principle." (Adam Smith: The Wealth of Nations pp. 429-431-488-489).

Over the past hundred years, defence equipment has become increasingly expensive. This fact inspired many economic thinkers to study the economic impact of war. Prior to World War I, several economists shared the idea that a war cannot continue for a long time because the heavy expenses incurred can cause serious crisis in the economy of countries involved. A distinguished preacher of this theory was Norman Angell\*, a British economist and pacifist who discussed this problem in his book "The Great Illusion", published in 1910. He described the economic absurdity caused by war and concluded that war cannot last for long periods. This was proven to be untrue. Though he was right in describing the economic consequences yet, financial and economic factors could not deter the explosion of war nor limit its lengthy period. Mr. Angell based his unrealistic theory on the assumption that economic factors are the sole motives behind the behaviour of individuals and nations, and since the losses outbalance the gain, then nations, according to him, will avoid this policy as much as they can.

At the outbreak of World War I, the allied nations believed the Germans did not have sufficient resources to fight a lengthy conflict. On the other hand, the Germans believed in achieving victory by a sudden and quick attack.

A German industrialist by the name of Walter Ratheneau\* realized the role raw materials play in warfare. Before the Declaration of War by the allied nations against Germany, he discussed his ideas with the Department of War. His ideas were very impressive and the department asked him to study the problem of raw materials and give his recommendations. Thus, a bureau of raw materials for defence was established within the Department of War. This bureau reported to the department shortages in raw

\* Encyclopedia Britannica

materials and gave the following recommendations:

1. The German Government should control the use of raw materials and prevent using them for luxuries.
2. The German Government should purchase raw materials from abroad and take hold of any raw materials in captured countries.
3. The German Government should promote defence production at home so as to avoid dependence on foreign suppliers.
4. The German Government should encourage developing ways and means to substitute rare materials with more available ones.

The concept of "War Economy" or "War Socialism" was thus coined in Germany during World War I. This concept means that economic activities should be devoted for one sacred purpose - military victory. This term was rather a novelty that introduced radical changes in the economic policy of countries concerned. These changes were:

1. It put an end to the International Free-trade Policy, which was based on free movement of goods and capital from one country to another. The fighting countries tried to obtain economic independence by manufacturing goods they required rather than importing them. Governments protected their industry through high tariff rates and prevented the export of materials that may be of strategic importance to the enemy.
2. Governments became very active in regulating the economy. During the war they even controlled the entire economy, the commercial fleet, allocation of essential food and prohibition of manufacturing luxuries.

#### V THE ECONOMIC CONSEQUENCES OF DEFENCE PRODUCTION AND THE ARMS RACE

A few years after the end of World War II, the Western nations realized that a defence policy was a must and that their unilateral policy of disarmament was not practical (10). Defence agreements had to be formed; NATO was established in April 1948 and its aim was crystalized in 1951 to become a system of collective military forces. This was a new experiment in international cooperation. The new approach adopted as such required assessment of the new situation, and the beginning of a new era of military build-up, while public expenditures had to be allocated for this purpose. As it was put by Frederic M. Scherer; "a nation should weigh its own costs against the costs

of its enemy". (25 (b) - pp. 105). In other words, defence build-up should be planned after assessing the military might of the potential enemy. The cost involved in a defence build-up forced treaty nations to divert substantially more of their resources for defence.

Few years after the establishment of NATO, economists in Western countries started to focus their attention on the economic aspect of defence. The Director of the U.S. Defence Mobilization explained this in his second report to the U.S. President: (33-pp. 11)

"Military power is much more than weapons of war and men in uniform. It is also the power to produce. Like modern society itself, modern war is constantly growing in its technological complexity - in the size, intricacy, and destructive power of machines in relation to the number of men required for their operation.

Military power depends, then, on the ability of this nation to produce more powerful and effective machines than our potential enemies, to produce more of them and to produce them faster. This in turn depends upon the strength of the whole basic economy in all of its interrelated segments.

An example will illustrate how munition production affects the entire basic economy. Completion of our aircraft production program will require huge quantities of aluminum. Producing the aluminum will require an enormous volume of electric power. Generating and distributing the electric power will call, in turn, for great quantities of copper and also aluminum. Each of the three industries which experience the initial "chain reaction" impact will place demands on transportation and productive equipment, which in turn are heavy users of steel. The effects of the aircraft program could be treated in an endless number of additional steps into every segment of the economy."

Advanced technology helped to support the design of dangerous and highly sophisticated weapons. This was promoted by increased expenditures on defence by many countries, especially the United States. The production program for defence mobilization, in the United States, e.g., is designed to fit the present situation - a situation of indefinite, prolonged cold war with the possibility of an all out conflict at any time. As it is summarized in the 6th Report to the President of the United States: (31-pp.7)

"Thus, our goal is not a military production alone but rather a many sided production build-up, which will give this nation and the free world the maximum of military and economic strength at whatever time it might be needed over a long period."

The purpose behind this approach is that defence production program is not supposed to reduce the output made available for civilian consumption. The overall plan implies to maintain a standard of living at the highest level that can be maintained while yet meeting the defence production target. This program, in the United States, has accordingly been aimed at four objectives:

1. Military Production: A growing output of superior weapons to equip American and allied forces.
2. The military mobilization base-provision of the productive facilities, including machine tools and other production equipment, which will enable the United States to swing rapidly into all-out military production if the need should arise.
3. Basic economic expansion - building of the industrial, raw materials, and agricultural capacity that is needed for maintaining a large-scale military production program over an indefinite period, or that would be needed as part of the mobilization base for global war.
4. Consumer goods and services - within the limits set by the above objectives, allowance for a high level of production for current civilian needs.

The mobilization program launched in the United States after World War II shows the importance of planned economy in the area of defence production. The example given earlier about Germany on the outbreak of World War II and the recommendations given by Walter Ratheneau to the German Department of War have many elements in common with the recommendations mentioned above in a report to the U.S. President from the Director of Defence Mobilization. The important points to be mentioned are building relevant sections of the national economy and ensuring raw materials necessary are available. These are, in fact, necessary guidelines to ensure necessary materials in wartime.

Similar ideas were published in official reports of the Federal Government in Canada: (11-pp. 37)

"A defence program must be supported by industrial strength. During a period of increasing military preparedness, armed forces make a heavy call on the economy, both because of the

large amount of equipment they require and because this equipment must be kept up-to-date. New and better types of aircraft, for instance, are continually developed and put into production, and types in service become obsolete before they are worn out. Large quantities of supplies are also needed by the armed forces in their normal training activity."

And again,

"When modern forces go into action, they must be supported not only by large reserves of expendable supplies, such as ammunition, gasoline and replacements for weapons and equipment, but also by factories capable of maintaining these reserves at a high level. Even if the existence of adequate defence forces ensure that they will not have to be used in combat, the reserves of industrial strength must be maintained. Canada is fortunate in having modern, efficient and growing industries backed by great natural resources sufficient to provide the major requirements of arms and equipment."

The above explanation about the international situation and the economic aspect of it - both served as guidelines to establish the Department of Defence Production in 1951. The functions and objectives are detailed in the next chapter. The Department of Defence Production, therefore, is assigned an important role in defence production for the benefit of Canada and its allies.

## VI THE INFLUENCE OF DEFENCE PROCUREMENT ON SELECTED SECTORS OF THE ECONOMY:

The purpose of this section is to describe in general terms only the influence of defence production on particular sectors of the economy, mainly, on industry region and employment.

The expenditures on military procurement bring about the question of their impact on the economy. Being part of total expenditures on defence, there are conflicting views on the role they play in the Canadian economy. On the one hand, defence is viewed as a "burden", because of its costs and diversion of real goods and services to defence production. In other words, it prevents or retards the satisfaction of many civilian needs. This is described in a speech of the late President Eisenhower in 1953:

"The cost of one modern heavy bomber is this:  
A modern brick school in more than thirty cities.  
It is two electric plants, each serving a town of 60,000 population.  
It is two fine, fully equipped hospitals.  
It is some 50 miles of concrete highway." (24-pp. 4)

On social grounds, defence spending is undesirable and civilian alternatives are likely to have a preference. On security grounds, however, available resources are allotted to military procurement. This is dictated by the international military situation.

On the other hand, defence programs have indirect benefits, because of numerous spillovers of technology and development into the private sectors of the economy. To quote a study prepared for the Parliamentary Committee on Defence:

"... .. defence spending can, to cite a few of its possibilities, provide an important stimulus to the level of business generally, or in a particular geographic region; reduce unemployment; maintain or advance technical competence, lead to important new inventions and improvements in the non-defence area; stimulate foreign trade; and increase capital investment." (7-pp. 95)

In considering these benefits, it is not intended to view defence spending as an essential element in economic activity without which the economy could not exist. In fact, these expenditures are part of the total demand for goods and services in the economy and have many ramifications which go far beyond the initial results of spending the defence budget. Compared with other

types of public expenditures, defence procurement spending is highly volatile and so the possibility of large changes are greater because it is subject to political pressure.

#### a. INDUSTRY AND DEFENCE PRODUCTION

The Second World War influenced the industrial development of Canada. Existing industries were expanded and many new industries were established. The following quotation depicts the extent of war production effort:

"From the automotive plants came over 700,000 mechanical transport vehicles and more than 50,000 armoured fighting vehicles; field, anti-aircraft and naval guns were produced to the number of more than 40,000; more than 1,700,000 small arms were manufactured, amunitions, chemicals and explosives were produced in astronomical figures. From shipyards came escort ships, mine-sweepers, landing craft and cargo vessels; from aircraft factories combat, patrol and trainer aircraft. Instruments and signal equipment were produced having a value of \$551,000,000. The output of steel, coal, lumber, metals and basic materials was substantially increased, the output of aluminum became greater than the peacetime production of the entire world." (7-pp. 97-98)

During the 1950's and the 1960's, defence production spending continued to influence industrial growth following the development of the Korean War. Among the large Canadian industries, Aircraft, Shipbuilding and Electronics were affected substantially by defence procurement. While statistics are not available to enable measuring defence impact on these industries, yet, the study prepared for the Parliamentary Committee on Defence suggests the following estimates:

##### 1. Aircraft and Parts:

- In 1950, the industry comprised 15 establishments employing 10,500 workers.
- In 1955, the industry comprised 52 establishments employing 33,000 workers.
- In 1961, annual shipments amounted to about \$304 million, and defence spending on aircraft program amounted to \$231 million (76%).
- In 1962, annual shipments amounted to about \$352 million, and defence spending on aircraft program amounted to \$244 million (69%).

## 2. Shipbuilding:

- In 1953, the industry comprised 79 establishments employing over 22,500 workers.
- In 1953, annual shipments amounted to about \$183 million, and defence spending on shipbuilding amounted to \$99 million (54%).
- In 1955, the industry comprised 70 establishment employing 16,800 workers.
- In 1955, annual shipments amounted to about \$134 million, and defence spending on shipbuilding amounted to \$87 million (65%).

## 3. Electronics:

The influence on the electronic industry is precisely illustrated in the following quotation of the Parliamentary report mentioned earlier:

"The industry has shown a truly remarkable rate of growth since 1939, increasing by eighteen times. While a great deal of demand came from non-military sources, defence has been and still is a very important influence. In recent years estimates suggested that defence absorbed about 20-25% of Canadian supply while during the Korean War and World War II the evidence indicated a much higher proportion". (7-pp. 100)

Being important for defence, these industries were encouraged by the Canadian Government by means of capital assistance, accelerated depreciation and other ways and means followed in the contracting system of the Department of Defence Production.

### b. REGIONAL IMPACT OF DEFENCE PRODUCTION

The Parliamentary Report on Defence Production deplored the lack of statistics for adequate economic analysis in this area. The figures used in this report are restricted to Canadian prime contracts only and take no account of subsequent transfer of business between areas by subcontracting for materials and parts. The rough estimates illustrate the following distribution of Canadian Defence expenditures against prime contracts placed in Canada for four major industries, 1962-1963:

	<u>AIRCRAFT</u>	<u>SHIPBUILDING</u>	<u>ELECTRONICS</u>	<u>INSTRUMENTS</u>	<u>TOTAL</u>
	\$ 000	\$ 000	\$ 000	\$ 000	\$ 000
Maritimes	5,777	6,674	2,460	-	14,912
Quebec	76,133	21,618	22,319	10,148	130,218
Ontario	40,699	58	40,821	13,594	95,172
Manitoba	4,615	-	-	8	4,623
Saskatchewan	-	-	-	-	-
Alberta	2,637	-	-	-	2,637
British Columbia	204	11,476	6	-	11,686
Total	130,065	39,826	65,606	23,750	259,247

The data show that Quebec shares 50% of the total and Ontario 36% while the share of the remaining provinces is only 14% or \$34 million only. Moreover, these two provinces share 90% of defence expenditures on aircraft and 97% of defence expenditures on electronics.

Although this Parliamentary report is confined to industries in which DND is a major consumer, yet it is necessary to examine also industries in which DND consumes a small percentage of the national total. A small industry supplying materials to a close army camp, can be a major employer within a given locality. (26-pp. vi). A study prepared by the Atlantic Provinces Economic Council shows that these Provinces are more reliant on defence activities than Canada as a whole. 7.3% of the labour force engaged in defence activities as against 2.7% at the national level (16-pp. 9).

Data are not available to find out whether defence industries are the major employer in a particular region or the extent the locality is dependent on defence industry. Indeed overspecialization in a region can create problems regardless of the type of industry - whether defence or other. This is true for areas entirely dependent on one trade such as timber cutting, coal mining, railroads, and so on; however, specialization is more dangerous if dependent on defence expenditures because of their wide fluctuation and their being subject to political pressure.

c. EMPLOYMENT AND DEFENCE PRODUCTION:

The impact of defence expenditures on employment in a given industry is generated by direct and indirect factors:

1. Direct factors; defence contracts awarded to firms in that industry.
- ii. Indirect factors; these are sub-contracts, orders from sub-contractors, and orders from those supplying sub-contractors.

To estimate the net effect, it is necessary to deduct the import portion of defence orders and also imports meeting the requirements of contractors, sub-contractors and suppliers of sub-contractors. Statistics required for these adjustments are not available (30-pp. 11). Hence with the absence of reliable information, only rough estimates can be used. By means of input-output tables, Prof. G. Rosenbluth estimated the contribution of defence procurement to employment as follows (30-pp. 15-16):

"Defence accounted for the employment of over 90,000 individuals in private business. The overall ratio of defence employment to total employment (4.2%) was very close to the ratio of defence expenditures to total net output (4.1%). It should be stressed that the estimates of both defence employment and total employment are very rough indeed."

Moreover, no information is available with regard to the break-down of the estimated number of employees by type of profession. A study, in this field in the United States shows a relatively high proportion in the professions and skilled occupations employed in defence industry (18-pp. 76):

"Of the estimated 2.6 million persons employed directly and indirectly in all private industries providing defence goods and services in 1960, it is estimated that over 380,000 were professional and technical workers. Another 545,000 were skilled craftsmen. These proportions are very high relative to national average ..."

The discussion in this section gives a general view of the impact of defence procurement. Though, some aspects were mentioned, there are more points that should not be overlooked such as the influence on research and development, training, education, infrastructure and so on. Thus the impact of the total defence budget may give a better picture than just defence expenditures on goods and related services. The former areas are beyond the scope of this paper. Selected data, however, are given in Figures 2-3 and Tables 3, 4, and 5 of Appendix B.

## VII THE ESTABLISHMENT OF THE DEPARTMENT OF DEFENCE PRODUCTION AND THE PROCUREMENT FUNCTION

On April 1, 1951, the Department of Defence Production came into being following the proclamation of the Defence Production Act of the same year\*.

The purpose of this establishment stems from the Government's decision to embark on a policy of civilian procurement of the requirements of the three armed services. That policy had been consistently followed since 1939 and finally brought forth the establishment of the department after a number of historical developments:

### 1. The Defence Purchasing Board:

The Defence Purchasing Board was established on July 14, 1939, after an act was passed in May of the same year. The principles involved were:

a. To control and limit the profits with regard to munitions of war. It aimed at a limitation of profits to a maximum of 5% of the capital use in the production of the articles purchased.

b. To separate the awarding of munition contracts from the Minister of National Defence, and establish a non-political board.

### 2. The War Supply Board:

This agency was set up on September 15, 1939, according to the War Measures Act to supplant the Defence Purchasing Board. It started operations on November 1, 1939. This Board was responsible to the Minister of Finance.

### 3. The Department of Munitions and Supply:

The discussion in Parliament in September 1939, regarding the supply of war material, finally led to the establishment of the Department of Munitions and Supply. However, the Act was proclaimed on April 9, 1940. The reasons that led to this establishment are as follows:

a. There was a need for a flexible and dynamic agency to carry on duties of the Boards previously established and to coordinate their activities.

\* See items 3 and 6 Appendix "C".

b. During war time, it was hard to place a contract on the basis of 5% profit provision. Different basis, therefore, had to be adopted for profit limitations.

This Department operated under a combination of the Special Act, which created the Department and the War Measures Act and therefore, had extraordinary powers to carry its function, such as the command of production, determination of priorities and negotiation of contracts.

#### 4. The Canadian Export Board:

This agency was established in January 1944 to handle procurement of civilian type supplies for foreign governments. Because of the relation of this function to the ordinary export trade of the country, this agency was established as a part of the Department of Trade and Commerce.

#### 5. The Department of Reconstruction and Supply:

The functions of the Department of Munitions and Supply were transferred on December 31, 1945, to the Department of Reconstruction and Supply.

#### 6. Canadian Commercial Corporation:

In carrying out the operations of the Canadian Export Board, it became apparent that the contractual relations with the purchases and the supplies would be materially simplified if the contracting agency were a Crown Corporation, capable of contracting in its own name rather than having all transactions with the Crown. Accordingly, in May 1946, by an Act of Parliament, the Canadian Commercial Corporation was brought into being and took over the operations of the Canadian Export Board. Like the Board, CCC was part of the Department of Trade and Commerce.

#### 7. Department of Trade and Commerce:

While the volume of CCC procurement of civilian goods for foreign governments was increasing, the direct procurement activity of the Department of Reconstruction and Supply on behalf of DND was decreasing. The war was over, and it was no longer felt appropriate that purchasing should be carried out under the special emergency powers that had been found necessary during the war. By this time, the volume of purchasing through CCC on account of Foreign Governments had risen to an aggregate greater than the amount of purchasing being done on behalf of DND. A good many of the staff who had been in the Department of Munitions and Supply had by then transferred to CCC and it was apparent that there was no useful purpose to be served by maintaining two procurement agencies.

In February 1947, under appropriate authority, the procurement for the Department of National Defence was taken over by the Minister of Trade and Commerce from the Minister of Reconstruction and Supply, and arrangements were made for the Minister of Trade and Commerce to utilize CCC as his agent in purchasing the requirements of the Services. It should be noted that, while the Canadian Commercial Corporation acted as a principal in dealing with Foreign Governments, it acted only as an agent of the Minister in procurement of the requirements of the Canadian Services. It performed as the Minister's agent the same general functions for the services as had been performed by the Department of Munitions and Supply, namely, the receipt from the services of details of their requirements, the canvassing of the market to determine the best source of supply, the awarding of contracts, and the follow-up deliveries.

It did not assume any responsibility for inspection, nor did it pay the suppliers, these two functions being the responsibility of the Department of National Defence. The size of the operation is indicated by the figures for the year ended March 31, 1948, which was the first full year of operation of the CCC. In that year CCC handled for:

	<u>No. of Contracts</u>	<u>Value</u>
DND	45,000	\$82 millions
Foreign Governments and Other agencies		\$88 millions

From that point on, the purchasing on behalf of DND steadily increased.

	<u>No. of Contracts</u>	<u>Value</u>
FY 1948-49	65,000	\$145 millions
FY 1949-50	84,000	\$221 millions
FY 1950-51	112,000	\$676 millions

At the same time, the business on behalf of foreign governments and other agencies steadily decreased.

## 8. DEPARTMENT OF DEFENCE PRODUCTION:

On April 1, 1951, the Defence Production Act (15 George VI Chapter 4) came into force and provided for the establishment of the Department of Defence Production, in order to carry out the procurement functions of Canada's expanded defence program. The new Department assumed the responsibility previously discharged under the direction of the Minister of Trade and Commerce by the Canadian Commercial Corporation, insofar as defence procurement was concerned, and by the Department of Trade and Commerce relating to essential materials under the Defence Supplies Act (19 George VI Chapter 33) and the Essential Materials (Defence) Act (14-15 George VI Chapter 6).

Various steps were taken in the Department of Trade and Commerce in anticipation of the coming into force of the Defence Production Act and the setting up of the new Government department.

Included in these arrangements were the steps necessary to provide for the transfer of the bulk of the staff from the Canadian Commercial Corporation to the new department. It was decided to retain the Canadian Commercial Corporation as an entity, for substantially the purpose for which it had been originally created, namely, to facilitate the carrying out of transactions with other countries. This was really the same function for which war supplies had been incorporated in the Department of Munitions and Supply days. It proved a very successful arrangement. With the creation of a special department, however, there was no need for a Crown Company to act as an agent for the Minister of Trade and Commerce in connection with procurement in Canada of defence requirements. Actually, as the situation stands today, all procurement, whether for Canadian account or the account of other countries, is, in fact, handled by officers of the Department of Defence Production, but to facilitate the contractual arrangements, the transactions with the purchases outside of Canada are processed through the Canadian Commercial Corporation.

The main responsibility of the Minister of Defence Production are provided in sub-section (2) of Section 9 of the Act which provides that:

1. The Minister shall have the exclusive authority to buy or otherwise acquire defence supplies and construct defence projects required by the Department of National Defence.
2. The Minister is also required to "examine into, organize, mobilize and conserve the resources of Canada contributing to, and the sources of supply of "defence supplies". Defence supplies are defined in the Act but, in general, are all those articles, materials, substances and things required or used for

the purposes of the defence of Canada or for the cooperative efforts for defence being carried on by Canada and associated governments. The responsibilities of the department can, therefore, be summarized as follows:

a. The procurement of all requirements of the Department of National Defence.

b. Steps necessary to ensure adequate supply of materials to support the defence procurement program.

The Defence Production Act was enacted to provide special powers to the Minister, to the end that requirements of defence should be met in priority to other demands on available supply. These special powers were adequate to meet the situation which resulted from the decision to embark on a substantially expanded defence program. The special powers of the Defence Production Act were broader than that of the Munitions and Supply.

a. DEPARTMENTAL ORGANIZATION:

The organization of the new department was planned to assist in the procurement of the required goods and services. At that time, the organization consisted of (6-1951):

a. Three line branches serving as purchasing units.

b. Five administrative and service branches

a. The line branches are: Production, General Purchasing and Materials.

1. The Production Branch:

This branch procures commodities for which special military specifications must be met and special production facilities must be used. Such items as ships, military vehicles, electronic equipment, etc., fall into this category. The branch is sub-divided into divisions which have specific fields such as aircraft, electronic and communication equipment, shipbuilding, etc. It also includes Defence Construction (1951) Ltd., a Crown Company responsible for military construction.

2. The General Purchasing Branch:

This branch procures commodities which are either of standard

commercial types or of specifications not greatly different from commercial ones. Examples of these commodities are clothing, food, fuel, etc.

### 3. The Materials Branch:

This branch is concerned with ensuring the availability of essential materials for defence purposes, the development of resources, and the procedures governing essential imported materials which are under restrictions in the country of origin.

b. The five administrative and services branches are auxiliary to support the line branches. They are: the administrative, the financial adviser's comptroller, the legal and the economics and statistics branch. The latter has an important function (as described in DDP First Annual Report, April-December 1951).

1. To provide an economic appraisal of Canada's defence production effort.
2. To compile statistical data relating to the whole defence program.
3. To maintain a continuous review of expansion projects of a defence-supporting nature.
4. To prepare reports and memoranda on the developments taking place in industries producing strategic materials.

Throughout the years, the volume of purchasing increased substantially. This volume required more buyers with advanced technical ability. These developments, therefore, brought about frequent changes in the organization of the department. The three buying branches were increased into six and several auxiliary branches were created for the purpose of investigating purchasing problems and improving the quality of buying systems.

### b. PROCUREMENT POLICY OF DDP (6-1951):

Procurement by the department is for the most part, based on requests from the Department of National Defence or other agencies. When an item is required by the Department of National Defence, an inquiry or Contract Demand is submitted to DDP giving the specification required and estimated value.

In general, items required by DND are peculiar in quality and type due to its usage. This involves special difficulty in purchasing because such items are not produced for the masses but they are designed according to a specific purpose. As a result, buying procedure has to be designed to allow an acceptable level of profit to encourage competition among producers in the production of defence materials. The vehicles to this purpose is the type of the financial terms of contracts normally entered into by the department. They are six in number:

1. Fixed Price Contracts:

This type, which is most frequently used, is awarded on the basis of competitive tender. Usually the contract is awarded to the tenderer with the lowest bid, though there are factors that justify departure from this principle such as delivery dates, capacity of contractor to produce the goods as well as his past records.

2. Negotiated Fixed Price Contract:

This type provides for cases where an item can be obtained from only one source of supply. This applies in situations where spare parts for items already in use are required.

The other four types of contracts, in fact, are special cases of the previous two. They are applicable in cases where the price cannot be fixed.

3. Ceiling Price Contract:

This type is employed where benefits of volume production occasioned by military requirements cannot be determined accurately in advance and when contract price can be calculated only on the basis of commercial experience.

4. Target Price Plus Incentive Contract:

This type is applied when an item is produced in Canada for the first time. In this case, the target price is based on the price of similar imported items. The contractor is paid his actual cost, and a fee which is calculated as an agreed percentage of the target price plus a bonus if the contractor reduces costs below the target price.

5. Cost Plus a Fixed Fee Contract:

This type is applicable in cases where costs cannot be known in advance. Hence, an increase in costs do not result in increased profits or fees to the contractor.

## 6. Cost Plus a Fixed Percentage of Costs:

This type is similar to the previous one (Type 5) except that a fixed percentage of costs is paid instead of a fixed fee.

The purpose behind the diversification of the financial terms of contracts is to create an environment of encouraging new lines of defence industry in Canada. To be a pioneer in a new field may turn to be fatal. Therefore, DDP has to interfere so that to ensure coverage of cost and a minimum amount of profit for the entrepreneur for a take-off period.

### c. ASPECTS OF MILITARY PROCUREMENT POLICY:

The U.S. Department of Defence practice similar financial terms of contract that DDP follows in the purchasing process. The impact of this policy is frequently studied by economic committees of the Congress and the reports are published for the public. These studies indicate the characteristic of defence procurement policy in the U.S., however, similar surveys are not conducted in Canada, and thus comparison of findings is impossible. The following are selected findings: (36-pp. 5)

1. The procurement of U.S. Department of Defence is highly concentrated. A relatively small number of contractors receive most of the dollar value of the defence contract awards. In fiscal year 1968, the 100 largest defence contractors were awarded 67.4% of the total defence contracts, the highest percentage since 1965. To get on the list of the top 100 in fiscal year 1968 required \$50 million in awards, up from \$46 million in fiscal year 1967. These large contractors generally have assets of \$250 million or more. Small firms (as defined by the Small Business Administration) received only 18.4% of defence prime contracts in fiscal year 1968, down from 20.3% in fiscal year 1967 and 21.4% in fiscal year 1966.

2. The larger, dominant defence firms tend to hold entrenched positions. Eighty-four of the top 100 firms appeared on both the fiscal year 1968 and fiscal year 1967 lists. Eighteen of the top 25 in 1967 were in the top in 1968. The same five companies received prime contract awards of more than one billion each in fiscal year 1968 as in fiscal year 1967.

3. More business is done through non-competitive rather than competitive contracts.

4. In some specific areas of military procurement the

government does business not only with sole source suppliers, but with absolute monopolies. The nature of the purchases and the limited quantities may not be adequate to justify more than one producer. For this reason, the Federal Government must improve its capability to control procurement costs in the absence of competition.

5. The report revealed inadequate means to control cost in non-competitive types of contracts:

a. The price of a contract is negotiated on the basis of cost estimates submitted by the contractor. An inflated estimate can result in an inflated price unless the Department of Defence can properly evaluate estimated cost data. Yet the survey indicates that the Department's ability to adequately analyze cost data is severely limited by the lack of information on profitability, the absence of data on sub-contracting and so on.

b. Cost estimation presently relies extensively on past experience, that is, historical costs are used to provide estimates of the future costs of proposed weapons system. Historical costs refer to the actual costs of performing earlier contracts. They are often insufficient and misleading guides to estimate costs of new contracts.

The committee recommended a new approach termed "should-cost" to determine the amount that weapons systems or products ought to cost given attainable efficiency and economy of operation. The methods of determining "should-cost" figures is based on a combination of industrial engineering and financial management principles. Briefly, a study is made at a contractor's plant of each of the cost elements of the contractors operation to ascertain what the product should cost the government, assuming reasonable efficiency and economy on the part of the contractor.

c. Little is known to the Department of Defence about defence profits. First, it defines profit as a percentage of cost, and does not report profits as a return on investment. Second, the Department of Defence does not obtain complete information about profits on firm fixed price contracts. Third, without uniform accounting standards, it is difficult if not impossible, to discover the costs and profits in defence production, without excessive toil. The reason for this is that contractors are not required to maintain books and records on most defence contracts.

The committee recommended profit on the basis of investment rather than on the basis of cost. If 10% profit is allowed on a contract of a weapon that costs one million, then that would produce a \$100,000 profit for the contractor. If a contractor could use government owned equipment, then he may have relatively small investment in that contract. In such a case it is more accurate to measure his profit as a percentage or return on investment. If his investment was \$500,000, then his \$100,000 profit calculated on the previous basis is 20%.

The committee used the following example showing how a low profit as a percentage of costs can be misleading. This is a case brought before the Tax Court involving Air Force contracts (North American Aviation Inc., Vs. Renegotiation Board, 1962). In that case, while the contract provided for 8% profits as a percentage of costs, the Tax Court found the contracts returned 612% and 802% profit on the contractors investment in a two succeeding years. In that case 99% of the contractors sales was to the government.

In a special survey Prof. M. Weidenbaum examined the profit margin of defence contractors that are doing more than three quarters of their business with the government and he compared his findings with non-defence industries of similar size. His study revealed that for the period 1962-1965 net profit as a percentage of stockholders investments was 17.5% for the defence contracts and 10.6% for the industrial firms (36-pp. 16).

While this study was performed in the U.S. for the Department of Defence purchasing, however, nothing can be said about its applicability to DDP purchasing on behalf of DND. Indeed, the findings of this study and the similarity of purchasing practices in U.S.A. and Canada may lead to a conclusion that a similar examination of the Canadian case is rather necessary to find out practical guide-lines to DDP purchasing policy.

The committee of the Congress concluded the survey with a number of recommendations and some are selected here as they may be applicable to DDP purchasing policy:

1. The Department of Defence should collect adequate statistics about the procurement process including profitability, status of program costs, sub-contracting, military prices, cost allocation, performance, etc., to establish a base for a reporting system to be brought to the attention of the taxpayer.
2. The Department of Defence should conduct a comprehensive study of profitability in defence contracting. The study should include historical and actual profits considered both as a percentage of costs and as a return on investment.

3. The Department of Defence must require contractors to maintain books and records on firm-fixed price contracts showing the costs of manufacturing all components in accordance with uniform accounting standards.

4. Large contracts amounting to hundreds of millions of dollars and extending over several years should be broken down into smaller, more manageable segments.

## VIII CONCLUSIONS OF PART A

1. The main characteristics of DND expenditures on behalf of DDP purchases are instability and high fluctuation related to international military tensions. During the early fifties of the arms race and the Korean War, substantial funds were allocated for strengthening Canada's armed forces to take part in international defence arrangements. In 1952, for example, they accounted for:

- 5% of GNP
- 26% of Federal Expenditures
- 41% of Federal Expenditures on goods and related services
- 63% of total expenditures on defence

During the late sixties, there was a significant decrease as they accounted for:

- 0.8% of GNP
- 5% of Federal Expenditures
- 26% of Federal Expenditures on goods and related services
- 28% of total expenditures on defence

While during the sixties these expenditures are not significant in terms of GNP and other National Accounts indicators, yet their impact may be substantial in terms of specific industry or specific location.

The economic aspect of defence expenditures constitute an immediate potential for examination and study. On the one hand, purchasing and expenditures can be timed to the requirements of monetary and fiscal policy. On the other hand, they can be used to promote certain types of industry or to develop certain regions.

2. During the period under review, 67% of these expenditures were spent on five programs for procurement of military equipment: Aircraft, Armament, Electronics and Communications, Ships and Tank-Automotive-Railway. Thirty-three percent of expenditures were for eight subordinate programs, such as fuels and lubricants, clothing and equipage, food and subsistence, construction, construction equipment, production equipment, etc. The concentration on the equipment program was planned to achieve mobility of the armed forces and speed when required. This idea was expressed in the "White Paper on Defence" of March 1964, which states that Canada's principal contribution might best be made in the air or at sea, but was at a disadvantage in supplying large land forces.

3. Following this policy, the Canadian industries most

influenced by DDP contracts are: Aircraft, Communications, Shipbuilding, and since most of them are located in Quebec and Ontario, the two provinces happen to receive the highest share of these contracts. Other industries may share a very small percentage of the total, however, it is necessary to break out data by location to find the contribution of an industry to a particular location.

4. No data are available for the influence of DDP contracts on the level of employment in industries supplying defence materials. A rough estimate shows that nearly 90,000 employees are involved. These estimates could not be broken out by type of skill or profession. A study performed in the United States, however, indicates a high ratio of professional and highly skilled employees in defence oriented industries. Nor could the estimates be distributed by province or region. A study published by the Economic Council of the Atlantic Region, revealed that the Atlantic Region is highly dependent for employment on defence expenditures - 7.3% of the labour force was engaged in defence activities, a ratio higher than the national level.

5. The defence of a country requires the diversion of resources from civilian to defence project and to promote defence industry in order to have a reliable industrial base for use in time of emergency. A reliable source of this nature may even require subsidizing defence industries at the expense of non-defence industries.

6. The increasing cost of defence equipment could not deter the outbreak of war, as some pacifists tend to believe. This concept was shown to be an illusion when World War I erupted.

The heavy burden of defence expenditures, however, raises the question of their impact on the economy and many economists try to investigate the economic aspect of defence expenditures and the requirement of governments to regulate the economy in order to achieve military victory. This policy was followed by Germany during World War I and was named "War Economy" or "War Socialism".

7. The arms race which started during the Korean War, created a situation of indefinite prolonged cold war with the possibility of an all out conflict at any time. Substantial amounts were funnelled for defence purchases. It was necessary to adopt a flexible economic policy to accommodate increasing expenditures for defence. Economists in the United States recommended that the best policy to be followed in maintaining defence production is not to reduce the output made available for civilian consumption. Flexible economic planning implies the maintenance of a high

standard of living, while meeting defence production targets. The main objective is to achieve expansion in increasing the industrial raw materials and agricultural capacity required by both military and civilian production.

8. To ensure a reliable source of sophisticated weapons in time of war, countries had to establish an industrial complex to produce military equipment and other strategic materials. These establishments employed a high percentage of qualified professionals and highly skilled labour and became dependent on government defence contracts. A decrease in government expenditure through a policy of disarmament produces unemployment of professionals and skilled employees. The influence of a change in policy toward defence procurement may be different from one region to another and from one industry to another.

9. DDP was established in 1951 as the exclusive agent to purchase goods and services on behalf of DND. Prior to 1951 and since the outbreak of World War II, the defence procurement function was performed by six agencies. DDP was given authority broad enough to ensure an adequate supply of material to support defence procurement programs. In general, the DDP function is comparable to that of a private purchasing agent who may find it necessary to study markets, plan a purchasing policy and cost its operations.

Studies need to be conducted continuously to resolve purchasing problems and propose optimum solutions. A study submitted to the United States Congress, e.g., revealed that most U.S. Department of Defence purchasing is through the placing of large contracts amounting to hundreds of millions of dollars and extending over several years. Since managing these contracts is rather difficult, it was recommended that the larger contracts should be broken down into smaller more manageable segments.

10. In the acquisition of weapon and military equipment government is the sole customer. Competition is limited to the few suppliers who have technical competence and financial resources. A large number of purchases, therefore, is made on a sole source basis. This situation requires the government to take an active part in investigating costs, profits and in control of purchasing procedures.

11. In order to investigate the area of defence expenditures, adequate statistics must be compiled. The lack of statistics has been pointed out by Canadian and American experts and both recommended adequate reporting to the public about the impact of defence expenditures.

PART B

FORECASTING MODEL

DISTRIBUTED LAG ANALYSIS

PART B - FORECASTING MODEL: DISTRIBUTED LAG ANALYSIS

This part has two purposes:

1. To build up a quarterly prediction model for:
  - a. Value of contracts from value of contract demands expected
  - b. Expenditures from value of contracts
  
2. To find out the distribution of lag between:
  - a. Placement of contract demands and contracts
  - b. Placement of contracts and expenditures

This model is based on a priori information about purchasing procedures in DDP.

## IX A PRIORI INFORMATION USED TO BUILD UP THE MODEL

### 1. THE PROCESS OF PURCHASING IN DDP

DDP starts functioning when it receives a contract demand (a requisition) from a customer. An Allocation Section which receives these documents distributes them among the buying branches as per type of goods required. The branch, in turn, assigns the requisition to a buyer who studies the specifications, and communicates with contractors in that field either through direct negotiation or through competition - as a first step before placing a contract. Generally, payment against a contract may be made either:

1. After goods have been shipped by contractor. This is the case when goods are produced commercially.

or

2. In the form of a progress payment, after a contract is signed and later when goods have reached a certain stage of production.

The analysis, thus, is based on the relationship of the three milestones of the purchasing process, namely, contract demands, contracts and expenditures. Expenditures are the last stage of the procurement process as they are made after final product is completed, unless a progress payment is involved in the contract. From the point of view of the economy, the important stage is the placing of the contract, because the production process begins after the supplier accepts an order and signs a contract with DDP. This is explained by M. Lee (70-pp. 154):

"As the industries take steps to fill the order, employment, output, and income payment are affected. This implies that the impact of defence procurement on GNP (through employment, income, output and inventories) is felt prior to the expenditures stage. In fact, expenditures and delivery or shipment usually signal the end of the impact of a given defence procurement. Because of this, it is not the sale or the expenditures but the letting of new orders that should be investigated to measure the impact of defence procurement on the economic activity."

## 2. MULTICOLLINEARITY:

The three variables to be used in the proposed model have wide fluctuations from one quarter to another. The fluctuations are caused by the methods with which data are compiled as explained later in this chapter. As a result, the lagged quarterly values of the independent variables do not have a high coefficient of correlation and multicollinearity does not occur in this case.

## 3. SEASONAL ADJUSTMENT OF DATA:

In this study, the time series data were not deseasonalized. This was done following the argument presented by M. Nerlove (77) which states that:

a. Deseasonalization procedures remove far more from the series to which they are applied than can properly be considered as seasonal.

b. If the relation between two seasonally adjusted series in time is compared with the corresponding relation between the original series in time, it is found that there is a distortion due to the process of seasonal adjustment itself.

Both defects impair the usefulness of the seasonally adjusted series as indicators of economic conditions.

The seasonal component of the series does not seem to be a major problem, since defence purchases are more related to irregular rather than seasonal factors. A test of the three series shows that the contract series has no seasonality, although contract demands and expenditures have seasonality due to budgetary policy.

In a more recent article (78), Nerlove reversed his ideas and admitted that seasonal adjustment may aid the business analyst in his task of appraising economic conditions. Better results could be obtained in this study if data were adjusted or if seasonal dummy variables had been introduced in an attempt to net out the effect of seasonality of the unadjusted time series.

## 4. EXPLANATORY VARIABLES IN THE MODEL:

A variety of explanatory variables were utilized in studies on government purchasing conducted in the United States. Studies conducted separately by Lovell (72) and Suits (85) show that orders of the U.S. Department of Defence have an immediate impact upon inventories. Galper and Gramlick (57) used capacity utilization as an independent variable in their model. In this thesis no attempt is made to use these

variables for the following reasons:

a. Data used include not only goods which portion cannot be identified. They also include related services to the purchased goods such as, Repair and Overhaul, Modification and Maintenance, Research and Development, etc. ... The portion of these services cannot be identified either.

b. The major portion of DND expenditures on goods and related services is for heavy military equipment (67% of Annual expenditures, see IV-5 above) and due to their nature, little or no inventories are accumulated by industries concerned in anticipation of contracts. The remaining of the expenditures, which is only a small portion (33%) is for a variety of goods produced commercially in big quantities. The impact of defence expenditures on the inventories of this type of goods is also doubtful because the share of DND in its consumption is negligible, compared to the share of private consumers. Hence, inventories should not be included.

The explanatory variables used in this model are lagged value of contracts to estimate expenditures and lagged value of contract demands to estimate value of contracts.

#### 5. LAGS AND LEADS IN PURCHASING AND EXPENDITURES:

DDP purchasing on behalf of DND is comprised mainly of high value major equipment and large number of low value contracts for subordinate materials. This characteristic dominates the pattern of DDP purchasing throughout the years. While the purchasing of subordinate materials can be completed in a short period, however, the purchasing of major equipment requires a long period and is extended to several quarters. A requisition submitted by a customer, a contract placed by DDP and expenditures against the contract - are the three milestones of any procurement which do not always happen in the same quarter. In general, there is a lapse of time between one step and another. This lapse of time differs in accordance with the procurement program. The purchase of a newly designed equipment, for instance, is different from the purchase of equipment produced commercially. In the latter case, expenditures are performed after delivery of goods to destination, while in the former case, expenditures are paid in instalments after completing certain stage of fabrication. Furthermore, fabrication of certain equipment may extend to several quarters.

In such cases, the phenomena of cause and effect is termed by Koyck (68-pp. 2) as, "the economic reaction" which is, in his words, "a process in time". Part of the reaction may be worked

out after the lapse of one period, another part of the reaction taking place during the second period and so on until after a certain number of periods the total reaction is worked out and payment is completed. "In other words, economic reactions have certain time-shape." To summarize it in his words (68-pp. 6):

"The reaction of the dependent variable to the independent will not be concentrated in any one point of time, it will be spread over a period of time. The general case is that there will be a distributed lag, long or short, in the reaction of the dependent variable to the independent."

Fox explains the idea further (39-pp. 341):

"The basic idea of an economic reaction which is spread over a number of time units is intuitively obvious, and has been put forward by various economists. Unless the units are extremely short, it has also seemed safe to assume, in most practical instances, that the largest adjustment to a change in an independent variable would take place in the first time period, a smaller one in the second time period and so on, until the remaining adjustment (if any) become imperceptible."

The explanations outlined above show that there are lags and leads in this type of economic activity.

a. Between value of requisitions and value of contracts there is always a lag caused by institutional factors, such as time required to study customer requisitions by DDP buyers, invitation to tender, selection of the right contractor, and other administrative procedures to be followed regularly.

b. Between value of contracts and value of expenditures, there is either a lag, or lead or both in the same program.

1. A lag is caused by the following factors:

i. Technological Factors: These factors are related to the fact that production of durable goods requires time. The preparation of ready made material also requires time because a contractor is supposed to supply goods in a certain packaging to a certain destination.

ii. Institutional Factors: Cheques are only issued after bills have been received, inspection of equipment has been completed, cost audits have been made, or administrative backlogs have been overcome.

2. A lead is caused by the fact that in special cases progress

payments are made to firms by the government as equipment reaches various stages of fabrication. Thus expenditures for certain goods are spread over a period of time, and do not necessarily happen after final delivery of goods.

Since both lags and leads may happen in the same program, the influence of one offsets that of the other. The lag characteristic, however, is dominant in purchasing patterns because purchasing with lags takes place more often than purchasing with leads.

In this discussion, it is assumed that future tends to move like the past, "since without some continuity between past, present and future, there would be little possibility of successful prediction". (37-pp. 3). The proposed econometric model assumes also continuity in the fundamental structure and interrelationships of this activity.

#### 6. DISTRIBUTED LAGS IN ECONOMETRICS:

The use of the lag distribution in econometrics was attributed by Griliches to Fisher and Tinbergen back in the 1930's. However, more pioneering work was done in the same field within the business cycle literature under the guise of different concepts: "dynamic multipliers", "flexible accelerator" and "habit persistence". As a workable technique used in econometrics, the distributed lag was developed in the work of Koyck, Cagan and Nerlove (58-pp. 16).

While Irving Fisher (1937) proposed a linearly decreasing adjustment pattern, Koyck assumed a geometrically or exponentially decreasing response. According to Fisher, if the adjustment in the first period accounted to (say) five units, the further adjustment to the initial stimulus would be four units in the second period, three units in the third period, and so on. According to Koyck, the response in Year 1 was equal to a certain percentage of the response in Year 0, and so on.

Almon (46-47) made I. Fisher's proposal more flexible in the way that the coefficient are expressed as a polynomial with a degree to be chosen in advance (42-pp. 479). It was applied by Almon on problems of lag distribution between capital appropriations and expenditures.

The distributed lag models that were examined for this study are as follows:

1. Bayesian approach (73)
2. Frequency domain - Spectral analysis
3. Time domain:
  - a. Geometric distribution - Koyck model
  - b. Pascal lags
  - c. Jorgenson: rational polynomial
  - d. Almon's technique

In all these alternatives, a priori data are required regarding the pattern of lag, or the minimum or maximum lag, etc. ... Unfortunately, these data are not available. Therefore, the multiple regression approach is adopted. The coefficient of regression of the lagged independent variables are divided by their absolute value to find out their contribution to the dependent variable. They are thus normalized, cumulated and charted in Fig. 26 for the individual programs for contract to expenditures and for contract demands to contract.

## 7. THE NATURE OF DATA COMPILED:

Data compiled with respect to three stages of procurement process under the three milestones consist of a heterogeneous type of goods and services that are independently purchased. These data, therefore, are classified under a number of homogeneous groups called procurement programs. They are thirteen in number and are explained in Appendix "A" of this thesis. Since each program has its own purchasing specifics, the proposed model, therefore, will be adjusted to each program separately.

## X THE MODEL

The model consists of two equations, one is behavioural and one is an identity:

- a. For predicting expenditures from value of contracts, the model is:

$$\begin{aligned}
 (1) \quad y_i &= f(x_i) && i = \text{Program no.1, } \dots \dots, \text{Program no.13} \\
 (2) \quad \Sigma Y &= \hat{y}_1 + \hat{y}_2 + \hat{y}_3 + \dots \dots \dots + \hat{y}_{13}
 \end{aligned}$$

b. For predicting value of contracts from value of contract demands, the model is:

$$(1a) \chi_i = f(Z_i) \quad i = \text{Program no. 1}, \dots, \dots, \text{Program no. 13}$$

$$(2a) \Sigma X = \hat{\chi}_1 + \hat{\chi}_2 + \hat{\chi}_3 + \dots \dots \dots + \hat{\chi}_{13}$$

having

Y = Expenditures

X = Value of Contracts

Z = Value of Contract Demands

1, ..., 13 = The 13 procurement programs defined in Appendix "A".

Equations (1) and (2) will be developed only since equation (1) is identical to 1(a) and equation (2) is identical to 2(a).

The actual quarterly data for contract demands, contracts and expenditures are shown in Tables 17-19 by programs and totals. These totals are displayed in Fig. 8-12 on arithmetic and logarithmic scales. Because of the wide fluctuations in the successive values of these variables, and the resulting lack of multicollinearity, least square estimation and not the Almon procedure has been applied (70-pp. 157). The value of contracts in any quarter is determined by value of contract demands carried over from previous quarters. Similarly, expenditures in any quarter is determined by value of contracts placed in current quarter plus incomplete contracts carried over from previous quarters for completion. The behavioural equation, therefore, will include a number of lagged variables that varies from one procurement program to another. The additional lagged variable may assist in getting an appropriate coefficient of correlation between the estimated and actual values of contracts or expenditures in that particular program.

The behavioural equation (1) becomes

$$y = \alpha + \beta_0 x_0 + \beta_1 x_1 + \dots + \beta_k x_k + e \quad (3)$$

where  $x_1, \dots, x_k$  represent these additional variables of lagged quarters and may be fairly large. This equation can be written in a simpler way by replacing the additional terms in the model  $\beta_1 x_1, \dots, \beta_k x_k$  by a single term lag operator  $\beta_q x_q$  which stands for the joint effect of all the terms omitted from the model. Thus equation (3) can be written:

$$y = \alpha + \beta_0 x_0 + \beta_q x_q + e \quad (4)$$

where the residuals "e" are assumed to be distributed independently of the x's with zero mean and variance  $\sigma^2$ . Under this assumption these residuals are assumed to be uncorrelated.

The above model has been estimated for each program separately, once to estimate contract value from contract demand and once to estimate expenditures from value of contracts.

Different criteria are used for choosing the best lag to forecast contracts and expenditures on the one hand and to find out the pattern of lag distribution on the other.

For forecasting, the equation chosen is the one that gives the highest  $\bar{R}^2$  adjusted for degrees of freedom (43-pp. 217 and 44-pp. 129). These forecasts are compiled in Tables 34(a) and (b) by program. The aggregates of estimated values of contracts and expenditures are graphed in Fig. 13(a) and (b) and the coefficients of correlation between them are calculated and summarized in Table 35. The actual and estimated contracts and expenditures of the individual programs are summarized in Tables 34(a) and (b) and Fig. 14-26.

For the distribution of lags the following "rules of thumb" are used to select the appropriate formula:

1. Durbin-Watson Statistics
2. Lags with the highest  $\bar{R}^2$  adjusted or
3. Lags with high number of significant coefficients of regression - mostly positive

## 1. RESULTS OF COMPUTER EXPERIMENTS:

For each individual program, in contracts and expenditures, several experiments were conducted. When applying linear regression analysis an additional variable is added every test by lagging the independent variable one quarter. The results of these trials are tabulated in Tables 20-32 and the number of significant coefficients of the equations of these experiments has been summarized in Table 33.

## 2. SELECTED FINDINGS:

While increasing the number of independent variables, the variance, standard error of estimate, coefficient of variation,  $R^2$  (coefficient of determination) and  $\bar{R}^2$  (adjusted coefficient of determination), fluctuate, increase or decrease steadily. The first three statistics (variance, standard error of estimate and coefficient of variation) either reach or do not reach a minimum value when  $\bar{R}^2$  has a maximum value. The  $R^2$  also does not always have a maximum value with the maximum  $\bar{R}^2$  adjusted. The following are the findings of the experiments using expenditures and contracts data by program:

### a. CONTRACTS AND CONTRACT DEMANDS:

In the experiments involving these variables, the following was found for some of the programs:

1. Minimum variance with maximum  $\bar{R}^2$  : Aircraft, Electronics and Communications, Ships and "Others" programs.

2. Minimum S.E.E. with maximum  $\bar{R}^2$  : Aircraft, Electronics and Communications, Ships and "Others" programs.

3. Minimum coefficient of variation with maximum  $\bar{R}^2$  : Aircraft, Electronics and Communications, Fuels and Lubricants, Clothing and Equipage, Production Equipment and "Others" programs.

4. Maximum  $R^2$  with maximum  $\bar{R}^2$  : Armament, Electronics and Communications, Ships, Tank-Automotive-Railway, Clothing and Equipage and "Others" programs.

In these experiments the two programs - Electronics and Communications and Other program - had a minimum value for variance, S.E.E., coefficient of variation when  $\bar{R}^2$  adjusted is maximum and  $R^2$  is maximum also.

b. EXPENDITURES AND CONTRACTS:

In the experiments with these variables, the following findings relate to selected programs.

1. Minimum variance with maximum  $\bar{R}^2$  : Aircraft, Electronics and Communications, Fuels and Lubricants, Regional Offices program.
2. Minimum S.E.E. with maximum  $\bar{R}^2$  : Aircraft, Electronics and Communications, Fuels and Lubricants, Construction, Regional Offices program.
3. Minimum coefficient of variations with maximum  $\bar{R}^2$  : Aircraft, Armament, Electronics and Communications, Ships.
4. Maximum  $R^2$  with maximum  $\bar{R}^2$  : Aircraft, Fuels and Lubricants, Clothing and Equipage, Food and Subsistence, Construction, Construction Equipment, "Others" programs.

In these experiments, there are only two programs, Aircraft and Fuels and Lubricants, that are consistent in having a minimum value of variance, S.E.E., coefficient of variation when  $\bar{R}^2$  adjusted is maximum and  $R^2$  is maximum also.

c. RESIDUAL ANALYSIS:

Durbin-Watson statistics of the equations chosen for the analysis of lags distribution are displayed in Table 37(a) for contracts to expenditures and in Table 37(b) for contract demands to contracts.

Among programs of contracts to expenditures, the Durbin-Watson statistics of the "Regional Offices Branch" show a negative autocorrelation residuals. Another program "Construction Equipment" has a DW = 2.27 that indicates only a moderate degree of negative autocorrelation exists between the residuals and implies that the error terms in the model are relatively independent. For the rest of the programs, the DW Statistics indicate that the error terms in the model are independent.

Among programs of contracts to contract demands, the DW Statistics of two programs show autocorrelation of residuals. The "Fuels and Lubricants" has a negative autocorrelation (DW = 2.39) and "Other Program" has a positive autocorrelation - (DW = 1.42). For the rest of the programs the DW Statistics indicate that the error terms in the model are independent.

An autoregressive transformation has to be conducted for the three programs with autocorrelation in order to minimize the residual variance of the specified equation. The procedures of transformation that can be applied are either the one suggested by Hildreth and Lu (64) or the one suggested by Orcutt and Cochrane (50). Unfortunately the computer sub-routines for the two procedures were not available when these data were processed.

For selected major programs (Aircraft, Electronics and Communication, Ships, Construction, Armament) the residuals were plotted in Fig. 28.

The plot indicates that seasonality is not a major problem in the series and that the outliers are more related to irregular factors, caused by changes in purchase habit brought about by international military tensions. Large disturbances of the five major programs are displayed in Table 40 Appendix "B" (4).

As previously suggested (IX-(3)), the use of dummy variables in the model can yield better results and take care of the disturbance which some of the figures reveal.

### 3. APPLICATION OF THE MODEL:

As explained earlier, the procurement programs serve as homogeneous strata for a better prediction of the aggregate. The various experiments performed to obtain the best prediction equation reveals also the specific problems of each program. The estimated contracts and expenditures for military equipment require more lagged quarters than other types of commercial goods. However, for soft goods materials that are to be supplied for specific periods also require additional lagged quarters; such as Fuels and Lubricants. Military equipment that require long periods for production require more lagged quarters of contracts to estimate expenditures rather than lagged quarters of contract demands to estimate value of contracts. This is the case in three programs: Aircraft, Armament and Tank-Automotive-Railway. However, two programs, Electronics and Communications and Ships, require more time for planning and design or to negotiate with relevant suppliers and therefore more lagged quarters are used to estimate value of contracts from value of contract demands and less lagged quarters to estimate expenditures from value of contracts.

As mentioned earlier (See Section X), the best equation chosen for prediction is the one that gives the highest  $\bar{R}^2$  adjusted.

The results of these tests are shown in Table 36(a) for contracts and Table 36(b) for expenditures. These tables show for each program, the coefficient of regression, standard error, t test and level of significance, as well as  $R^2$ ,  $\bar{R}^2$  adjusted and Durbin-Watson statistic. In some programs  $\bar{R}^2$  is quite high for estimated contracts and low for estimated expenditures and vice versa. Generally speaking, in programs whose  $\bar{R}^2$  is low, little search time for a better fit was expended because the portion of these programs, out of the total, is not significant.

The reasons for the poor relationship between actual and predicted variable can be explained as follows:

1. Under the present system, a number of contracts may be placed against the same contract demand. While a contract demand is coded under a certain procurement program, the number of contracts placed may not always represent the program if the coders cannot identify the end object of the contract demand. It may happen also that a contract demand or some items of it are transferred, for administration, to the regional offices upon a recommendation of the Head Office Purchasing unit. These changes are not entered in the card originally punched for identifying the contract demand. In such cases, the value of contracts placed against a contract demand and coded to a procurement program may add up to less than the value recorded for the contract demand. On the other hand, if a program has many contracts where contract demands are coded under other programs, then the value of contracts will exceed the value of contract demands. The relationships of the dependent and independent variables are thus affected.

2. While the value of contract demands and contracts in any particular quarter includes amendments to original contracts placed in previous quarter expenditures have no amendments. The value of amendments may be either positive, to increase the value of the original contract, or negative, to decrease it. These amendments are compiled in the quarter they occur and are not related to the quarter of the original contract. Hence, as a result of this procedure, values of contract demands or contracts in any quarter may be negative, if the value of amendment decrease exceeds the value of original contracts and amendment increases. The relationship between the dependent and independent variables are also affected.

- a. A great fluctuation in the value of the two variables and in contract demands and contracts or contracts and expenditures occurs and thus lead to a low coefficient of correlation.

- b. This procedure of data compilation may create a wide gap between the value of the two variables in certain quarters

and as such the coefficient of regression may be either insignificant positive or negative, or significant but negative.

The programs that are affected by these procedures are as follows:

1. Value of Contracts Predicted from Value of Contract Demands: Electronics and Communications, Food and Subsistence, Production Equipment, Other Program, and Regional Purchasing Offices.
2. Expenditures Predicted from Value of Contracts: Armament, Electronics and Communications, Ships, Production Equipment and Regional Offices.

Since the main object of the thesis is to forecast total value of contracts and total value of expenditures and not that of the individual programs, then the results thus obtained will be accepted if the actual and estimated aggregates of contracts and expenditures lead to a reasonable coefficient of correlation.

The predicted value of all the programs are added together for contracts and expenditures quarterly and the total thus obtained is matched with the actual quarterly total. The coefficient of correlation between the estimated and actual values are as follows:

1. For estimated value of contracts from the value of contract demands 0.8141.
2. For estimated expenditures from the value of contracts 0.9217.

The coefficient of correlation of the latter is higher than the former, because quarterly value of both contracts and contract demands are both subject to wide variation due to the method of compiling data - as explained above. The statistics are tabulated in Table 36(a) for contracts and Table 36(b) for expenditures. The data are also graphed in Fig. 13(a) for total quarterly value of contracts, Fig. 13(b) for total quarterly expenditures and Fig. 14-26 for the individual programs.

To provide additional test of the closeness with which the series of predictions approximated the series of actual values, Theil's "U" coefficient was used. For contracts  $U = 0.1213$  and for expenditures  $U = 0.0956$ . These results do not contradict the test of the coefficient of correlation.

The Durbin-Watson statistic for the quarterly aggregates are 1.85 for contracts and 2.90 for expenditures. Though the latter shows negative serial autocorrelation, yet it does not affect the prediction model because the aggregate quarterly values are

not used to estimate one from the other and the prediction value is based on aggregation of the values of the individual procurement programs.

To find out the advantage of this disaggregation approach, an experiment was conducted using total quarterly values. Total quarterly values of contracts were estimated from lagged quarterly values of contract demands. In like manner, the total quarterly expenditures were estimated from lagged total quarterly value of contracts. The lags for sixteen quarters showed a coefficient of correlation of 0.65 for contracts (compared to 0.81) and of 0.33 for expenditures (compared to 0.92). It can be concluded, therefore, that disaggregation yields better results in forecasting quarterly totals if heterogeneous strata of the total are segregated and each is treated in accordance with its purchasing specifics (59) (80).

## XI THE DISTRIBUTION OF LAGS

Based on the criteria mentioned earlier, equations with a certain number of lags are chosen for each program both for contracts and expenditures. The coefficients of these equations with standard error, t test and level of significant are summarized in Table 37(b) for estimated value of contracts and Table 37 (a) for estimated expenditures. These absolute value of coefficients are normalized to one by dividing them by their absolute total value and they are shown in Tables 38(a) - 38(b) and are plotted in Fig. 27.

Further tests were carried out for contracts and expenditures of three major programs: Aircraft, Electronics and Communications, and Ships. The model was slightly modified by reducing the intercept of the regression equation to zero. However, the results are similar to those of the original model and no significant change has been obtained (Table 39).

The equations used to explain lags are built the same way as the prediction model. In the case of contracts, for instance, contracts placed in a particular quarter may belong to contract demands placed a number of quarters earlier. Similarly, expenditures in a certain quarter may belong to contracts placed several quarters earlier. Thus, the influence of one quarter value of independent variable is distributed among a number of dependent quarters in the future. This feature is common to all programs and as such brings about a fluctuation behaviour in the distribution of lags because one quarter is too short a period in comparison with the length of time required to complete the purchasing process. These fluctuations of the lagged quarterly values of contract demands to estimate value of contracts and of lagged

value of contracts to estimate expenditures are expressed in the coefficients of regression of the appropriate formula developed for the purpose. A positive coefficient of regression contributes positively to the estimated value and vice versa if the coefficient is negative. The regression coefficient of an independent variable is positive if its actual value is close to or higher than the actual value of the dependent variable, and vice versa if it is negative. As an example, a negative coefficient of regression of a lagged value of contract demands indicates that this value is smaller than the actual value of contracts in the estimated quarter: and vice versa with positive coefficient.

The fluctuation in the value of a dependent variable compared to that of the independent variable stems from the way in which data are compiled and the nature of the material purchased. The reasons can be summarized as follows:

#### 1. Coefficients of Contract Demands and Contracts:

A positive coefficient of regression may be generated if value of contract demands in a certain quarter is reduced because of amendment decrease while high value contracts are placed. The coefficient may be even significantly positive. This situation can be reversed if value of contracts is decreased (through amendment decrease) while high value contract demands are submitted. This phenomenon is also applicable to all programs.

#### 2. Coefficients of Contracts and Expenditures:

A negative coefficient of regression may be obtained if the value of contracts in a certain quarter is reduced because of amendment decrease and on the other hand expenditures are increased because a progress payment is paid in that quarter for contracts placed in previous quarters. This situation also can be reversed if value of contracts is increased because of amendment increase and no progress payments have been made during that quarter. This phenomenon is also applicable to all programs.

The fluctuations of the coefficient of regression, in other words, cyclical distribution of lags, though are common to all programs, varies from one program to another, in accord with the nature of materials procured. It is necessary, therefore, to deal with each program individually. The distribution of lag for each program is dealt with in two stages: the first is between contract demands and contracts and the second between contracts and expenditures. The combination of the two stages shows the purchasing cycle of that program. The first stage shows when a requisition starts affecting the economy, and the second stage shows when it starts affecting government expenditures.

The cyclical distribution of lags also differs from one program to another. The trough and peak in the significant positive and negative coefficients of regression occur at different quarters lagged for different programs.

The equipment programs for Aircraft, Armament, Electronics and Communications, Ships and Tank-Automotive-Railway display a common behaviour relevant to the purchasing process and nature of materials involved. In this field there are few suppliers and purchasing is based on negotiation rather than competitive tendering. In Aircraft and Armament programs considerable value of contracts are placed already in the current quarter; in Electronics and Communications and Tank-Automotive-Railway this happens in the first lagged quarter; and in Ships in the fifth lagged quarter probably because of the long period of negotiations, research and design required prior to placing a contract.

The expenditures against contracts of this equipment have also similar specifics. Since this equipment requires a long period for production, progress payments are paid in the same quarter of placing the contract and further payments are paid later whenever a certain stage of production is reached. In Aircraft, Armament and Ships, progress payments are paid in the current quarter, and in Electronics and Communications this happens in the second lagged quarter.

The significant value of contracts placed and the significant expenditures against them both are expressed in the significant coefficient of regression of the quarters involved.

The following are specific findings of the individual programs: (See Fig. 27 and Tables 38(a) and 38(b)):

1. AIRCRAFT:

a. Contracts:

The best distribution of lags for contracts is obtained with seven lagged quarters. The value of contracts placed against contract demands in a quarter are distributed as follows: 13% contributed by contract demands of the current quarter, 35% of the fourth and fifth quarters and 16% of the eighth quarter.

b. Expenditures:

The best distribution of lags for expenditures is obtained with eight lagged quarters. Expenditures against contracts in a quarter are distributed as follows: 12% contributed by contracts of the current quarter; 38% of the third and fourth quarter and 24% of the seventh quarter.

c. Conclusion:

The influence cycle for the Aircraft program has seven quarters between contract demands and contracts and eight quarters between contracts and expenditures - a total of fifteen quarters or about four years. These two periods may be overlapping and, therefore, it may be better to conclude that the influence cycle of contract demands placed in a quarter may extend between eight to fifteen quarters in the future or about two to four years.

2. ARMAMENT

a. Contracts:

The best distribution of lags for contracts is obtained with five lagged quarters. The values of contracts placed against contract demands in a quarter are distributed as follows: 9% contributed by contract demands of the current quarter, 46% of the third and fourth quarters.

b. Expenditures:

The best distribution of lags for expenditures is obtained with nine lagged quarters, 13% of the expenditures are influenced by contracts placed during current quarter and 27% during the third and fourth quarters.

c. Conclusion:

In both contracts and expenditures the important quarters are the third and the fourth. The influence cycle of the Armament program has five quarters between contract demands and contracts and nine quarters between contracts and expenditures - a total of 14 quarters or about 3-1/2 years. These two periods may be overlapping and, therefore, it may be better to conclude that the influence cycle of contract demands placed in a quarter may extend between nine and fourteen quarters - 2-1/4 to 3-1/2 years.

3. ELECTRONICS AND COMMUNICATIONS:

a. Contracts:

This program consists of advanced equipment as well as a variety of less technically advanced commercial parts. The production of these materials and their services of maintenance and overhaul differ significantly. Some items can be produced in a short period, while for others whose value is very significant, a quarter is too short for production. In addition,

a buyer requires a considerable time to find out a relevant supplier. On the other hand, a contract demand for one year's service of maintenance, repair and overhaul has to be submitted several months before the start of the service period so that enough lead time is given to communicate with suppliers. This background casts a shadow on the findings of the formula in that the coefficient of regression of the current quarter is significantly negative, then those of the fifth (19%) and the sixth (14%) are significantly positive.

b. Expenditures:

Expenditures in a current quarter is generated by value of contracts placed over five past quarters. The quarter that contributed most is the second, as compared to the first, fifth and sixth in contracts.

c. Conclusion:

The influence cycle in the Electronics and Communications program has seven quarters between contract demands and contracts and five quarters between contracts and expenditures, a total of twelve quarters or about three years. These two periods may be overlapping and, therefore, it may be better to conclude that the influence cycle of contract demands placed in a quarter may extend between seven and twelve quarters, i.e., two to three years.

#### 4. SHIPS

a. Contracts:

The building, refitting and repairing of ships requires long periods. For example, a service contract for maintenance is given for a period of a year. This means that a contract demand has to be submitted a few months before the starting date of the contract to enable the buyers to study the requirement before placing a contract. A contract demand for building a ship is usually split into parts: metal sheets, paints, electrical equipment, etc., each may require a different contract to provide material at certain stages of production. Contracts placed in a current quarter are influenced by contract demands placed during the past twelve quarters. Up to the third quarter, the contribution of contract demands to the estimated value of contracts is either insignificant or negative. The fourth (11%) and fifth (10%) are significantly positive followed by another downward cycle up to the eleventh quarter when contribution is significantly positive (22%).

b. Expenditures:

Expenditures of a current quarter is influenced by contracts placed in the past eight quarters. The current quarter is significantly positive and contributes 26% and the rest is completed up to the eighth quarter. This displays the methods of payment followed in this program - a significant progress payment in the current quarter followed by other payments whenever production reaches an agreed stage.

c. Conclusion:

The significant impact on contracts starts six quarters after receiving contract demands and on expenditures, it starts in the current quarter when a contract is placed.

The influence cycle of the Ships program has twelve quarters between contract demands and contracts and eight quarters between contracts and expenditures - a total of twenty quarters, about five years. The two periods may be overlapping and, therefore, it may be better to conclude that the influence cycle of contract demands placed in a quarter may extend between fifteen to twenty quarters, i.e., three to five years.

5. TANK-AUTOMOTIVE-RAILWAY:

a. Contracts:

Contracts placed in a current quarter are influenced by ten past quarters of contract demands placed. While the current quarter is negative and insignificant, the first lagged quarter is significant and contributes about 8%. This is followed by insignificant and negative quarters up to the sixth. From the sixth quarter to the tenth, the contribution amounts to 80%.

b. Expenditures:

Expenditures in a current quarter is brought about by value of contract demands placed within the current and the four past quarters. The current quarter contributes significantly (about 13%) which indicates the progress payments involved. This is followed by cycles troughs and peaks. The quarters that contribute significantly are the third (11%) and the fourth (62%).

c. Conclusion:

The quarters that contribute significantly to contracts and expenditures are close. While in contract the first, sixth and eighth to tenth are significant, in expenditures the current, the third and the fourth are significant. Hence a progress payment is made and further payments are linked to stages of production.

The influence cycle from contract demands to expenditures in Tank-Automotive-Railway program is about fourteen quarters; however, the period of contract demands to contracts may be overlapping that of contracts to expenditures. It may be better to conclude, that the influence cycle of contract demands placed in a quarter may extend between ten to fourteen quarters, i.e., 2-1/2 to 3-1/2 years.

6. FUELS AND LUBRICANTS:

This program includes, mainly, high value contracts to supply these materials for an agreed period of one year or more.

a. Contracts:

Contracts placed in a current quarter are influenced by contract demands placed six quarters earlier. Past quarters that contribute most are the current (13%), second (24%), fifth (23%) and sixth (18%). The fifth and the sixth alone contribute 41%.

b. Expenditures:

Expenditures of a current quarter are influenced by contract placed nine quarters earlier. Past quarters that contribute most are the third (11%), fifth (17%), sixth (19%), seventh (18%) and ninth (17%). The fifth to seventh quarters contribute about 77%.

c. Conclusion:

The influence cycle of the Fuels and Lubricants program has seven quarters between contract demands and contracts and nine quarters between contracts and expenditures. However, the two periods are overlapping and therefore, we can say that the purchasing cycle is between six to nine quarters, i.e., 1-1/2 to 2-1/4 years.

7. CLOTHING AND EQUIPAGE

a. Contracts:

Contracts placed in a current quarter are influenced by contract demands placed six quarters earlier. The negative coefficients indicate that insignificant contribution of these quarters in terms of value of contracts to contract demands. The current (13%), the fifth (22%) and the sixth (30%) quarters contribute most.

b. Expenditures:

Expenditures of a current quarter are influenced by contracts placed during the past five quarters. There are five positive significant coefficients: the current, first, second, third and fifth quarters. The highest contribution is made by the fifth quarter (about 33%) and the second highest is the third quarter (23%).

c. Conclusion:

The influence cycle of the Clothing and Equipage program has six quarters from contract demands to contracts and five quarters from contracts to expenditures. The two periods are overlapping and, therefore, we can conclude that the influence cycle extends between five to eleven quarters.

8. FOOD AND SUBSISTENCE:

a. Contracts:

From the experiments performed the best distribution of lag is obtained with eleven quarters. However, the relationship of contract demands to contracts, in this program, is poor due to the fact that several contract demands are forwarded for action to the Regional Offices without adjusting the value of contract demands of this program. A wide gap is thus created and the relationship between the two variables is distorted. No adequate

conclusion can therefore be drawn, and no other method is used to obtain better results because the portion of this program out of the aggregate is insignificant.

b. Expenditures:

Expenditures of a current quarter is influenced by contracts placed during the past six quarters. There are six significant coefficients of regression and the sixth only is negative. The coefficients of the first quarter to the fifth contributed to 87% of the estimated expenditures.

c. Conclusion:

No conclusion can be drawn with regard to the period between contract demands and contracts. However, for the period between contracts and expenditures there is a time lag of six quarters.

9. CONSTRUCTION:

a. Contracts:

Contracts placed in a current quarter are influenced by value of contract demands submitted during the past six quarters. Five quarters contribute significantly, and only one of them is negative. The negative is the current quarter and this indicates that insignificant value of contracts are placed in the current quarter. The first and second quarters both contribute 29% of the value. However, 52% are contributed by the fifth (30%) and sixth (22%) quarters.

b. Expenditures:

Expenditures of a current quarter is influenced by value of contracts placed during the past four quarters. The quarters that contribute most are the current, first to the third. The main contribution is made by the first to the third quarter which amounts to 80%.

c. Conclusion:

1. Contracts of a current quarter are mainly influenced by contract demands placed during the past five quarters. On the other hand, expenditures of a current quarter are highly influenced by contracts placed during the second and fourth past quarters.

ii. The influence cycle of the Construction program has six quarters between contract demands and contracts and four quarters between contracts and expenditures, and since the two periods are overlapping, then the total cycle is between four to nine quarters, i.e., 1 to 2-1/4 years.

## 10. CONSTRUCTION EQUIPMENT

### a. Contracts:

This program includes tools and equipment rented to perform construction. The rent should be timed to the requirement of the construction project. This reason added to the procedure followed to procure this service competitively contributes to the fact that the early quarters lagged have insignificant contribution to the estimated value of contracts. The significant quarters are the sixth (35%) and seventh (49%).

### b. Expenditures:

Expenditures of a current quarter are influenced by value of contracts placed three quarters earlier. The quarters that contribute most are the current (30%) and the third (48%). The quarters in between have insignificant contribution.

### c. Conclusion:

i. In both contracts and expenditures the quarters that contribute more are the last lagged quarters.

ii. The influence cycle of the Construction Equipment program from contract demands to contracts is seven quarters and from contracts to expenditures three quarters. The two periods are overlapping, therefore, we can conclude that the total cycle is between seven to ten quarters, i.e., 1-3/4 to 2-1/2 years.

## 11. PRODUCTION EQUIPMENT

### a. Contracts:

This program has certain similarity with the Construction Equipment program. Here also the reaction of contract value of a current quarter to contract demands is spread over five lagged quarters. The quarters that contribute most are the fourth (20%) and fifth (43%).

b. Expenditures:

Expenditures of current quarter are influenced by value of contracts, placed two quarters earlier. The current quarter contributes 23%, the first lagged quarter 50% and the second 27%.

c. Conclusion:

The influence cycle of the Production Equipment program from contract demands to contracts is five quarters and from contracts to expenditures is two quarters, and since the two periods are overlapping, then the total cycle is between two to seven quarters, i.e., 1/2 to 1-3/4 years.

12. OTHER PROGRAMS

a. Contracts:

This program includes miscellaneous items placed by Head Office and that they cannot be classified under any other program. The low value of the coefficient of correlation of contract demands and contracts stems from reasons explained earlier, i.e., the way in which data are collected. Contracts of a current quarter are influenced by contract demands placed four quarters earlier. The quarters that contribute most are the third (21%) and the fourth (37%).

b. Expenditures:

Expenditures of a current quarter are influenced by value of contracts placed during the past five quarters. The quarters that contribute most are the third (38%) and the fifth (26%).

c. Conclusion:

The influence cycle of the Other program from contract demands to contracts is four quarters and from contracts to expenditures is five quarters, and since the two periods are overlapping, then the total cycle is between four to nine quarters, i.e., 1 to 2-1/4 years.

13. REGIONAL OFFICES

This program includes a variety of material whose contract value is mainly less than \$10,000.

a. Contracts:

Contracts of a current quarter are influenced by contract demands submitted during the past five quarters. The quarters that contribute most are the current, the fourth and the fifth. The current contributes 31%, the fourth 23% and the fifth 19%.

b. Expenditures:

Expenditures of a current quarter are influenced by value of contracts placed during the past four quarters. The quarters that contribute most are the second (36%) and the third (20%).

c. Conclusion:

The influence cycle of this program has five quarters between contract demands and contracts and four quarters between contracts and expenditures, but since the two are overlapping, then the total cycle is between five to nine quarters, i.e., 1-1/4 years to 2-1/4 years.

## XII CONCLUSIONS OF PART B

The following general conclusions can be derived from the analysis of the data:

1. Aggregating the predicted values of the individual programs (in contracts and expenditures) gives a high coefficient of correlation with the actual aggregates and a relatively small standard deviation (see Table 35 Appendix B). The model, therefore, can be used for forecasting contracts from value of contract demands and expenditures from value of contracts.
2. Contracts placed in any quarter are generated by contract demands placed several quarters earlier and, likewise, expenditures in any quarter are generated by contracts placed several quarters earlier. The number of past quarters involved differs from one program to another, and the quarter influence differs from one quarter to another.

The influence of time by quarter and the magnitude of the influence can be analyzed to give policy planners some indication about expected results of their policies. For example:

a. If an expected quarterly value of contract demands of the Aircraft program is \$100 million, then contracts placed against it are likely to be distributed as follows:

- 13% during current quarter
- 35% will be carried over to the fourth and fifth quarters
- 16% will be carried over to the eighth quarter

The influence of this purchasing on the economy is distributed accordingly.

These indicators also associate with the efforts invested in placing a contract, because the longer the time lapse between contract demands and contracts placed, the greater the effort required from the buyer to purchase this type of material.

b. If the expected quarterly value of contracts of the Aircraft program is \$100 million, then expenditures against it may be distributed as follows:

- 12% during current quarter
- 38% will be carried over to the third and fourth quarters
- 24% will be carried over to the seventh quarter

The influence of this value of contracts on Federal Defence expenditures is distributed accordingly.

The distribution indicates also the administrative efforts required in placing a contract and follow through to completion of delivery, such as inspection, monitoring stages of production, quality control, design changes, etc.

Similar conclusions can be drawn on the basis of findings for the remaining programs. A policy planner can use the results to anticipate the effects of shifting value of contract demands and contracts in going from one program to another.

In summary, the model was able to predict the behaviour of DDP activity for both the placing of contracts and the need for providing for expenditures during 1950-1967. This point is reflected in the graphs showing the actuals and estimated values of contracts and expenditures (see Fig. 13 for total quarterly value and Figs. 14-26 for quarterly value of individual programs). From Figures 13 (a) and (b), it can be observed that the estimated values were close to actual values in most of the periods, with the exception of 1966 to 1967 where the estimated values diverged because of a new policy adopted by DND which was based on the Defence White Paper of 1964. A ceiling of \$1.8 billion was established for total defence expenditures, and that influenced the appropriations for defence equipment purchased through DDP.

In general, the model achieved satisfactory predictions for the aggregate quarterly values even though the data were not seasonally adjusted. However, for the individual programs, the  $\bar{R}^2$  was rather low and the model requires slight change. Finer results could be obtained with the use of seasonally adjusted data by means of dummy variables.

### XIII CONCLUSIONS OF THE THESIS

The Department of Defence Production main function was purchasing goods and related services on behalf of the Department of National Defence - a function similar to a commercially oriented corporation which studies its share of the market, its influence on suppliers and customers and forecasts its purchasing activity for short and long terms.

Since 1951, substantial funds had been committed to implement defence programs and purchase a variety of goods and related services. The thesis evaluated DDP purchasing functions both qualitatively and quantitatively. The interrelationships were developed for the value of DDP purchases for the period under review (1950-1968), their share of the National Accounts Component, their influence on the economy and other problems related to procurement of defence material. A distributed lag model was developed to explain patterns of purchasing for groups of commodities. The analysis points out a number of findings:

1. Funds committed for defence purchases were substantial during the early 1950's but declined sharply during the 1960's. The model indicated that wide fluctuations in defence purchases were related to international military situations.
2. More than two thirds of the funds were expended for military equipment and ensures mobility in time of emergency. The Canadian industries that are influenced most by this policy are the Aircraft, Communications and Shipbuilding and since these industries are primarily located in Quebec and Ontario, it followed that these two provinces received most of the value of contracts placed.

It is recommended that the model of the thesis be used to study the influence of DDP purchases by locality even on industries that are least affected by procurement program purchases.

Inconclusive conclusions can be drawn with regard to the level or type of employment generated by DDP purchases. Analogous study shows that a rough estimate of 90,000 jobs are affected by DDP purchases. Another study shows that employment in the Atlantic regions is affected by defence expenditures more than other regions in Canada. In the United States, a study reveals the high ratio of professional and highly skilled labour employed in defence oriented industry.

3. The defence of a country requires the diversion of resources from civilian to defence projects and the establishment of a defence industrial complex to ensure a reliable source of material in time of emergency. The government may even require to regulate the economy as a means to achieve military victory.

4. The economic policy found appropriate for the arms race is an overall plan to maintain a high standard of living while meeting the defence production target. In other words, a basic economic expansion in building the industrial raw material and agricultural capacity required by both military and civilian production.

5. The purchase of weapons is performed on a non-competitive basis since there are few suppliers and the government is the sole buyer. In this case, the government has to plan a purchasing and expenditure policy in dealing with suppliers, investigating costs, profits and in establishing purchasing procedures.

6. The distributed lag model applied to the data yield better results through disaggregating the quarterly values into components and dealing with each component in accordance with its purchasing specifics. These components are the procurement programs of DDP and their purchasing problems differ from one to another and as such, the number of lagged quarters differs from one program to another. Additional administrative efforts are required, in the purchasing process for programs with long lags.

7. The model was able to predict, on a quarterly basis, the value of contracts placed from lagged value of contract demands and expenditures made from lagged value of contracts. For prediction of quarterly totals the model achieved satisfactory results. For the individual programs, however, the model requires further adjustments. The model shows the lagged quarters of the independent variables that contribute to the dependent variables. With the exception of extreme cases, the range of lagged quarters in contracting and expenditures activity for military equipment program is between eight to fifteen quarters. Similarly, in the eight subordinate programs the lag range is between four to ten quarters.

The thesis used mostly published data. There is no doubt that finer results could be achieved if the data for financial terms and for detailed classes of material were in the public domain. Finer details to develop the relationship for contracts and expenditures still would be necessary to relate defence contracts placed in other countries and to chart the inter-industry flow of defence goods by goods Vs. services and include Canadian province of origin.

These details could expand the qualitative and the quantitative evaluation of the thesis and give a wider picture of the economic impact of DDP procurement in Canada.

The distributed lag model used in this thesis explains in general terms the lags of contracts and expenditures for military equipment program. The results can provide a priori information to use in a more sophisticated lag model such as the Almon technique or even to use a number of models, compare the results and chose the appropriate one.

In summary, the constraints in the availability of detail in the data of this thesis are a handicap in expanding the meaningful analysis performed.

APPENDIX "A"

DEFINITIONS OF TERMS AND SOURCE OF DATA

## APPENDIX "A"

### DEFINITION OF TERMS AND SOURCE OF DATA

#### I DEFINITION OF TERMS

##### Contract:

A deliberate agreement between two or more competent persons to perform or not to perform a specific act or acts. A contract can be let for the supply of articles, commodities, equipment, goods, materials or supplies, furnishings or performance of service, construction or repair of a work, leasing or a license to occupy, etc.

##### Contract Amendment:

A negotiated change to the terms, conditions or performance required under a contract or a correction or clarification. Value of contract amendments can be positive or negative to increase or decrease value of original contract or no change in value.

##### Contract Demand:

A document which requests the Department of Defence Production to obtain materiel or services on behalf of the Department of National Defence and which authorizes the commitment of funds to cover the purchase.

(The above three definitions are based on Glossary of Materiel Management Terminology - Treasury Board, Queens Printer, Ottawa, March 1968).

##### CCC:

Canadian Commercial Corporation.

##### DDP:

Department of Defence Production.

DND:

Department of National Defence.

Expenditures:

Payment against contracts placed after delivery of materiel or at any other time agreed upon by contracting parties.

NATO:

North Atlantic Treaty Organization.

Procurement Programs (4-1964):

This classification related all procurement, insofar as possible, to readily identifiable end-items of military and other hardware, such as ships, electronic devices, guns, types of ammunition, clothing, etc. Thus a particular program includes, in addition to the end-item, those components or parts that become an integral part of the equipment, as well as the associated services such as design and development, installation, maintenance, and repair and overhaul.

The following are the programs by which data are classified:

**Aircraft:**

Includes complete aircraft and items to be physically incorporated into complete aircraft, such as airframes, engines, propellers, navigational and flight instruments, electrical systems and their components. Design and development services, maintenance, and repair and overhaul of aircraft are included also.

Excluded are specialized accessories such as armament and communication equipment, photographic equipment, training devices and ground support equipment and associated services.

**Armament:**

Includes projects involving weapons such as small arms, guns, howitzers and their components; light, medium and heavy ammunition of all types; mines, depth charges and torpedoes; rockets, missiles and their launchers; and explosives and certain defence chemicals.

Excluded are electronic fire control projects.

#### Electronics and Communications:

Includes electronics and communication equipment projects of all types. Telephone, telegraph, radio, radar, underwater sound, fire control, flight and tactics simulation, and test equipment are included. Development, maintenance, management and transport services associated with the procurement of electronics and communication equipment are also included.

Excluded are photographic equipment and navigational and flight instrument projects.

#### Ships:

Includes destroyer escorts, frigates, minesweepers, aircraft carriers, submarines, other floating equipment and ship components such as hulls, superstructures, propulsion machinery, boilers, condensers, heating and electrical systems, etc., as well as reconversion, refit and repair projects.

Excluded are armament and electronic equipment projects.

#### Tank-Automotive-Railway:

Includes tanks and vehicles and railways of both armoured and non-armoured types and the associated services of development, maintenance and repair overhaul. Cars, trucks, buses and components, such as tires and tubes are also included.

Excluded are armament and electronic equipment projects.

#### Fuels and Lubricants:

Includes supplies and services of petroleum, gas, coal and coke and their products; principally aviation turbine fuel and gasoline, motor vehicles gasoline and heating fuels.

#### Clothing and Equipment:

Includes items of personal clothing, footwear and equipment such as mess kits, steel helmets, tents, etc.

Excluded are protective and life saving equipment projects.

**Food and Subsistence:**

Includes all projects involving the supply of food, beverages and tobacco.

**Construction:**

This program includes all construction contracts for building structures, runways, etc., as well as for consultant services, repair and maintenance.

**Construction Equipment:**

Includes all purchased building supplies and equipment to be physically incorporated in structures and facilities, construction machinery, mining machinery and all equipment necessary to build a structure or facility.

Excluded are production machinery and conveying, elevating and materials handling equipment projects.

**Production Equipment:**

Includes metal working machinery, special and general purpose industrial machinery, trade and service industry equipment, agricultural machinery, etc.

Excluded are projects involving mobile equipment, generator sets, office machinery and equipment, protective and life saving equipment, transportation equipment and conveying, elevating and material handling equipment.

**Other Programs:**

Includes contracts for materials that are not classified by any of the above programs, such as: medical and dental supplies, office supplies and stationery, office equipment and machines, office furniture, chemicals, protective equipment, home-type electrical appliances, certain fabricated and crude materials, primary metal products, etc., as well as the services associated with the supply of these products.

**Regional Offices in Canada:**

These offices handle the purchasing of miscellaneous

of-the-shelf commodities required by the Department of National Defence in that region, such as fresh fruits and vegetables, dairy produce, etc.

## II SOURCE OF DATA

As mentioned earlier, the Economics and Statistic Branch was assigned the function to compile and analyze statistical data related to the general activity of the department. The branch reported on this activity in the Departmental Annual Report, Canada Year Book and other types of reporting for internal circulation only. In these sources, the annual value of DND contracts and expenditures are broken by homogeneous groups called DDP Procurement Programs. These programs are similar to those used in the statistical reports of the Department of Defence of the United States.

For the analysis of this study quarterly data are more appropriate. A special permit was received from the office to break down the annually published data into quarters and to use also quarterly data of DND Contract Demands.

The compiled quarterly values (1 and 2, 1951-1968) are rounded to millions of dollars and checked against the annual values published in the Departmental Annual Reports. They are tabulated in three tables and the following are some explanations for these tables:

1. Though DDP was officially established on April 1, 1951, data in these tables are extended back to include January-March 1950 to January-March 1951. Although procurement of this period was performed by the Department of Trade and Commerce, yet it was transferred to DDP for completion and, therefore, has some contribution to DDP activity for a considerable time.

2. Data on DND expenditures against contracts placed by DDP are available up to January-March 1968. After this period, it was impossible to identify this type of expenditure from total DND expenditures. For all procurement programs expenditures are available for the period between January-March 1950 to January-March 1968, with the exception of the following two programs:

- a. Construction Program:

- Data are available from January-March 1950 until January-March 1965 when the function of Defence Construction was officially transferred to the Department of National Defence.

- b. Regional Purchasing Offices:

- Data are available from April-June 1951 when these offices were established.

3. Data on the value of Contract Demands and Contracts are available from January-March 1950 to October-December 1968 for all procurement programs except for construction programs and regional offices programs for the same reasons mentioned in Item (2) above.

4. For the distribution of lag and for building the prediction model the period covered is as follows:

a. For construction program the period extends from January-March 1950 to January-March 1965, hence, 61 quarters.

b. For regional purchasing offices the periods extends from April-June 1951 to January-March 1968, hence, 64 quarters.

c. For the rest of the programs, the period extends from January-March 1950 to January-March 1968, hence 73 quarters.

APPENDIX "B"

TABLES AND CHARTS

APPENDIX "B"

TABLES AND CHARTS FOR

(1) A GENERAL DESCRIPTION

TABLE 1 : COMPARATIVE HIGHLIGHTS

SELECTED INDICATORS	1952	1962	1966	1967
	%	%	%	%
<b>A. <u>DDP PURCHASINGS FOR DND AS % OF :</u></b>				
1. GNP	4.7	1.5	0.8	0.8
2. TOTAL GOVERNMENTS EXPENDITURES (ALL LEVELS) <sup>(a)</sup>	16.8	4.3	2.4	2.2
3. FEDERAL EXPENDITURES	25.7	8.2	5.0	4.6
4. GOV'TS EXPENDITURES ON GOODS (ALL LEVELS) <sup>(a)</sup>	41.1	15.7	8.1	7.8
5. FEDERAL EXPENDITURES ON GOODS	65.4	44.2	26.6	25.6
6. TOTAL EXPENDITURES ON DEFENCE	62.6	36.1	28.3	27.7
7. TOTAL EXPENDITURES ON DEFENCE GOODS	73.6	55.5	44.5	45.4
<b>B. <u>TOTAL DEFENCE EXPENDITURES .</u></b>				
1. AS % OF GNP	7.5	4.1	2.9	2.9
2. AS % OF GOV'TS EXPENDITURES (ALL LEVELS) <sup>(a)</sup>	26.9	12.2	8.4	7.8
3. AS % OF FEDERAL EXPENDITURES	41.2	22.7	17.7	16.6
4. PER CAPITA (TOTAL POPULATION) <sup>(d)</sup>	\$ 124	\$ 91	\$ 86	\$ 89
5. PER CAPITA (ARMED FORCES) <sup>(c)</sup> <sup>(d)</sup>	\$ 18,367	\$ 13,884	\$ 16,123	\$ 17,028

(a) INCLUDES MUNICIPAL, PROVINCIAL, AND FEDERAL GOVERNMENTS

(b) SOURCE DBS PUBLICATION - NATIONAL ACCOUNTS AND LABOUR FORCE FOR ALL DATA, IN THIS TABLE, EXCEPT (C) BELOW. (5-APPEND.

(c) BANK OF CANADA STATISTICAL SUMMARY, '81D DEPT. OF NATIONAL DEFENCE.

(d) IN CURRENT DOLLARS

FIG. 1

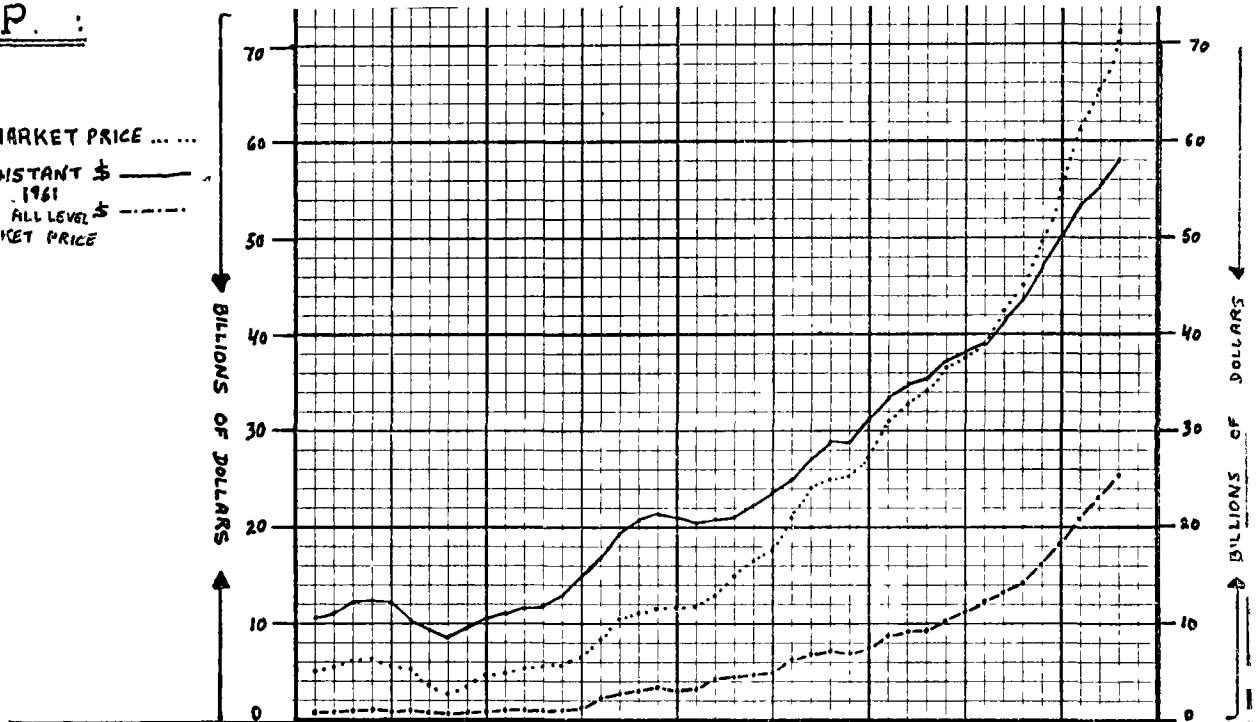
# GNP & GOVERNMENTS' EXPENDITURES

AS PERCENT OF GNE

— 1926 - 1968 —

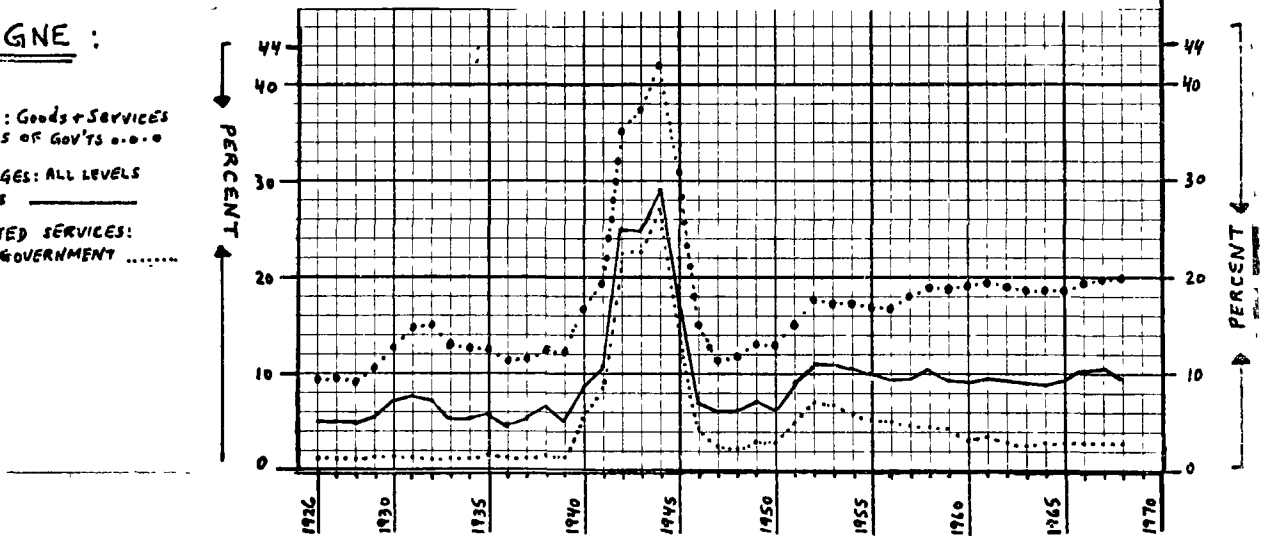
## GNP. :

GNP AT MARKET PRICE .....  
 " " CONSTANT \$ 1961 .....  
 GOVTS EXPEND. ALL LEVEL \$ AT MARKET PRICE .....



## % OF GNE :

EXPENDITURES: Goods + Services ALL LEVELS OF GOVTS .....  
 SALARIES + WAGES: ALL LEVELS OF GOVTS .....  
 Goods + RELATED SERVICES: FEDERAL GOVERNMENT .....



SOURCE : DBS - NATIONAL ACCOUNTS ( 5 APPENDIX "C" )

TABLE 2(a) HISTORICAL SERIES OF GNP AND GOVERNMENTS EXPENDITURES

CANADA, 1926 - 1968

(IN MILLIONS OF DOLLARS)

YEAR	GNP	ALL LEVELS				FEDERAL			PROVINCIAL			MUNICIPAL		
		TOTAL EXPEND.	SALARIES + GOODS	SALARIES	GOODS	SALARIES + GOODS	SALARIES	GOODS	SALARIES + GOODS	SALARIES	GOODS	SALARIES + GOODS	SALARIES	GOODS
1926	5,152	839	488	245	243	121	72	49	89	45	44	278	128	150
7	5,549	889	531	261	270	133	76	57	99	51	48	299	134	165
8	6,046	932	560	276	284	138	80	58	118	57	61	304	139	165
9	6,134	1,027	640	295	345	159	85	74	137	65	72	344	145	199
30	5,728	1,155	721	317	404	172	91	81	162	73	89	387	153	234
1	4,699	1,220	688	317	371	147	84	63	156	79	77	385	154	231
2	3,827	1,138	584	294	290	119	76	43	128	68	60	337	150	187
3	3,510	1,020	462	264	198	115	72	43	97	55	42	250	137	113
4	3,984	1,122	503	282	221	127	76	51	129	71	58	247	135	112
5	4,315	1,172	542	287	255	159	82	77	136	66	70	247	139	108
6	4,653	1,187	544	294	250	153	82	71	138	70	68	253	142	111
7	5,257	1,279	619	312	307	151	86	65	202	81	121	266	145	121
8	5,278	1,343	666	336	330	176	88	88	218	97	121	272	151	121
9	5,636	1,288	683	361	322	213	122	91	189	83	106	281	156	125
40	6,743	1,755	1,116	542	574	680	305	375	155	78	77	281	159	122
1	8,328	2,286	1,635	747	888	1,187	505	682	164	81	83	284	161	123
2	10,327	4,493	3,674	1,063	2,611	3,235	813	2,422	148	83	65	291	167	124
3	11,088	5,164	4,177	1,383	2,794	3,718	1,113	2,605	155	92	63	304	178	126
4	11,850	6,147	4,978	1,568	3,410	4,470	1,277	3,193	172	99	73	336	192	144
5	11,838	5,203	3,656	1,652	2,004	3,097	1,337	1,760	198	108	90	361	207	154
6	11,850	3,952	1,796	953	843	1,077	586	491	283	130	153	436	237	199
7	13,165	3,416	1,541	746	795	629	327	302	382	150	232	530	269	261
8	15,120	3,580	1,797	851	946	673	349	324	467	182	285	657	320	337
9	15,095	4,078	2,127	987	1,140	870	434	436	510	196	314	747	357	390
50	18,006	4,233	2,344	1,067	1,277	977	471	506	535	213	322	832	383	449
1	21,170	5,243	3,271	1,290	1,981	1,702	614	1,088	631	241	390	938	435	503
2	23,995	6,686	4,279	1,540	2,739	2,489	766	1,723	724	278	446	1,066	496	570
3	25,020	7,025	4,432	1,700	2,732	2,559	856	1,703	695	295	400	1,178	549	629
4	24,871	7,280	4,461	1,912	2,549	2,449	986	1,463	747	320	427	1,265	606	659

TABLE 2(a) CONT.

YEAR	GNP	ALL LEVELS				FEDERAL			PROVINCIAL			MUNICIPAL		
		TOTAL EXPEND.	SALARIES + GOODS	SALARIES	GOODS	SALARIES + GOODS	SALARIES	GOODS	SALARIES + GOODS	SALARIES	GOODS	SALARIES + GOODS	SALARIES	GOODS
1955	27,132	7,730	4,780	2,073	2,707	2,498	1,056	1,442	842	351	491	1,440	666	749
6	30,585	8,474	5,266	2,278	2,988	2,671	1,153	1,518	1,051	384	664	1,544	738	806
7	31,909	9,174	5,738	2,561	3,177	2,727	1,286	1,441	1,149	438	711	1,862	837	1,025
8	32,894	10,408	6,161	2,800	3,361	2,849	1,380	1,469	1,274	501	773	2,038	919	1,119
9	34,915	11,239	6,490	3,027	3,463	2,832	1,390	1,442	1,349	557	792	2,309	1,080	1,229
60	36,287	12,112	6,769	3,270	3,499	2,730	1,446	1,284	1,465	615	850	2,574	1,209	1,365
1	37,471	13,232	7,236	3,596	3,640	2,982	1,574	1,408	1,467	654	813	2,787	1,368	1,419
2	40,575	14,200	7,717	3,849	3,868	3,025	1,650	1,375	1,563	702	861	3,129	1,497	1,632
3	43,424	14,887	8,075	4,104	3,971	2,934	1,719	1,215	1,725	757	968	3,416	1,628	1,788
4	47,393	15,970	8,654	4,369	4,285	3,046	1,770	1,276	1,929	826	1,103	3,679	1,773	1,906
5	52,203	17,677	9,596	4,682	4,914	3,267	1,843	1,424	2,234	911	1,323	4,095	1,928	2,167
6	58,104	20,375	11,286	5,286	6,000	3,920	2,100	1,820	2,663	1,052	1,611	4,703	2,134	2,569
7	62,109	23,161	12,377	5,921	6,456	4,259	2,308	1,951	3,015	1,241	1,774	5,103	2,372	2,731
8	67,368	25,748	13,329	6,654	6,675	4,475	2,477	1,998	3,229	1,406	1,823	5,625	2,771	2,854

SOURCE : DBS - NATIONAL ACCOUNTS - 5 APPEND. "C".

TABLE 2(b) GOVERNMENTS EXPENDITURES AS % OF GNP  
CANADA, 1926 - 1968

( IN MILLIONS OF DOLLARS )

YEAR	GNP	ALL LEVELS				FEDERAL			PROVINCIAL			MUNICIPAL		
		TOTAL EXPEND.	SALARIES + GOODS	SALARIES	GOODS	SALARIES + GOODS	SALARIES	GOODS	SALARIES + GOODS	SALARIES	GOODS	SALARIES + GOODS	SALARIES	GOODS
1926	100.0	16.3	9.5	4.7	4.8	2.4	1.4	1.0	1.7	0.8	0.9	5.4	2.5	2.9
7	100.0	16.0	9.6	4.7	4.9	2.4	1.4	1.0	1.8	0.9	0.9	5.4	2.4	3.0
8	100.0	15.4	9.3	4.6	4.7	2.3	1.3	1.0	2.0	1.0	1.0	5.0	2.3	2.7
9	100.0	16.7	10.4	4.8	5.6	2.6	1.4	1.2	2.2	1.0	1.2	5.6	2.4	3.2
30	100.0	20.2	12.6	5.5	7.1	3.0	1.6	1.4	2.8	1.2	1.6	6.8	2.7	4.1
1	100.0	26.0	14.6	6.8	7.8	3.1	1.8	1.3	3.3	1.7	1.6	8.2	3.3	4.9
2	100.0	29.7	15.2	7.6	7.6	3.1	2.0	1.1	3.3	1.7	1.6	8.8	3.9	4.9
3	100.0	29.1	13.2	7.6	5.6	3.3	2.1	1.2	2.8	1.6	1.2	7.1	3.9	3.2
4	100.0	28.2	12.6	7.0	5.6	3.2	1.9	1.3	3.2	1.7	1.5	6.2	3.4	2.8
5	100.0	27.2	12.6	6.7	5.9	3.7	1.9	1.8	3.2	1.6	1.6	5.7	3.2	2.5
6	100.0	25.5	11.7	6.3	5.4	3.3	1.8	1.5	3.0	1.5	1.5	5.4	3.0	2.4
7	100.0	24.3	11.8	6.0	5.8	2.9	1.7	1.2	3.8	1.5	2.3	5.1	2.8	2.3
8	100.0	25.4	12.6	6.3	6.3	3.3	1.6	1.7	4.1	1.8	2.3	5.2	2.9	2.3
9	100.0	22.8	12.1	6.4	5.7	3.7	2.1	1.6	3.4	1.5	1.9	5.0	2.8	2.2
40	100.0	26.0	16.6	8.1	8.5	10.1	4.5	5.6	2.3	1.2	1.1	4.2	2.4	1.8
1	100.0	27.4	19.6	8.9	10.7	14.2	6.0	8.2	2.0	1.0	1.0	3.4	1.9	1.5
2	100.0	43.5	35.6	10.3	25.3	31.3	7.8	23.5	1.5	0.9	0.6	2.8	1.6	1.2
3	100.0	46.5	37.7	12.5	25.2	33.6	10.1	23.5	1.4	0.8	0.6	2.7	1.6	1.1
4	100.0	51.8	42.0	13.3	28.7	37.7	10.8	26.9	1.5	0.9	0.6	2.8	1.6	1.2
5	100.0	43.9	30.9	13.9	17.0	26.1	11.2	14.9	1.7	0.9	0.8	3.1	1.8	1.3
6	100.0	33.3	15.2	8.1	7.1	9.1	5.0	4.1	2.4	1.1	1.3	3.7	2.0	1.7
7	100.0	25.9	11.7	5.6	6.1	4.8	2.5	2.3	2.9	1.1	1.8	4.0	2.0	2.0
8	100.0	23.7	11.9	5.7	6.2	4.5	2.4	2.1	3.1	1.2	1.9	4.3	2.1	2.2
9	100.0	27.0	13.0	5.4	7.6	5.3	2.4	2.9	3.1	1.0	2.1	4.6	2.0	2.6
50	100.0	23.5	13.0	5.9	7.1	5.4	2.6	2.8	3.0	1.2	1.8	4.6	2.1	2.5
1	100.0	24.7	15.5	6.2	9.3	8.1	3.0	5.1	3.0	1.2	1.8	4.4	2.0	2.4
2	100.0	27.8	17.8	6.3	11.5	10.4	3.2	7.2	3.0	1.1	1.9	4.4	2.0	2.4
3	100.0	28.0	17.7	6.8	10.9	10.2	3.4	6.8	2.8	1.2	1.6	4.7	2.2	2.5
4	100.0	29.3	17.9	7.7	10.2	9.8	3.9	5.9	3.0	1.3	1.7	5.1	2.5	2.6

TABLE 2(b) : CONT.

YEAR	GNP	ALL LEVELS				FEDERAL			PROVINCIAL			MUNICIPAL		
		TOTAL EXPEND.	SALARIES + GOODS	SALARIES	GOODS	SALARIES + GOODS	SALARIES	GOODS	SALARIES + GOODS	SALARIES	GOODS	SALARIES + GOODS	SALARIES	GOODS
1955	100.0	28.4	17.6	7.6	10.0	9.2	3.9	5.3	3.1	1.3	1.8	5.3	2.4	2.9
6	100.0	27.6	17.5	7.7	9.8	8.9	3.9	5.0	3.5	1.3	2.2	5.1	2.5	2.6
7	100.0	28.7	18.0	8.1	9.9	8.6	4.1	4.5	3.6	1.4	2.2	5.8	2.6	3.2
8	100.0	31.6	18.7	8.5	10.2	9.6	4.1	4.5	3.9	1.6	2.3	6.2	2.8	3.4
9	100.0	32.1	18.6	8.7	9.9	8.1	4.0	4.1	3.9	1.6	2.3	6.6	3.1	3.5
60	100.0	33.3	18.7	9.1	9.6	8.1	4.6	3.5	3.9	1.6	2.3	6.7	2.9	3.8
1	100.0	35.2	19.4	9.6	9.8	8.0	4.2	3.8	3.9	1.7	2.2	7.5	3.7	3.8
2	100.0	34.9	19.0	9.5	9.5	7.4	4.0	3.4	3.9	1.8	2.1	7.7	3.7	4.0
3	100.0	34.2	18.6	9.5	9.1	6.7	3.9	2.8	4.0	1.8	2.2	7.9	3.8	4.1
4	100.0	33.7	18.3	9.3	9.0	6.4	3.7	2.7	4.1	1.8	2.3	7.8	3.8	4.0
5	100.0	33.8	18.5	9.1	9.4	6.3	3.6	2.7	4.3	1.8	2.5	7.9	3.7	4.2
6	100.0	35.0	19.4	9.1	10.3	6.7	3.6	3.1	4.6	1.8	2.8	8.1	3.7	4.4
7	100.0	37.3	19.9	9.5	10.4	6.9	3.8	3.1	4.9	2.0	2.9	8.1	3.7	4.4
8	100.0	38.1	19.8	9.9	9.9	6.6	3.6	3.0	4.8	2.1	2.7	8.4	4.2	4.2

SOURCE : SEE TABLE 2(a)

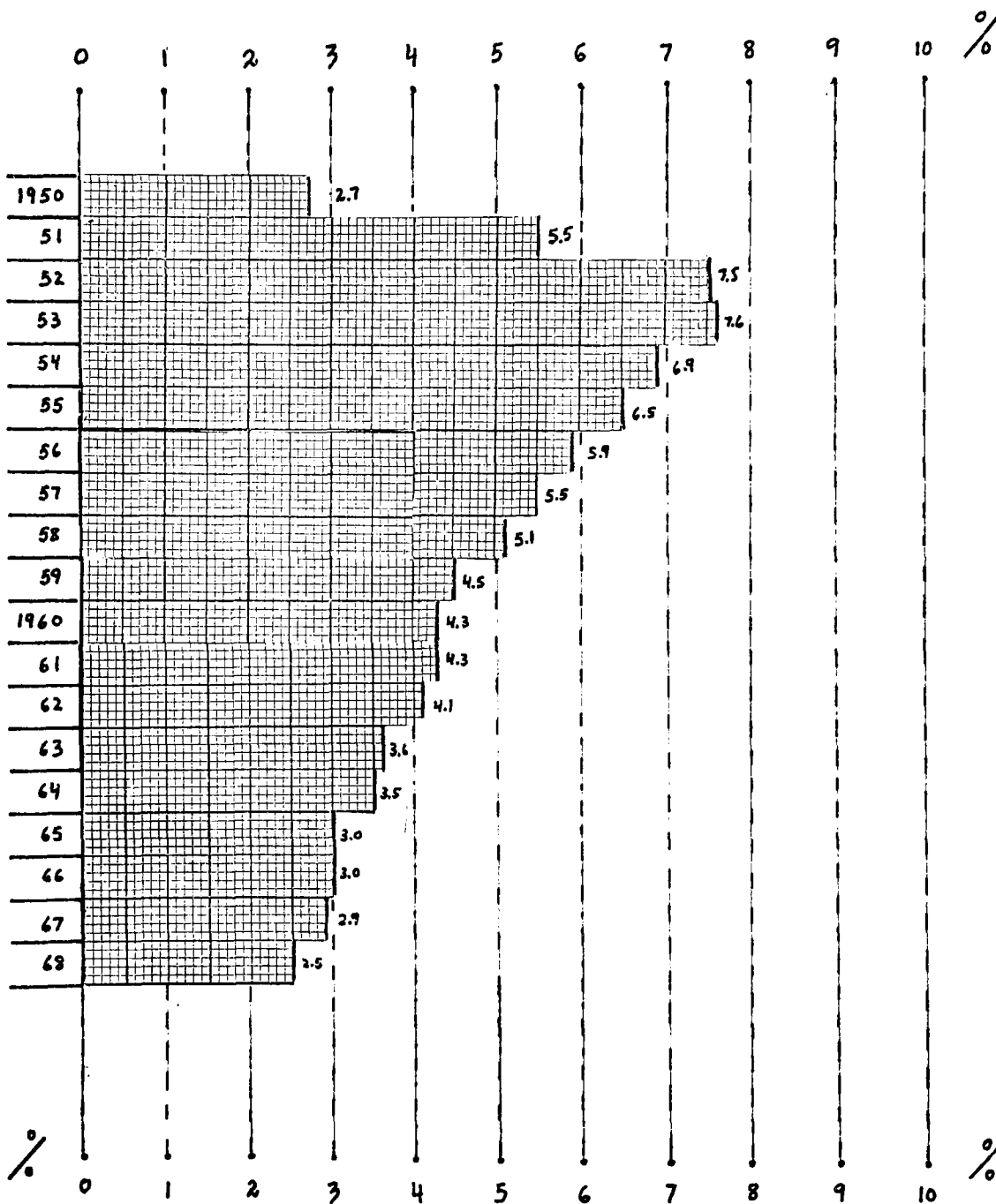
FIG. 2 DEFENCE EXPENDITURES AS A PROPORTION OF GNP

(a) SELECTED COUNTRIES, 1962

(b) CANADA 1950 - 1968

# FIG. 2 (b) DEFENCE EXPENDITURES AS A PROPORTION OF GNP

CANADA, 1950 - 1968  
 = PER CENT =

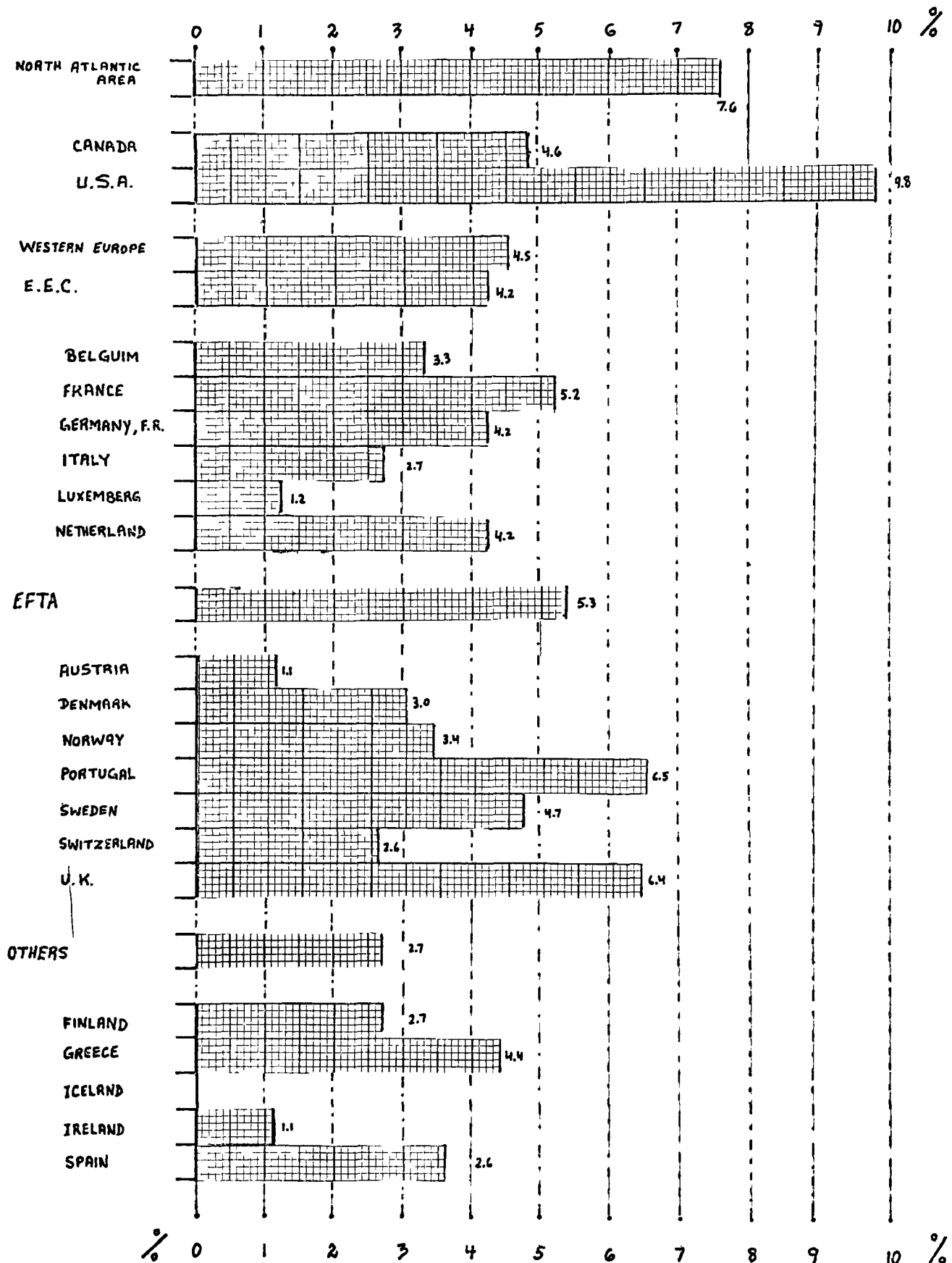


SOURCE - TABLE 3(b)

FIG. 2 (a) DEFENCE EXPENDITURES AS A PROPORTION OF GNP

SELECTED COUNTRIES, 1962

= PER CENT =



SOURCE - TABLE 3(a)

TABLE 3(a): GNP COMPONENTS OF SELECTED COUNTRIES, 1962

(IN MILLIONS OF U.S. DOLLARS)

COUNTRY	GNP	PRIVATE CONSUMPTION		PUBLIC CONSUMPTION EXPENDITURES						BUSINESS GROSS FIXED CAPITAL FORMATION		OTHERS	
		U.S. DOLLARS	%	TOTAL		DEFENCE		OTHERS	U.S. \$	%	U.S. \$	%	
				U.S. \$	%	U.S. \$	%						
NORTH ATLANTIC AREA	971,157	608,528	62.7	168,603	17.4	73,216	7.6	45,387	178,589	18.4	+ 15,437	+1.5	
CANADA	37,332	23,834	63.8	5,541	14.9	1,704	4.6	3,837	8,008	21.5	- 51	-0.2	
U.S.A.	556,190	348,822	62.7	107,675	19.4	54,673	9.8	53,002	89,312	16.1	+ 10,381	+1.8	
WESTERN EUROPE	377,635	235,872	62.9	55,387	14.7	16,839	4.5	38,548	81,269	21.5	+ 5,107	+6.1	
EEC	226,223	137,932	61.0	32,170	14.2	9,494	4.2	22,676	51,645	22.8	+ 4,476	+2.0	
BELGIUM	12,743	8,655	67.9	1,591	12.5	414	3.3	1,177	2,400	18.8	+ 97	+8.0	
FRANCE	71,631	46,557	65.0	9,517	13.3	3,708	5.2	5,809	14,052	19.6	+ 1,505	+2.1	
GERMANY, F.R.	88,700	50,950	57.4	13,225	14.9	3,740	4.2	9,485	22,508	25.4	+ 2,017	+2.3	
ITALY	39,509	23,886	60.5	5,842	14.8	1,079	2.7	4,763	9,354	23.7	+ 427	+10.0	
LUXEMBERG	507	294	58.0	51	10.1	6	1.2	45	127	25.1	+ 35	+6.8	
NETHERLANDS	13,133	7,590	57.8	1,944	14.8	547	4.2	1,397	3,204	24.4	+ 395	+3.0	
EFTA	126,845	80,991	63.9	20,684	16.3	6,680	5.3	14,004	24,291	19.2	+ 879	+0.6	
AUSTRIA	7,190	4,427	61.6	935	13.0	80	1.1	855	1,627	22.6	+ 201	+12.8	
DENMARK	7,361	4,907	66.7	992	13.5	217	3.0	775	1,517	20.6	- 55	-0.8	
NORWAY	5,180	3,070	59.3	790	15.3	177	3.4	613	1,556	30.1	- 236	-4.1	
PORTUGAL	2,722	1,929	70.9	414	15.2	177	6.5	237	475	17.4	- 96	-3.5	
SWEDEN	14,543	8,533	58.7	2,644	18.2	680	4.7	1,964	3,233	22.2	+ 133	+0.9	
SWITZERLAND	10,783	6,597	61.2	1,175	10.9	276	2.6	899	2,981	27.7	+ 30	+0.1	
U.K.	79,066	51,528	65.2	13,734	17.4	5,073	6.4	8,661	12,902	16.3	+ 902	+1.1	
OTHER	24,567	16,949	69.0	2,533	10.3	665	2.7	1,868	5,333	21.7	- 248	-1.0	
FINLAND	5,320	3,050	57.3	753	14.2	142	2.7	611	1,560	29.3	- 43	-0.8	
GREECE	3,921	2,851	72.7	495	12.7	171	4.4	324	862	22.0	- 287	-7.4	
ICELAND	263	169	64.3	22	8.4	-	-	22	66	25.1	+ 6	+2.2	
IRELAND	2,131	1,585	74.4	255	12.0	22	1.1	233	333	15.6	- 42	-2.0	
SPAIN	12,932	9,294	71.9	1,008	7.8	(330)	2.6	(678)	2,512	19.4	+ 118	+0.9	

SOURCE: 9 APPEND "C". P-66-67

TABLE 3(b) GROSS NATIONAL EXPENDITURES BY COMPONENTS  
 CANADA, 1950-1968  
 (IN MILLIONS OF CURRENT DOLLARS)

YEAR	GNE	PRIVATE CONSUMPTION		PUBLIC CONSUMPTION EXPENDITURES					BUSINESS GROSS FIXED CAPITAL FORMATION		OTHERS	
		DOLLARS	%	TOTAL		DEFENCE		OTHERS	DOLLARS	%	DOLLARS	%
				DOLLARS	%	DOLLARS	%					
1950	18,006	12,026	66.8	2,344	13.0	493	2.7	1,851	3,348	18.6	+288	+1.6
1	21,170	13,460	63.6	3,271	15.5	1,157	5.5	2,114	3,959	18.7	+480	+2.2
2	23,995	14,781	61.6	4,279	17.8	1,800	7.5	2,479	4,451	18.5	+484	+2.1
3	25,020	15,592	62.3	4,432	17.7	1,907	7.6	2,525	4,998	20.0	-2	*
4	24,871	16,175	65.1	4,461	17.9	1,727	6.9	2,734	4,779	19.2	-544	-22.0
5	27,132	17,389	64.1	4,792	17.6	1,760	6.5	3,032	5,210	19.2	-259	-0.9
6	30,585	18,833	61.6	5,386	17.5	1,802	5.9	3,584	6,774	22.2	-408	-1.3
7	31,909	20,072	62.9	5,722	18.0	1,765	5.5	3,957	7,335	23.0	-1,220	-3.9
8	32,894	21,245	64.6	6,180	18.7	1,661	5.1	4,519	6,975	21.2	-1,506	-4.5
9	34,784	22,495	64.7	6,449	18.6	1,560	4.5	4,889	6,894	19.8	-1,504	-3.1
1960	35,928	23,367	65.1	6,683	18.7	1,548	4.3	5,135	6,692	18.6	-814	-2.4
1	37,471	24,466	65.3	7,236	19.4	1,617	4.3	5,619	6,635	17.7	-866	-2.4
2	40,575	25,926	63.9	7,717	19.0	1,680	4.1	6,037	6,960	17.2	-28	-0.1
3	43,424	27,487	63.3	8,075	18.6	1,572	3.6	6,503	7,591	17.5	+271	+0.6
4	47,393	29,666	62.6	8,654	18.3	1,584	3.5	7,070	9,103	19.2	-30	-0.1
5	52,203	32,061	61.4	9,614	18.5	1,559	3.0	8,055	10,651	20.4	-123	-0.3
6	58,120	34,848	60.0	11,286	19.4	1,709	3.0	9,577	12,493	21.5	-507	-0.9
7	62,068	37,714	60.8	12,377	19.9	1,805	2.9	10,572	12,365	19.9	-388	-0.6
8	71,454	42,360	59.3	12,078	19.8	1,812	2.5	10,266	16,035	22.4	-981	-1.5

SOURCE : DBS - NATIONAL ACCOUNTS - 5-APPEND. "C."

TABLE 4(a) PER CAPITA GNP AND ITS COMPONENTS, 1962  
 = SELECTED COUNTRIES =  
 ( IN U.S. DOLLARS )

COUNTRY	GNP	PRIVATE CONSUMPTION	PUBLIC CONSUMPTION EXPENDITURES			BUSINESS GROSS FIXED CAPITAL FORMATION	OTHERS
			TOTAL	DEFENCE	OTHERS		
NORTH ATLANTIC AREA	1,873	1,174	325	141	184	344	+ 30
CANADA	2,007	1,281	298	92	206	430	- 2
U.S.A.	2,981	1,870	577	293	284	479	+ 55
WESTERN EUROPE	1,205	753	177	54	123	259	+ 16
EEC	1,289	786	183	54	129	295	+ 25
BELGIUM	1,382	939	173	45	128	260	+ 10
FRANCE	1,524	990	203	79	124	299	+ 32
GERMANY, F.R.	1,558	895	233	66	167	395	+ 35
ITALY	788	476	117	22	95	186	+ 9
LUXEMBERG	1,575	913	159	19	140	394	+ 109
NETHERLAND	1,113	643	165	46	119	272	+ 33
EFTA	1,393	889	227	73	154	267	+ 10
AUSTRIA	1,009	621	131	11	120	228	+ 29
DENMARK	1,582	1,054	214	47	167	326	- 12
NORWAY	1,423	843	217	49	168	428	- 65
PORTUGAL	303	215	46	20	26	53	- 11
SWEDEN	1,923	1,128	350	90	260	427	+ 18
SWITZERLAND	1,905	1,165	208	49	159	527	+ 5
U.K.	1,479	964	257	95	162	241	+ 17
OTHER	525	362	54	14	40	114	- 5
FINLAND	1,181	677	167	31	136	346	- 9
GREECE	464	337	59	20	39	102	- 34
ICELAND	1,445	928	121	-	121	363	+ 33
IRELAND	755	561	90	8	82	118	- 14
SPAIN	420	302	33	11	22	81	+ 4

SOURCE : 9- APPEND. "C" P-68-69.

# TABLE 4(b) PER CAPITA GNP AND ITS COMPONENTS

CANADA 1950-1968  
(IN CURRENT DOLLARS)

YEAR	GNP	PRIVATE CONSUMPTION	PUBLIC CONSUMPTION EXPENDITURES			BUSINESS GROSS FIXED CAPITAL FORMATION	OTHERS
			TOTAL	DEFENCE	OTHERS		
1950	1,313	877	171	36	135	244	+ 21
1	1,512	961	234	83	151	283	+ 34
2	1,660	1,022	295	124	171	308	+ 35
3	1,685	1,050	298	128	170	337	0
4	1,647	1,071	295	114	181	316	-35
5	1,747	1,119	308	113	195	335	-15
6	1,921	1,183	338	113	225	426	-26
7	1,951	1,227	350	108	242	449	-75
8	1,946	1,257	365	98	267	413	-89
9	2,009	1,299	372	90	282	398	-60
1960	2,029	1,319	377	87	290	378	-45
1	2,071	1,352	400	89	311	367	-48
2	2,200	1,406	418	91	327	377	-1
3	2,311	1,463	430	84	346	404	+14
4	2,476	1,550	452	83	369	476	-2
5	2,677	1,644	493	80	413	546	-6
6	2,927	1,755	568	86	482	629	-25
7	3,065	1,862	611	89	522	611	-19
8	3,464	2,053	586	88	498	777	+ 48

SOURCE : DBS-NATIONAL ACCOUNTS - 5 APPEND. "C".

TABLE 5(a) GOVERNMENT EXPENDITURES BY TYPE OF TRANSACTION,  
IN SELECTED COUNTRIES, 1962  
( IN MILLIONS OF U.S. DOLLARS )

COUNTRY	TOTAL		GOODS, SERVICES, SALARIES AND WAGES						OTHERS	
	U.S. DOLLARS	%	TOTAL		DEFENCE		CIVILIAN		U.S. DOLLARS	%
			U.S. DOLLARS	%	U.S. DOLLARS	%	U.S. DOLLARS	%		
NORTH ATLANTIC AREA	270,360	100.0	168,603	62.4	73,216	27.1	95,387	35.3	101,757	37.6
CANADA	10,396	100.0	5,541	53.3	1,704	16.4	3,837	36.9	4,855	46.7
U.S.A.	150,704	100.0	107,675	71.5	54,673	36.3	53,002	35.2	43,029	28.5
WESTERN EUROPE	109,260	100.0	55,387	50.7	16,839	15.4	38,548	35.3	53,873	49.3
EEC	68,253	100.0	32,170	47.1	9,494	13.9	22,676	33.3	36,083	52.9
BELGIUM	3,469	100.0	1,591	45.9	414	12.0	1,177	33.9	1,878	54.1
FRANCE	23,425	100.0	9,517	40.6	3,708	15.8	5,809	24.8	13,908	59.4
GERMANY, F.R.	26,241	100.0	13,225	50.4	3,740	14.3	9,485	36.1	13,016	49.6
ITALY	11,111	100.0	5,842	52.6	1,079	9.7	4,763	42.9	5,269	47.4
LUXEMBERG	127	100.0	51	40.2	6	4.7	45	35.5	76	59.8
NETHERLAND	3,880	100.0	1,944	50.1	547	14.1	1,397	36.0	1,936	49.9
EFTA	36,843	100.0	20,684	56.2	6,680	18.2	14,004	38.0	16,159	43.8
AUSTRIA	1,982	100.0	935	47.2	80	4.0	855	43.2	1,047	52.8
DENMARK	1,726	100.0	992	57.5	217	12.6	775	44.9	734	42.5
NORWAY	1,491	100.0	790	53.0	177	11.9	613	41.1	701	47.0
PORTUGAL	548	100.0	414	75.6	177	32.3	237	43.3	134	24.4
SWEDEN	4,390	100.0	2,644	60.2	680	15.5	1,964	44.7	1,746	39.8
SWITZERLAND	2,156	100.0	1,174	54.5	276	12.8	899	41.7	981	45.5
U.K.	24,550	100.0	13,734	55.9	5,073	20.6	8,661	35.3	10,816	44.1
OTHER	4,164	100.0	2,533	60.8	665	16.0	1,868	44.8	1,631	39.2
FINLAND	1,329	100.0	753	56.7	142	10.7	611	46.0	576	43.3
GREECE	811	100.0	495	61.0	171	21.1	324	39.9	316	39.0
ICELAND	56	100.0	22	39.3	-	-	22	39.3	34	60.7
IRELAND	524	100.0	255	48.7	22	4.2	233	44.5	269	51.3
SPAIN	1,444	100.0	1,008	69.8	330	22.9	678	46.9	436	30.2

SOURCE : 9 APPEND "C" P. 121

TABLE 5(b)

## GOVERNMENTS EXPENDITURES BY TYPE OF TRANSACTION

CANADA, 1950 - 1968

( IN MILLIONS OF CURRENT DOLLARS )

YEAR	TOTAL		GOODS, SERVICES, SALARIES AND WAGES						OTHERS	
	000,000 \$	%	TOTAL		DEFENCE		CIVILIAN		000,000 \$	%
			000,000 \$	%	000,000 \$	%	000,000 \$	%		
1950	4,233	100.0	2,344	55.4	493	11.7	1,851	43.7	1,889	44.6
1	5,243	100.0	3,271	62.4	1,157	22.1	2,114	40.3	1,972	37.6
2	6,686	100.0	4,279	64.0	1,800	26.9	2,479	37.1	2,407	36.0
3	7,025	100.0	4,432	63.0	1,907	27.1	2,525	35.9	2,593	37.0
4	7,280	100.0	4,461	61.2	1,727	23.7	2,734	37.5	2,819	38.8
5	7,730	100.0	4,780	61.9	1,760	22.8	3,020	39.1	2,950	38.1
6	8,474	100.0	5,266	62.2	1,802	21.3	3,464	40.9	3,208	37.8
7	9,174	100.0	5,738	62.5	1,765	19.2	3,973	43.3	3,436	37.5
8	10,408	100.0	6,161	59.2	1,661	16.0	4,500	43.2	4,247	40.8
9	11,239	100.0	6,490	57.7	1,560	13.9	4,930	43.8	4,749	42.3
1960	12,112	100.0	6,769	55.9	1,548	12.8	5,221	43.1	5,343	44.1
1	13,232	100.0	7,236	54.6	1,617	12.2	5,619	42.4	5,996	45.4
2	14,200	100.0	7,717	54.3	1,680	11.8	6,037	42.5	6,483	45.7
3	14,887	100.0	8,075	54.2	1,570	10.5	6,505	43.7	6,812	45.8
4	15,970	100.0	8,654	54.2	1,584	9.9	7,070	44.3	7,316	45.8
5	17,677	100.0	9,596	54.3	1,559	8.8	8,037	45.5	8,081	45.7
6	20,375	100.0	11,286	55.4	1,709	8.4	9,577	47.0	9,089	44.6
7	23,161	100.0	12,377	53.4	1,805	7.8	10,572	45.6	10,784	46.6
8	25,748	100.0	13,329	51.8	1,812	7.1	11,517	44.7	12,419	48.2

SOURCE : DBS - NATIONAL ACCOUNTS 5 APPEND. "C."

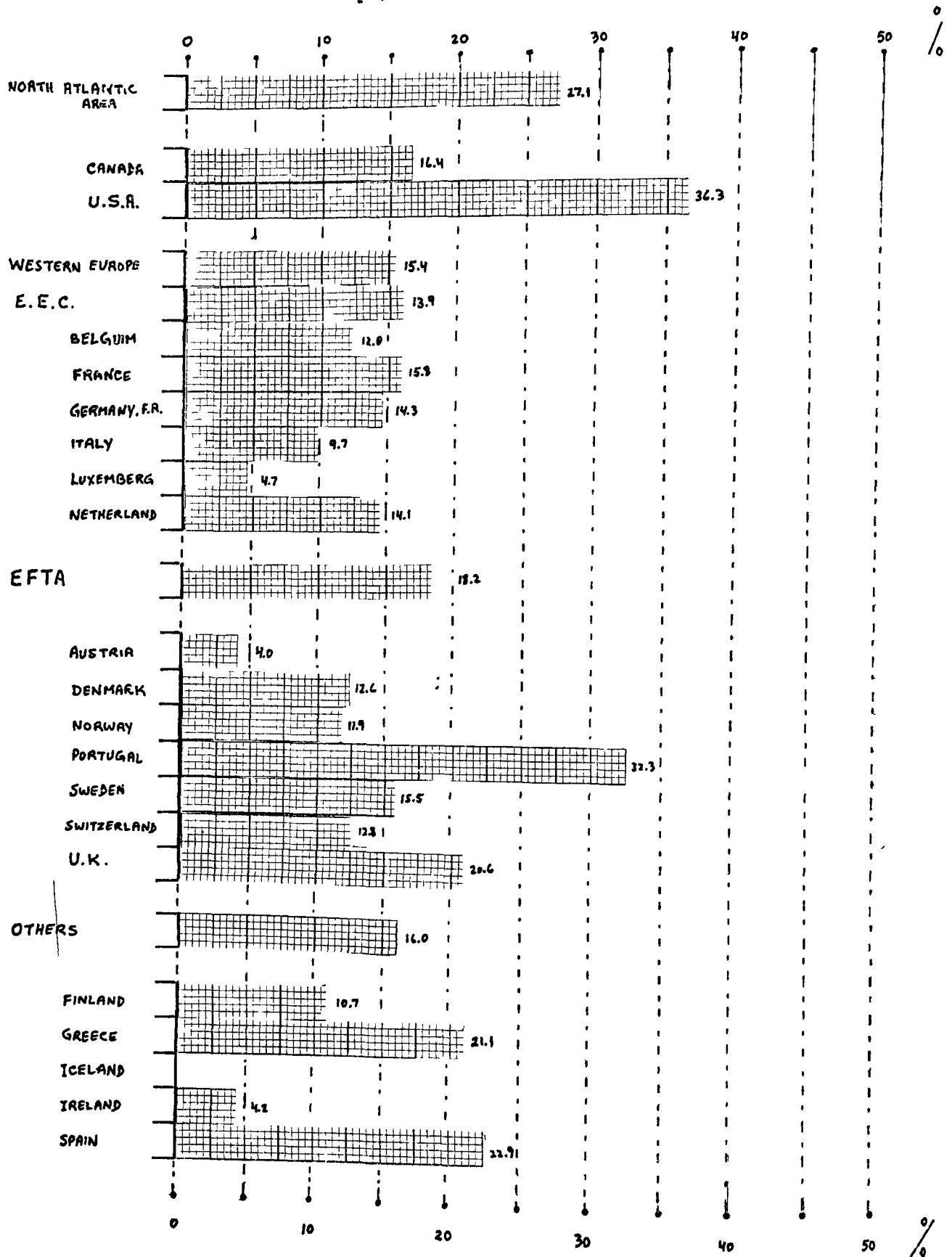
FIG. 3 DEFENCE EXPENDITURES AS A PROPORTION OF  
GOVERNMENT EXPENDITURES

- (a) SELECTED COUNTRIES
- (b) CANADA 1950-1968

FIG. 3(a) DEFENCE EXPENDITURES AS A PROPORTION OF GOVERNMENT EXPENDITURES, 1962

SELECTED COUNTRIES

= PER CENT =

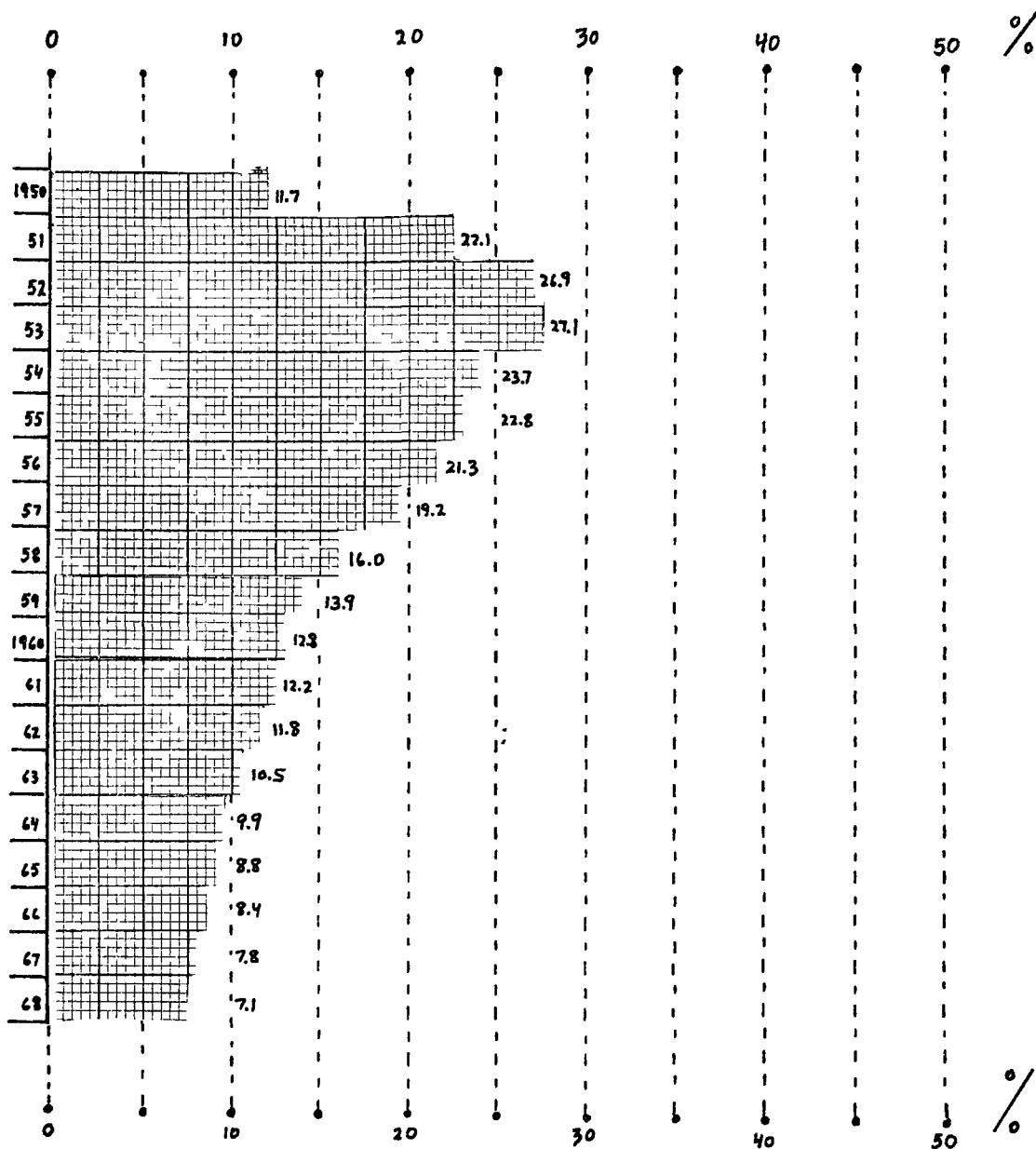


SOURCE : TABLE 5(a).

FIG. 3(b) DEFENCE EXPENDITURES AS A PROPORTION OF GOVERNMENT EXPENDITURES

CANADA, 1950 - 1968

= PER CENT =



# TABLE 6 GNP AND GOVERNMENTS EXPENDITURES

CANADA, 1950 - 1968

( IN MILLIONS OF CURRENT DOLLARS )

YEAR	GNP	ALL LEVELS OF GOV'TS - EXPENDITURES			FEDERAL GOVERNMENT EXPENDITURES					
		TOTAL	SALARIES + GOODS	GOODS	TOTAL	SALARIES + GOODS	GOODS	DEFENCE		
								SALARIES + GOODS	GOODS	GOODS PURCHASED BY DDG
1950	18,006	4,233	2,344	1,277	2,330	977	506	493	356	290
1	21,170	5,243	3,271	1,981	3,089	1,702	1,088	1,157	956	676
2	23,995	6,686	4,279	2,739	4,373	2,489	1,723	1,800	1,530	1,126
3	25,020	7,025	4,432	2,732	4,584	2,559	1,703	1,907	1,598	1,207
4	24,871	7,280	4,461	2,549	4,628	2,449	1,463	1,727	1,360	1,016
5	27,132	7,730	4,780	2,707	4,761	2,498	1,442	1,760	1,366	983
6	30,585	8,474	5,266	2,988	5,034	2,671	1,518	1,802	1,378	959
7	31,909	9,174	5,738	3,177	5,339	2,727	1,441	1,765	1,289	870
8	32,894	10,408	6,161	3,361	6,091	2,849	1,469	1,661	1,170	758
9	34,915	11,239	6,490	3,463	6,358	2,832	1,442	1,560	1,064	674
1960	36,287	12,112	6,769	3,499	6,667	2,730	1,284	1,548	1,039	621
1	37,471	13,232	7,236	3,640	7,129	2,982	1,408	1,617	1,067	624
2	40,575	14,200	7,717	3,868	7,424	3,025	1,375	1,680	1,094	607
3	43,424	14,887	8,075	3,971	7,507	2,934	1,215	1,570	974	527
4	47,393	15,970	8,654	4,285	7,891	3,046	1,276	1,584	1,001	546
5	52,203	17,677	9,596	4,914	8,434	3,267	1,424	1,559	972	463
6	58,104	20,375	11,286	6,000	9,645	3,920	1,820	1,709	1,088	484
7	62,109	23,161	12,377	6,456	10,887	4,259	1,951	1,805	1,101	500
8	67,368	25,748	13,329	6,675	11,970	4,475	1,998	1,812	1,116	590

SOURCE : DBS - NATIONAL ACCOUNTS - 5 APPEND. "C".

# TABLE 7 GOVERNMENTS EXPENDITURES AS % OF GNP

CANADA, 1950 - 1968

YEAR	GNP	ALL LEVELS OF GOV'TS EXPENDITURES			FEDERAL GOVERNMENT EXPENDITURES					
		TOTAL	SALARIES + GOODS	GOODS	TOTAL	SALARIES + GOODS	GOODS	DEFENCE		
								SALARIES + GOODS	GOODS	GOODS PURCHASED BY DDP
1950	100.0	23.5	13.0	7.1	12.9	5.4	2.8	2.7	2.0	1.6
1	100.0	24.7	15.4	9.4	14.6	8.0	5.1	5.5	4.5	3.2
2	100.0	27.8	17.8	11.4	18.2	10.4	7.2	7.5	6.4	4.7
3	100.0	28.0	17.7	10.9	18.3	10.2	6.8	7.6	6.4	4.8
4	100.0	29.3	17.9	10.3	18.6	9.8	5.9	6.9	5.5	4.1
5	100.0	28.4	17.6	10.0	17.5	9.2	5.3	6.5	5.0	3.6
6	100.0	27.6	17.2	9.8	16.4	8.7	5.0	5.9	4.5	3.2
7	100.0	28.7	18.0	9.9	16.7	8.5	4.5	5.5	4.0	2.7
8	100.0	31.6	18.7	10.2	18.5	8.7	4.5	5.1	3.6	2.3
9	100.0	32.1	18.6	9.9	18.2	8.1	4.1	4.5	3.1	1.9
1960	100.0	33.3	18.6	9.6	18.3	7.5	3.5	4.3	2.9	1.7
1	100.0	35.2	19.3	9.7	19.0	7.9	3.8	4.3	2.8	1.7
2	100.0	34.9	19.0	9.5	18.3	7.5	3.4	4.1	2.7	1.5
3	100.0	34.2	18.6	9.1	17.3	6.8	2.8	3.6	2.3	1.2
4	100.0	33.7	18.3	9.1	16.7	6.4	2.7	3.5	2.1	1.2
5	100.0	33.8	18.3	9.4	16.1	6.2	2.7	3.0	1.9	0.9
6	100.0	35.0	19.4	10.3	16.6	6.7	3.1	2.9	1.9	0.8
7	100.0	37.3	19.9	10.4	17.5	6.9	3.1	2.9	1.8	0.8
8	100.0	38.1	19.7	9.9	17.7	6.6	3.0	2.7	1.7	0.9

SOURCE : DBS NATIONAL ACCOUNTS 5 APPEND "C".

# TABLE 8 EXPENDITURES OF THE FEDERAL GOVERNMENT

## BY TYPE OF TRANSACTION

CANADA, 1950 - 1968

( IN MILLIONS OF CURRENT DOLLARS )

YEAR	TOTAL	DEFENCE EXPENDITURES					CIVILIAN EXPENDITURES			OTHERS
		TOTAL	SALARIES + WAGES	GOODS		TOTAL	SALARIES + WAGES	GOODS		
				TOTAL	PURCHASED BY					
					D.N.D.				D.D.P.	
1950	2,330	493	137	356	66	290	484	334	150	1,353
1	3,089	1,157	201	956	280	676	545	413	132	1,387
2	4,373	1,800	270	1,530	404	1,126	689	496	193	1,884
3	4,584	1,907	309	1,598	391	1,207	652	547	105	2,025
4	4,628	1,727	367	1,360	344	1,016	722	619	103	2,179
5	4,761	1,760	394	1,366	383	983	748	662	86	2,253
6	5,034	1,802	424	1,378	419	959	874	729	145	2,358
7	5,339	1,765	476	1,289	419	870	962	810	152	2,612
8	6,091	1,661	491	1,170	412	758	1,188	989	299	3,242
9	6,358	1,560	496	1,064	390	674	1,192	894	298	3,606
1960	6,667	1,548	509	1,039	418	621	1,182	937	245	3,937
1	7,129	1,617	550	1,067	443	624	1,365	1,024	341	4,147
2	7,424	1,680	586	1,094	487	607	1,351	1,064	287	4,393
3	7,507	1,570	598	974	448	527	1,353	1,121	232	4,584
4	7,891	1,584	583	1,001	455	546	1,462	1,187	275	4,845
5	8,434	1,559	587	972	509	463	1,741	1,256	485	5,134
6	9,645	1,709	621	1,088	604	484	2,211	1,479	732	5,725
7	10,887	1,805	704	1,101	601	500	2,454	1,604	850	6,628
8	11,970	1,812	696	1,116	526	590	2,663	1,781	882	7,495

SOURCE: DBS - NATIONAL ACCOUNTS - 5 APPEND "C"

TABLE 9 PERCENTAGE DISTRIBUTION OF FEDERAL EXPENDITURES  
 BY TYPE OF TRANSACTION  
 CANADA, 1950 - 1968

YEAR	TOTAL	DEFENCE EXPENDITURES					CIVILIAN EXPENDITURES			OTHERS
		TOTAL	SALARIES + WAGES	GOODS		TOTAL	SALARIES + WAGES	GOODS		
				TOTAL	PURCHASED BY					
					D.N.D.	D.D.P.				
1950	100.0	21.2	5.9	15.3	2.8	12.5	20.7	14.3	6.4	58.1
1	100.0	37.5	6.5	31.0	9.1	21.9	17.7	13.4	4.3	44.8
2	100.0	41.2	6.2	35.0	9.2	25.8	15.8	11.4	4.4	43.0
3	100.0	41.6	6.8	34.8	8.5	26.3	14.2	11.9	2.3	44.2
4	100.0	37.3	7.9	29.4	7.5	21.9	15.6	13.4	2.2	47.1
5	100.0	37.0	8.3	28.7	8.1	20.6	15.7	13.9	1.8	47.3
6	100.0	35.8	8.4	27.4	8.3	19.1	17.4	14.5	2.9	46.8
7	100.0	33.1	8.9	24.2	7.9	16.3	18.0	15.2	2.8	48.9
8	100.0	27.3	8.1	19.2	6.8	12.4	19.5	14.6	4.9	53.2
9	100.0	24.5	7.8	16.7	6.1	10.6	18.8	14.1	4.7	56.7
1960	100.0	23.2	7.6	15.6	6.3	9.3	17.8	14.1	3.7	59.0
1	100.0	22.7	7.7	15.0	6.2	8.8	19.2	14.4	4.8	58.1
2	100.0	22.7	7.9	14.8	6.6	8.2	18.2	14.3	3.9	59.1
3	100.0	21.0	8.0	13.0	6.0	7.0	18.0	14.9	3.1	61.0
4	100.0	20.1	7.4	12.7	5.8	6.9	18.5	15.0	3.5	61.4
5	100.0	18.5	7.0	11.5	6.0	5.5	20.6	14.9	5.7	60.9
6	100.0	17.7	6.4	11.3	6.3	5.0	22.9	15.3	7.6	59.4
7	100.0	16.6	6.5	10.1	5.5	4.6	22.5	14.7	7.8	60.9
8	100.0	15.1	5.8	9.3	4.4	4.9	22.3	14.9	7.4	62.6

SOURCE : TABLE 8

# TABLE 10 DEFENCE EXPENDITURES ON GOODS AND SERVICES

CANADA, 1950-1968

(IN MILLIONS OF CURRENT DOLLARS)

YEAR	TOTAL DEFENCE	MILITARY PAY + ALLOWANCES	GOODS + RELATED SERVICES PURCHASED			
			TOTAL	By DND	By DDP	% OF TOTAL
					VALUE (a)	
1950	493	137	356	66	290	81.5
1	1,157	201	956	280	676	70.7
2	1,800	270	1,530	404	1,126	73.6
3	1,907	309	1,598	391	1,207	75.5
4	1,727	367	1,360	344	1,016	74.7
5	1,760	394	1,366	383	983	72.0
6	1,802	424	1,378	419	959	69.6
7	1,765	476	1,289	419	870	67.5
8	1,661	491	1,170	412	758	64.8
9	1,560	496	1,064	390	674	63.4
1960	1,548	509	1,039	418	621	59.8
1	1,617	550	1,067	443	624	58.5
2	1,680	586	1,094	487	607	55.5
3	1,572	598	974	447	527	54.1
4	1,584	583	1,001	455	546	54.6
5	1,559	587	972	509	463	47.6
6	1,709	621	1,088	604	484	44.5
7	1,805	704	1,101	601	500	45.4
8	1,812	696	1,116	526	590	52.9

SOURCES: (a) 4 APPEND. "C"

OTHERS: DBS-NATIONAL ACCOUNTS 5 APPEND "C"

FIG. 4 VALUE OF GOODS AND RELATED SERVICES PROCURED FOR D.N.D.  
1950 - 1968

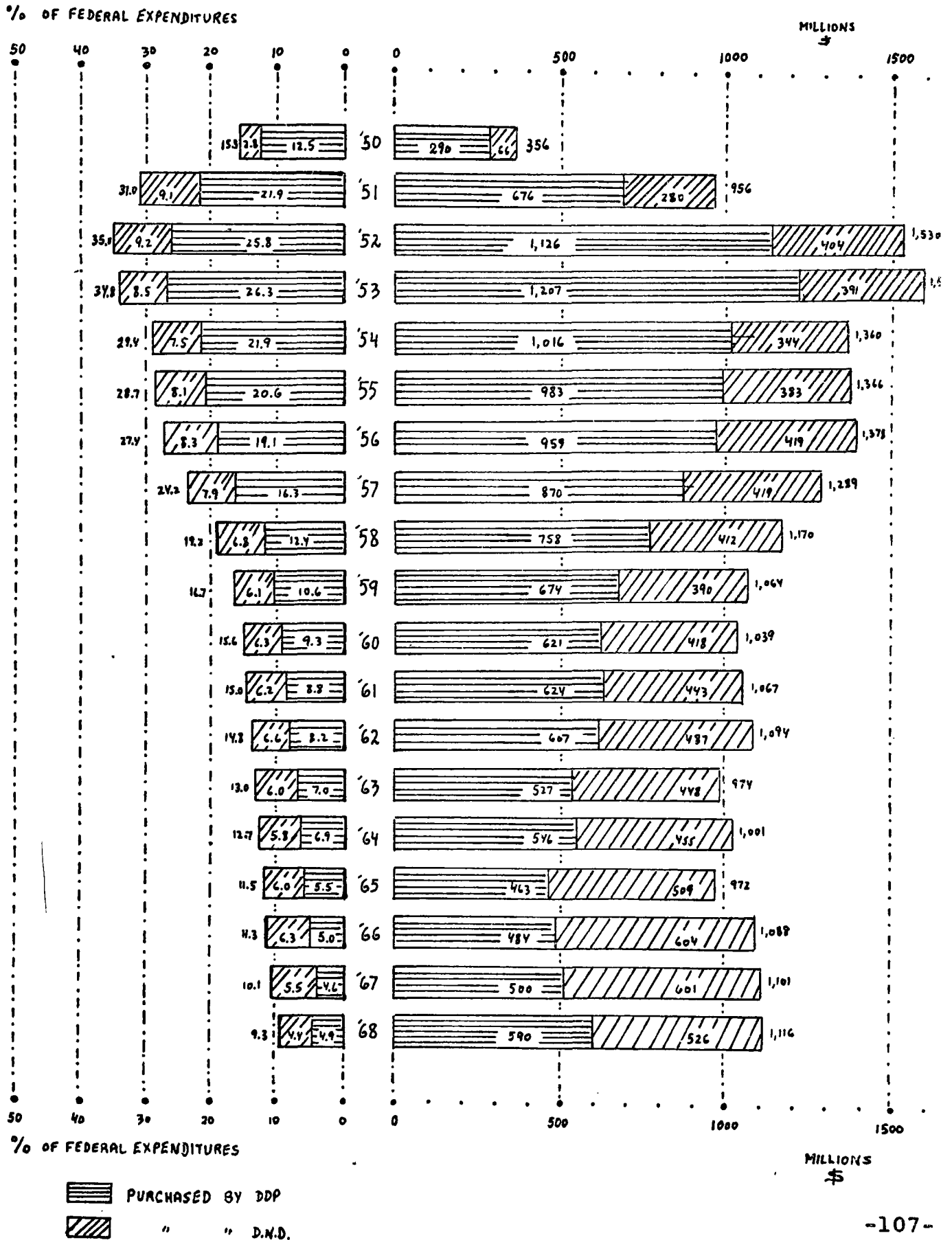


TABLE II D.N.D. EXPENDITURES ON DDP CONTRACTS  
AS % OF :

YEAR	GNP	EXPENDITURES - ALL LEVELS OF GOV'TS			EXPENDITURES - FEDERAL GOVERNMENT			DEFENCE	
		TOTAL	GOODS + SERVICES	GOODS + RELATED SERVICES	TOTAL	GOODS + SERVICES	GOODS + RELATED SERVICES	GOODS + SERVICES	GOODS + RELATED SERVICES
1950	1.6	6.8	12.4	22.7	12.4	29.7	57.3	58.8	81.5
1	3.2	12.9	20.7	34.1	21.9	39.7	62.1	58.4	70.7
2	4.7	16.8	26.3	41.1	25.7	45.3	65.4	62.6	73.6
3	4.8	17.2	27.2	36.8	26.3	47.2	70.9	63.3	75.5
4	4.1	14.0	22.8	39.9	21.9	41.5	69.5	58.8	74.7
5	3.6	12.7	20.6	36.3	20.6	39.4	68.2	55.9	72.0
6	3.2	11.3	18.2	32.1	19.1	35.9	63.2	53.2	69.6
7	2.7	9.5	15.2	27.4	16.3	31.9	60.4	49.3	67.5
8	2.3	7.3	12.3	22.6	12.4	26.6	51.6	45.7	64.8
9	1.9	6.0	10.4	19.5	10.6	23.8	46.8	43.2	63.4
1960	1.7	5.1	9.2	17.8	9.3	22.8	48.4	40.1	59.8
1	1.7	4.7	8.6	17.2	8.8	20.9	44.3	38.6	58.5
2	1.5	4.3	7.9	15.7	8.2	20.1	44.2	36.1	55.5
3	1.2	3.5	6.5	13.3	7.0	18.0	43.4	33.5	54.1
4	1.2	3.4	6.3	12.8	6.9	17.9	42.8	34.5	54.6
5	0.9	2.6	4.8	9.4	5.5	14.2	32.5	29.7	47.6
6	0.8	2.4	4.3	8.1	5.0	12.4	26.6	28.3	44.5
7	0.8	2.2	4.1	7.8	4.6	11.8	25.6	27.7	45.4
8	0.9	2.3	4.4	8.9	4.9	13.2	29.5	32.6	52.9

SOURCE : TABLES 6-10.

TABLE 12 D.N.D. CONTRACT DEMANDS/CONTRACTS/EXPENDITURES

1950 - 1967

( IN MILLIONS OF CURRENT DOLLARS )

YEAR	ANNUAL			CUMULATIVE		
	CONTRACT DEMANDS	CONTRACTS	EXPENDITURES	CONTRACT DEMANDS	CONTRACTS	EXPENDITURES
1950	520.01	559.01	289.51	520.01	559.01	289.51
1	1,725.33	1,546.32	675.82	2,193.04	2,105.33	965.33
2	1,677.93	1,409.76	1,126.65	3,923.27	3,515.09	2,091.98
3	983.88	818.84	1,207.24	4,907.15	4,333.93	3,299.22
4	1,272.86	1,221.39	1,016.13	6,180.01	5,555.32	4,315.35
5	724.03	726.20	982.49	6,904.04	6,281.52	5,297.84
6	452.86	746.50	958.51	7,356.90	7,028.02	6,256.35
7	654.12	606.05	869.66	8,011.02	7,634.07	7,126.01
8	793.49	730.64	757.73	8,804.51	8,364.71	7,883.74
9	423.22	591.57	673.45	9,227.73	8,956.28	8,557.19
1960	700.30	803.15	620.59	9,928.03	9,759.43	9,177.78
1	585.25	529.67	623.38	10,513.28	10,289.10	9,801.16
2	474.50	542.54	606.39	10,987.78	10,831.64	10,407.55
3	626.90	522.27	526.95	11,614.68	11,353.91	10,934.50
4	611.71	510.94	546.23	12,226.39	11,864.85	11,480.73
5	755.66	473.53	462.75	12,982.05	12,338.38	11,943.48
6	569.05	634.72	483.66	13,551.10	12,973.10	12,427.14
7	435.91	595.51	499.57	13,987.01	13,568.61	12,926.71

SOURCES : 1 AND 2, APPEND. "C"

TABLE 13 D.N.D. CONTRACT DEMANDS/CONTRACTS/EXPENDITURES

1950 - 1967

(IN MILLIONS OF CONSTANT 1957 DOLLARS)

YEAR	VALUE	ANNUAL			IMPLICIT PRICE INDEX <sup>(a)</sup>
		CONTRACT DEMANDS	CONTRACTS	EXPENDITURES	
1950		742.87	798.59	413.59	70.0
1		2,209.12	1,979.92	865.33	78.1
2		2,058.81	1,729.77	1,382.39	81.5
3		1,165.73	970.19	1,430.38	84.4
4		1,454.70	1,395.87	1,161.29	87.5
5		803.58	805.99	1,090.44	90.1
6		476.19	784.96	1,007.90	95.1
7		654.12	606.05	869.66	100.0
8		784.86	722.69	749.49	101.1
9		404.61	565.55	643.83	104.6
1960		648.43	743.66	574.62	108.0
1		530.60	480.21	565.17	110.3
2		418.80	478.85	535.21	113.3
3		531.72	442.98	446.95	117.9
4		502.64	419.84	448.83	121.7
5		591.28	370.52	362.09	127.8
6		419.04	467.39	356.16	135.8
7		306.33	418.49	351.07	142.3

SOURCES: (A) DBS - 5 APPEND. "C".  
OTHERS TABLE 12.

FIG. 5 VALUE OF D.N.D. CONTRACT DEMANDS/CONTRACTS/EXPENDITURES  
1950-1967

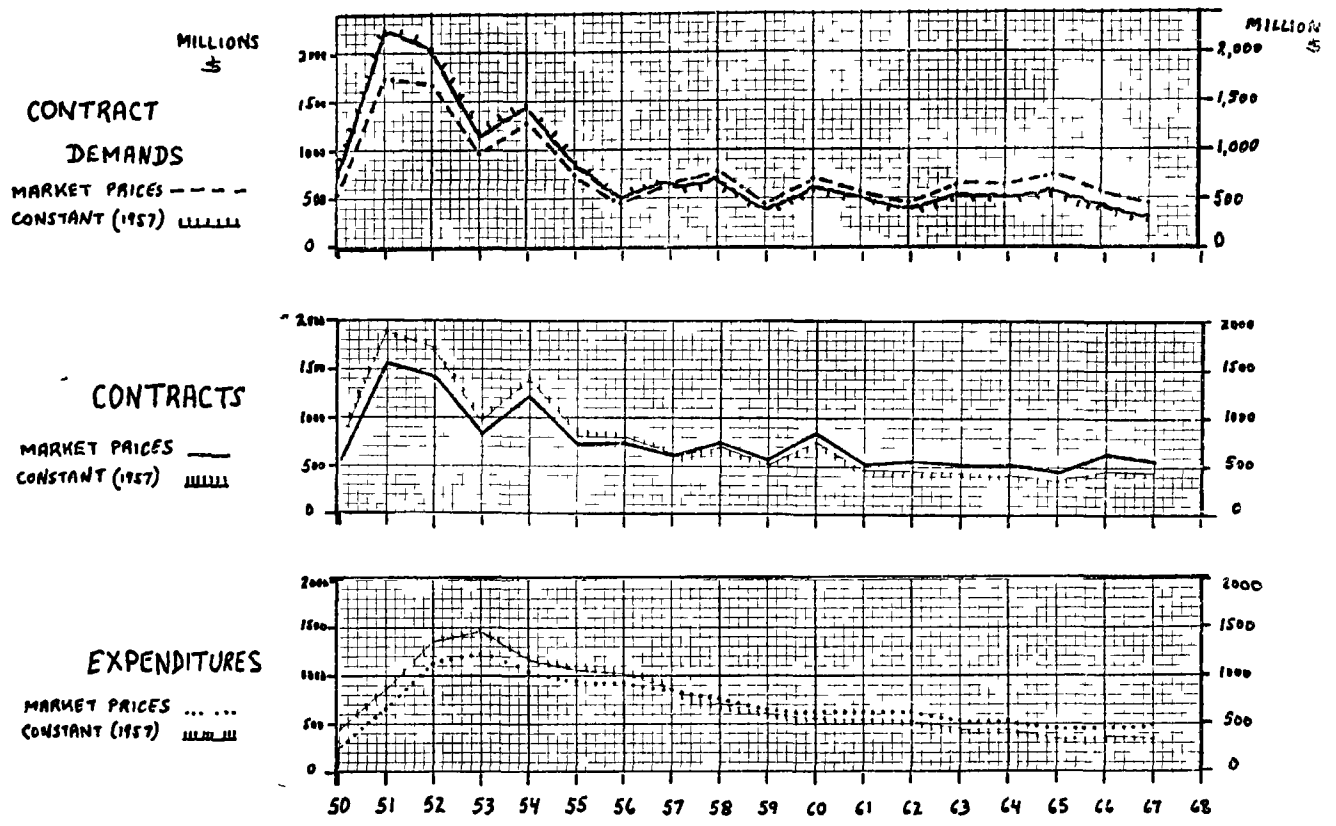
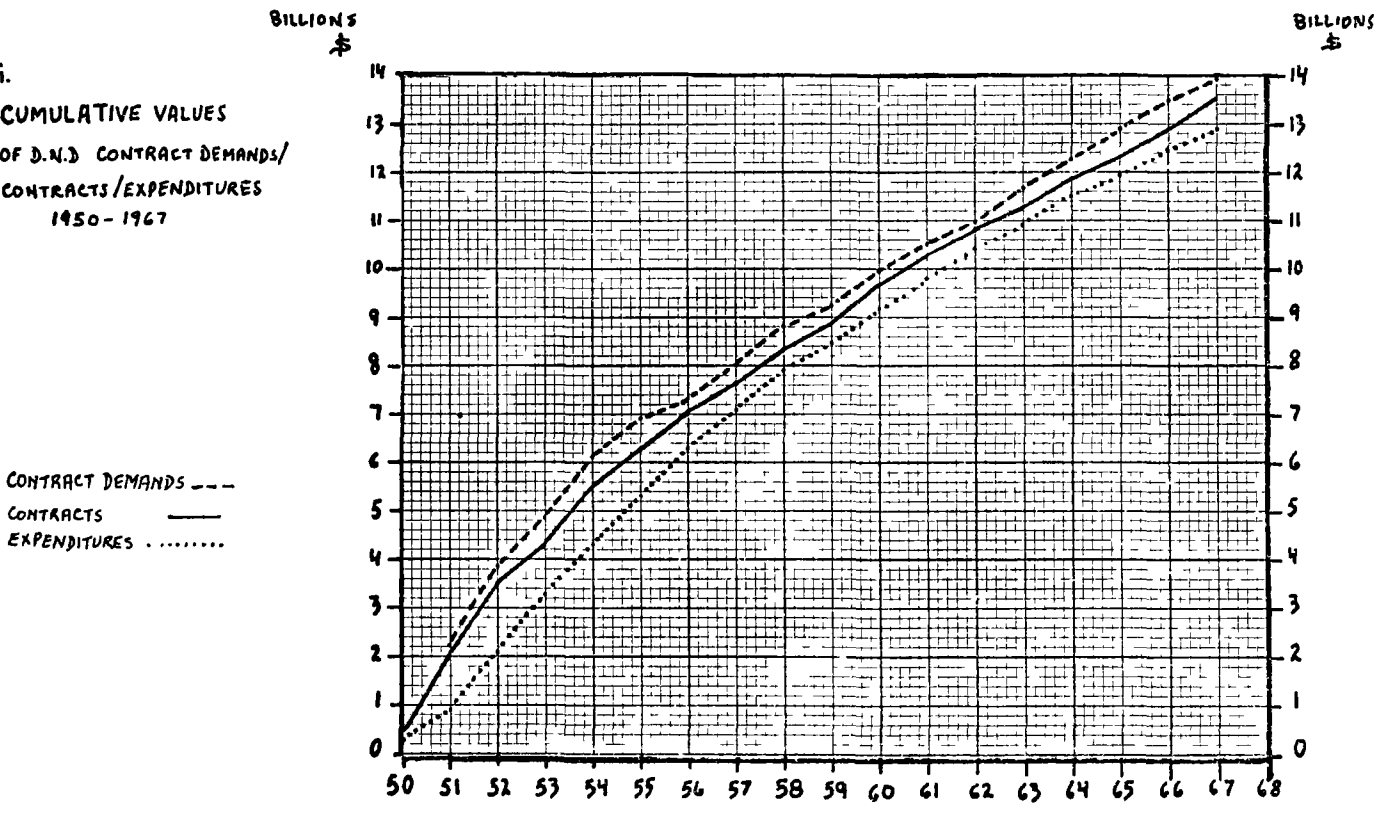


FIG. CUMULATIVE VALUES OF D.N.D. CONTRACT DEMANDS/CONTRACTS/EXPENDITURES 1950-1967



SOURCES: TABLES 12 AND 13

TABLE 14(a) D.N.D. EXPENDITURES AGAINST CONTRACTS BY PROCUREMENT PROGRAMS<sup>(a)</sup>

1950-1968

( IN MILLIONS OF DOLLARS )

YEAR	PROCUREMENT PROGRAMS	AIRCRAFT	ARMAMENT	ELECTRONICS & COMMUNICATION	SHIPS	TANK-AUTOMOTIVE - RAILWAY	FUELS & LUBRICANTS	CLOTHING & EQUIPAGE	FOOD & SUBSISTENCE	CONSTRUCTION	CONSTRUCTION EQUIPMENT	PRODUCTION EQUIPMENT	OTHER PROGRAMS	REGIONAL OFFICES IN CANADA	TOTAL
		1950	...	65.63	18.20	20.02	21.29	37.90	15.05	13.43	10.02	48.82	16.75	0.06	22.34
1	...	212.29	35.99	39.50	43.07	43.33	26.50	55.14	17.25	110.70	23.23	12.92	55.90	(f)	675.82
2	...	398.09	48.65	70.89	71.79	63.21	29.43	94.95	10.88	200.37	22.61	17.20	61.37	37.21	1,126.65
3	...	501.10	72.44	105.27	107.23	72.53	37.16	40.68	2.97	171.23	15.54	13.47	16.50	51.12	1,207.24
4	...	416.45	84.63	111.91	93.99	50.65	41.70	20.24	3.57	91.20	4.14	10.78	28.63	58.24	1,016.13
5	...	378.92	83.75	118.64	88.20	33.38	44.80	18.34	3.87	105.78	5.82	7.36	29.07	64.56	982.49
6	...	331.38	64.92	140.33	79.94	20.37	44.48	15.62	3.31	155.53	8.39	7.14	23.65	63.45	958.51
7	...	347.65	46.65	113.47	82.79	12.05	44.66	10.29	4.17	101.67	9.25	6.58	29.57	60.86	869.66
8	...	344.19	42.95	111.94	49.15	9.95	43.36	6.73	3.37	44.82	8.13	7.92	24.66	60.56	757.73
9	...	245.75	50.58	110.86	34.25	5.60	37.23	20.27	3.41	63.95	8.33	6.33	25.06	61.83	673.45
1960	...	254.15	27.17	96.58	30.44	6.70	35.96	3.77	3.45	60.62	8.66	5.32	29.16	58.61	620.59
1	...	208.14	23.00	134.71	45.20	6.50	34.95	6.75	3.41	64.31	7.95	6.16	22.67	59.63	623.38
2	...	177.42	15.89	124.26	52.72	7.90	34.59	10.40	3.56	77.14	8.57	10.20	23.70	60.04	606.39
3	...	161.51	24.08	116.38	52.02	9.00	26.22	11.72	3.06	29.07	8.53	6.65	22.27	56.44	526.95
4	...	177.96	17.92	123.90	47.45	23.82	23.01	10.25	2.97	31.86	6.90	7.53	18.71	53.95	546.23
5	...	150.56	22.75	105.38	45.11	13.44	21.65	11.54	3.30	7.37 <sup>(g)</sup>	5.64	8.36	14.86	52.79	462.75
6	...	149.40	20.73	109.57	45.60	29.91	19.21	11.12	3.03	-	7.85	9.44	19.50	58.30	483.66
7	...	179.02	27.78	93.33	43.33	12.75	20.29	13.94	2.29	-	7.17	11.26	21.77	66.64	499.57
8	...	54.31 <sup>(e)</sup>	18.27	28.80	18.31	6.18	5.89	2.91	0.86	-	2.73	4.92	8.29	17.03	168.50
TOTAL		4,753.92	746.35	1,875.74	1,051.88	465.17	586.14	378.09	88.75	1,364.44	186.19	159.60	497.68	941.26	13,095.21

(a) THIS VALUE BELONGS TO JAN-MARCH 1965. ON APRIL 1, 1965 DND HANDLES ALL CONSTRUCTION CONTRACTS.

(b) DATA ARE NOT AVAILABLE.

(c) DATA BELONG TO JAN-MARCH 1969. ON APRIL 1, 1969 A NEW ACCOUNTING SYSTEM WAS IMPLEMENTED THAT MADE DND EXPENDITURES AGAINST DDP CONTRACTS NO MORE AVAILABLE.

(d) 2 APPEND. 'E'

TABLE 14(b) PERCENTAGE DISTRIBUTION OF EXPENDITURES BY PROCUREMENT PROGRAMS

1950 - 1967

YEAR	PROCUREMENT PROGRAMS	AIRCRAFT	ARMAMENT	ELECTRONICS + COMMUNICATION	SHIPS	TANK- AUTOMOTIVE - RAILWAY	FUELS + LUBRICANTS	CLOTHING + EQUIPAGE	FOOD + SUSTINENCE	CONSTRUCTION	CONSTRUCTION EQUIPMENT	PRODUCTION EQUIPMENT	OTHER PROGRAMS	REGIONAL OFFICES IN CANADA	TOTAL
		1950	...	22.67	6.29	6.91	7.35	13.09	5.20	4.64	3.46	16.86	5.79	0.02	7.72
1	...	31.41	5.33	5.85	6.37	6.41	3.90	8.16	2.55	16.38	3.44	1.91	8.27		100.00
2	...	35.33	4.32	6.29	6.37	5.61	2.61	8.43	0.97	17.78	2.01	1.53	5.45	3.30	100.00
3	...	41.51	6.00	8.72	8.87	6.01	3.08	3.37	0.25	14.18	1.29	1.12	1.37	4.23	100.00
4	...	40.98	8.33	11.01	9.25	4.99	4.10	1.99	0.35	8.98	0.41	1.06	2.82	5.73	100.00
5	...	38.57	8.52	12.07	8.98	3.40	4.56	1.87	0.39	10.77	0.59	0.75	2.96	6.57	100.00
6	...	34.57	6.77	14.64	8.34	2.12	4.64	1.63	0.35	16.23	0.88	0.74	2.47	6.62	100.00
7	...	39.98	5.36	13.05	9.52	1.38	5.14	1.18	0.48	11.69	1.06	0.76	3.40	7.00	100.00
8	...	45.42	5.67	14.77	6.49	1.31	5.72	0.89	0.44	5.93	1.07	1.04	3.25	8.00	100.00
9	...	36.49	7.51	16.46	5.08	0.83	5.53	2.01	0.51	9.50	1.24	0.94	3.72	9.18	100.00
1960	...	40.95	4.39	15.56	4.90	1.08	5.79	0.60	0.56	9.77	1.40	0.86	4.70	9.44	100.00
1	...	33.39	3.69	21.61	7.25	1.04	5.60	1.08	0.55	10.31	1.28	0.99	3.64	9.57	100.00
2	...	29.26	2.62	20.49	8.69	1.30	5.71	1.72	0.59	12.72	1.41	1.68	3.91	9.90	100.00
3	...	30.65	4.57	22.09	9.87	1.71	4.97	2.22	0.58	5.52	1.62	1.26	4.23	10.71	100.00
4	...	32.58	3.28	22.68	8.69	4.36	4.21	1.88	0.54	5.83	1.26	1.38	3.43	9.88	100.00
5	...	32.54	4.92	22.77	9.75	2.90	4.68	2.49	0.71	1.59	1.22	1.81	3.21	11.41	100.00
6	...	30.89	4.29	22.65	9.43	6.18	3.98	2.30	0.63		1.62	1.95	4.03	12.05	100.00
7	...	35.84	5.56	18.62	8.67	2.55	4.06	2.79	0.46		1.44	2.25	4.36	13.34	100.00
8	...														
TOTAL		36.36	5.63	14.28	8.00	3.55	4.49	2.90	0.68	10.56	1.41	1.20	3.79	7.15	100.00

SOURCE: TABLE 14(a).

TABLE 15(a) D.N.D CONTRACTS PLACED BY PROCUREMENT PROGRAMS<sup>(c)</sup>

1950 - 1968  
(IN MILLIONS OF DOLLARS)

YEAR	PROCUREMENT PROGRAMS	AIRCRAFT	ARMAMENT	ELECTRONICS or COMMUNICATION	SHIPS	TANK- AUTOMOTIVE - RAILWAY	FUELS + LUBRICANTS	CLOTHING + EQUIPAGE	FOOD + SUBSISTENCE	CONSTRUCTION	CONSTRUCTION EQUIPMENT	PRODUCTION EQUIPMENT	OTHER PROGRAMS	REGIONAL OFFICES IN CANADA	TOTAL
1950	...	243.45	25.23	64.32	38.23	42.22	15.18	25.13	10.13	51.00	17.27	0.06	26.79	- <sup>(b)</sup>	559.01
1	...	580.45	162.56	118.63	120.12	61.86	34.89	127.11	9.03	170.29	36.76	13.42	59.75	51.45	1,546.32
2	...	579.63	136.88	131.32	78.18	88.68	33.64	56.79	3.10	178.20	15.70	14.69	34.83	58.12	1,409.76
3	...	242.89	81.62	117.01	74.61	53.87	44.56	23.86	2.72	88.21	6.76	9.20	22.76	50.77	818.84
4	...	670.87	58.60	102.93	66.22	56.41	43.85	14.36	5.30	102.18	4.75	8.16	28.46	59.30	1,221.39
5	...	174.79	41.83	92.77	73.64	13.64	51.40	25.27	4.53	134.48	5.30	7.32	36.76	64.47	726.20
6	...	245.72	18.25	110.56	59.90	11.40	60.93	11.73	2.34	120.63	6.98	7.02	28.06	62.98	746.50
7	...	198.39	11.63 <sup>(b)</sup>	128.20	54.95	10.33	55.07	7.25	3.94	56.61	8.40	7.18	26.60	60.76	606.05
8	...	307.88	30.99	81.87	76.35	8.72	50.73	5.76	3.51	63.23	8.21	6.87	25.48	61.04	730.64
9	...	208.71	18.88	89.09	25.19	5.92	54.57	18.44	4.51	63.39	5.95	5.87	29.52	61.53	591.57
1960	...	348.93	20.69	144.13	82.75	5.05	47.41	5.93	3.61	47.96	8.42	5.02	23.98	59.27	803.15
1	...	103.83	12.25	128.23	26.71	9.09	45.89	11.54	3.32	87.06	5.55	9.80	27.15	59.25	529.67
2	...	196.41	25.41	94.78	27.08	7.04	35.54	12.46	3.79	35.85	8.49	8.05	28.77	58.87	542.54
3	...	157.02	14.06	115.80	40.48	15.88	43.75	10.42	3.93	29.82	6.05	6.83	22.29	55.94	522.27
4	...	148.80	24.85	101.63	36.30	25.93	40.72	10.74	3.73	29.53 <sup>(a)</sup>	6.28	10.18	17.69	54.56	510.94
5	...	122.21	27.71	108.42	50.66	15.88	39.75	14.00	3.56	2.63	7.41	9.57	19.57	52.16	473.53
6	...	202.06	45.34	114.92	93.10	19.83	39.41	12.65	3.39	-	10.30	8.72	26.96	58.04	634.72
7	...	186.78	53.45	101.58	71.20	17.02	38.56	9.42	3.20	-	6.16	17.45	32.95	57.74	595.51
8	...	57.88	16.95	79.91	75.36	11.23	36.93	4.48	2.49	-	2.84	11.78	47.33	50.74	397.92
	TOTAL	4,976.70	803.92	2,026.10	1,171.03	480.00	812.78	407.34	80.13	1,261.07	177.58	167.19	565.70	1,036.99	13,966.53

(a) THIS VALUE BELONG TO JAN-MARCH 1965. ON APRIL 1, 1965 DND HANDLES ALL CONSTRUCTION CONTRACTS.

(b) DDP REGIONAL OFFICES IN CANADA WERE NOT ESTABLISHED YET.

(c) 2 APPEND. "C"

TABLE 15(6) PERCENTAGE DISTRIBUTION OF CONTRACTS BY PROCUREMENT PROGRAM  
1950 - 1967

YEAR	PROCUREMENT PROGRAMS													TOTAL
	AIRCRAFT	ARMAMENT	ELECTRONICS & COMMUNICATION	SHIPS	TANK-AUTOMOTIVE - RAILWAY	FUELS & LUBRICANTS	CLOTHING & EQUIPAGE	FOOD & SUBSISTENCE	CONSTRUCTION	CONSTRUCTION EQUIPMENT	PRODUCTION EQUIPMENT	OTHER PROGRAMS	REGIONAL OFFICES IN CANADA	
1950	43.55	4.51	11.51	6.84	7.55	2.72	4.50	1.81	9.12	3.09	0.01	4.79	-	100.00
1	37.54	10.51	7.67	7.77	4.00	2.26	8.22	0.58	11.01	2.38	0.87	3.86	3.33	100.00
2	41.12	9.71	9.32	5.54	6.29	2.39	4.03	0.22	12.64	1.11	1.04	2.47	4.12	100.00
3	29.66	9.97	14.29	9.11	6.58	5.44	2.91	0.33	10.77	0.84	1.12	2.78	6.20	100.00
4	54.92	4.80	8.43	5.42	4.62	3.59	1.17	0.43	8.37	0.39	0.67	2.33	4.86	100.00
5	24.07	5.76	12.77	10.14	1.88	7.08	3.48	0.62	18.52	0.73	1.01	5.06	8.88	100.00
6	32.92	2.44	14.81	8.02	1.53	8.16	1.57	0.31	16.16	0.94	0.94	3.76	8.44	100.00
7	32.73	1.92 <sup>4</sup>	21.15	9.07	1.70	9.09	1.20	0.65	9.34	1.39	1.18	4.39	10.03	100.00
8	42.14	4.24	11.21	10.45	1.20	6.94	0.79	0.48	8.65	1.12	0.94	3.49	8.35	100.00
9	35.28	3.19	15.06	4.26	1.00	9.22	3.12	0.76	10.72	1.01	0.99	4.99	10.40	100.00
1960	43.44	2.58	17.95	10.30	0.63	5.90	0.74	0.45	5.97	1.05	0.62	2.99	7.38	100.00
1	19.60	2.31	24.21	5.04	1.72	8.66	2.18	0.63	16.44	1.05	1.85	5.12	11.19	100.00
2	36.20	4.68	17.47	4.99	1.30	6.55	2.30	0.70	6.62	1.56	1.48	5.30	10.85	100.00
3	30.06	2.69	22.17	7.75	3.04	8.38	2.60	0.75	5.71	1.16	1.31	4.27	10.71	100.00
4	29.12	4.86	19.89	7.10	5.07	7.97	2.10	0.73	5.78	1.23	1.94	3.48	10.68	100.00
5	25.98	5.88	23.02	10.75	3.37	8.44	2.97	0.75	-	1.57	2.03	4.16	11.08	100.00
6	31.83	7.14	18.10	14.67	3.12	6.23	2.00	0.53	-	1.62	1.37	4.25	9.14	100.00
7	31.36	8.97	17.06	11.96	2.86	6.48	1.58	0.54	-	1.03	2.93	5.53	9.70	100.00
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...
TOTAL	36.25	5.80	14.34	8.08	3.46	5.72	2.97	0.57	9.27	1.29	1.15	3.83	7.27	100.00

SOURCE: TABLE 15(6).

TABLE 16(A)

D.N.D CONTRACT DEMANDS BY PROCUREMENT PROGRAMS<sup>(c)</sup>

1950 - 1968

(IN MILLIONS OF DOLLARS)

YEAR	PROCUREMENT PROGRAMS	AIRCRAFT	ARMAMENT	ELECTRONICS & COMMUNICATION	SHIPS	TANK-AUTOMOTIVE - RAILWAY	FUELS & LUBRICANTS	CLOTHING & EQUIPAGE	FOOD & SUBSISTENCE	CONSTRUCTION	CONSTRUCTION EQUIPMENT	PRODUCTION EQUIPMENT	OTHER PROGRAMS	REGIONAL OFFICES IN CANADA	TOTAL
1950	...	116.59	41.77	86.34	98.13	7.52	34.68	5.44	5.23	86.73	2.47	3.57	31.54	-	520.01
1	...	643.07	254.50	125.42	133.57	48.69	30.30	108.08	5.52	158.79	38.14	20.58	106.37	52.30	1,725.33
2	...	599.96	174.46	128.70	99.03	136.84	38.94	110.14	17.74	133.85	20.11	28.97	132.94	56.25	1,677.93
3	...	446.48	108.97	76.29	87.56	20.95	37.03	11.74	5.33	81.66	5.42	6.77	59.56	59.60	983.88
4	...	659.71	68.82	50.79	72.93	60.49	89.88	19.76	7.48	85.64	8.79	9.38	77.74	61.45	1,272.86
5	...	197.70	3.09	105.67	54.12	6.41	37.97	10.83	7.60	127.87	6.58	9.31	100.45	62.61	724.03
6	...	93.64	21.58	33.84	50.82	5.42	43.56	7.57	6.25	75.04	4.22	4.60	88.08	61.40	452.86
7	...	246.29	11.60	124.63	55.92	9.11	43.65	7.26	2.58	26.00	1.91	2.93	59.93	62.31	654.12
8	...	289.15	35.60	107.02	104.39	5.13	38.11	4.61	5.54	74.79	1.98	6.42	58.73	62.02	793.49
9	...	195.17	15.06	2.46	17.62	4.85	26.40	3.47	4.87	44.65	2.75	4.87	39.35	61.70	423.22
1960	...	320.39	18.60	90.04	46.36	5.72	37.86	6.31	19.37	51.42	6.74	2.83	35.51	59.15	700.30
1	...	197.02	13.30	83.70	25.04	10.25	47.24	16.12	19.65	64.85	5.50	5.83	39.10	57.65	585.25
2	...	170.12	26.85	60.10	29.55	9.09	34.42	9.97	19.03	20.90	5.44	5.13	27.05	56.85	474.50
3	...	126.23	30.43	119.59	127.20	16.61	44.65	10.98	24.32	27.31	4.85	10.57	27.56	56.60	626.90
4	...	219.60	29.32	97.18	19.74	49.32	50.29	12.43	21.42	22.86	4.40	8.02	21.21	55.92	611.71
5	...	361.33	45.96	92.23	97.33	3.92	16.97	14.27	17.55	7.96	13.70	8.18	19.63	56.63	755.66
6	...	139.03	82.61	110.53	69.19	34.33	19.82	10.55	5.47	- (a)	8.39	7.45	25.08	56.60	569.05
7	...	134.90	55.53	69.07	30.49	11.77	35.87	7.25	2.86	- (a)	4.34	9.62	20.81	53.40	435.91
8	...	77.31	24.05	54.96	17.97	0.58	32.58	18.05	2.79	- (a)	2.07	13.35	35.95	50.34	328.84
	TOTAL	5,233.69	1,012.76	1,618.56	1,236.96	445.84	740.22	371.35	200.60	1,090.32	147.80	168.38	1,006.59	1,042.78	14,315.85

(A) ON APRIL 1, 1965 DND ASSUMES RESPONSIBILITY OF ALL DEFENCE CONSTRUCTIONS.

(B) CONTRACT DEMANDS FOR DIRECT PURCHASING THROUGH DDP DISTRICT OFFICES ARE ESTIMATED

(C) 1 APPEN. "C".

TABLE 16(b) PERCENTAGE DISTRIBUTION OF CONTRACT DEMANDS BY PROCUREMENT PROGRAM

1950 - 67

YEAR	PROCUREMENT PROGRAMS														TOTAL
	AIRCRAFT	ARMAMENT	ELECTRONICS + COMMUNICATION	SHIPS	TANK- AUTOMOTIVE - RAILWAY	FUELS + LUBRICANTS	CLOTHING + EQUIPAGE	FOOD + SUBSISTENCE	CONSTRUCTION	CONSTRUCTION EQUIPMENT	PRODUCTION EQUIPMENT	OTHER PROGRAMS	REGIONAL OFFICES IN CANADA		
1950	...	...	...	...	...	...	...	...	...	...	...	...	...	...	100.00
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	100.00
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	100.00
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	100.00
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	100.00
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	100.00
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	100.00
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	100.00
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	100.00
9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	100.00
1960	...	...	...	...	...	...	...	...	...	...	...	...	...	...	100.00
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	100.00
2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	100.00
3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	100.00
4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	100.00
5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	100.00
6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	100.00
7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	100.00
8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	100.00
TOTAL	36.87	7.07	11.18	8.72	3.19	5.06	2.53	1.41	7.80	1.04	1.11	6.94	7.08	100.00	

SOURCE: TABLE 16(A).

FIG. 6 PERCENTAGE DISTRIBUTION OF THE TOTAL VALUE OF CONTRACT DEMANDS/CONTRACTS/EXPENDITURES BY PROGRAM, 1950-1967.

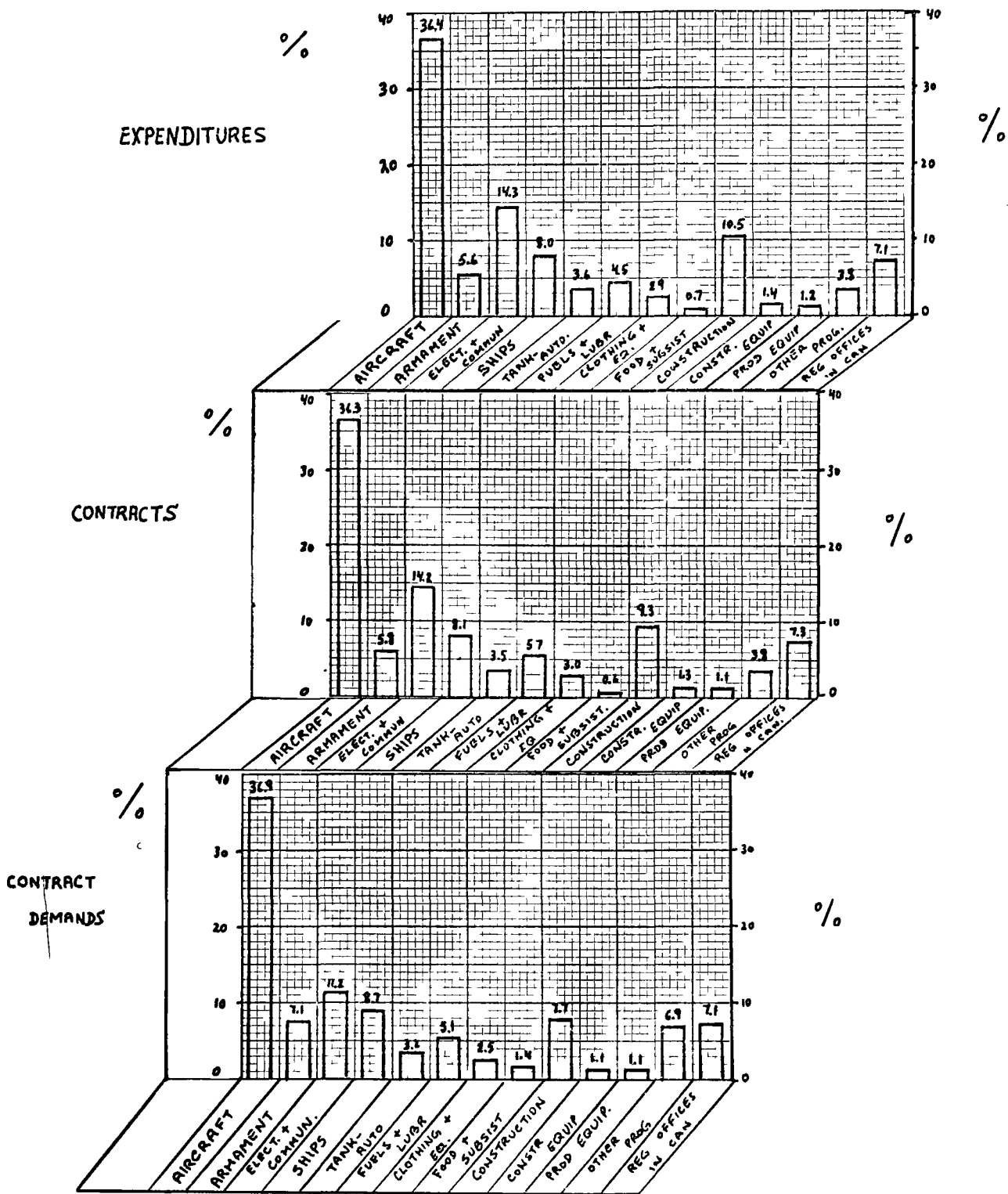
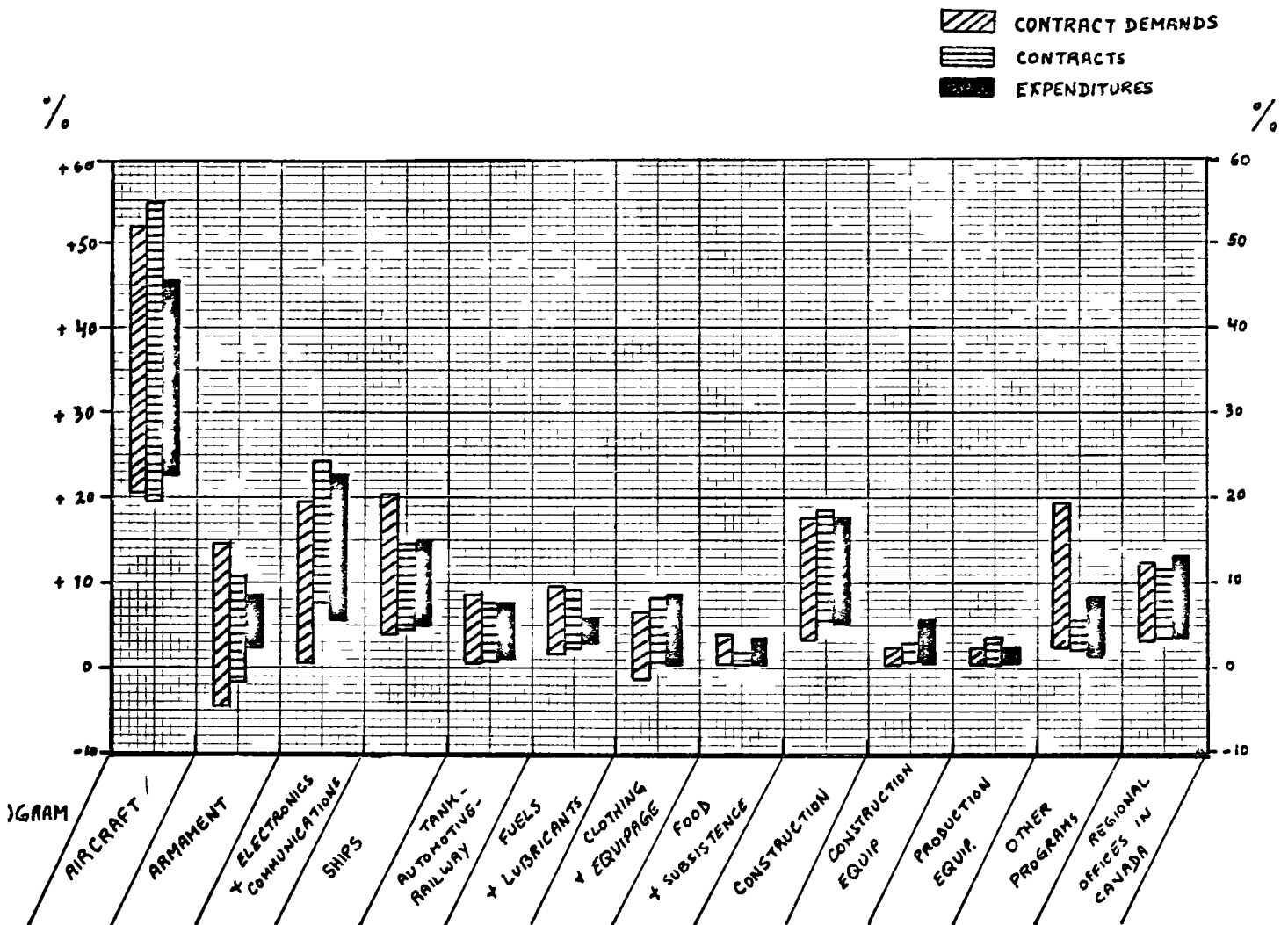


FIG. 7 RANGE OF PERCENTAGE DISTRIBUTION OF DND  
 CONTRACT DEMANDS / CONTRACTS / EXPENDITURES  
 1950 - 1967  
 \_ BY PROCUREMENT PROGRAM \_



SOURCES TABLES 14(b), 15(b) AND 16(b)

FIG. 8 D.N.D. CONTRACT DEMANDS

FIG. 9 D.N.D. CONTRACTS / EXPENDITURES

FIG. 8 D.N.D CONTRACT DEMANDS - QUARTERLY

1950 - 1968

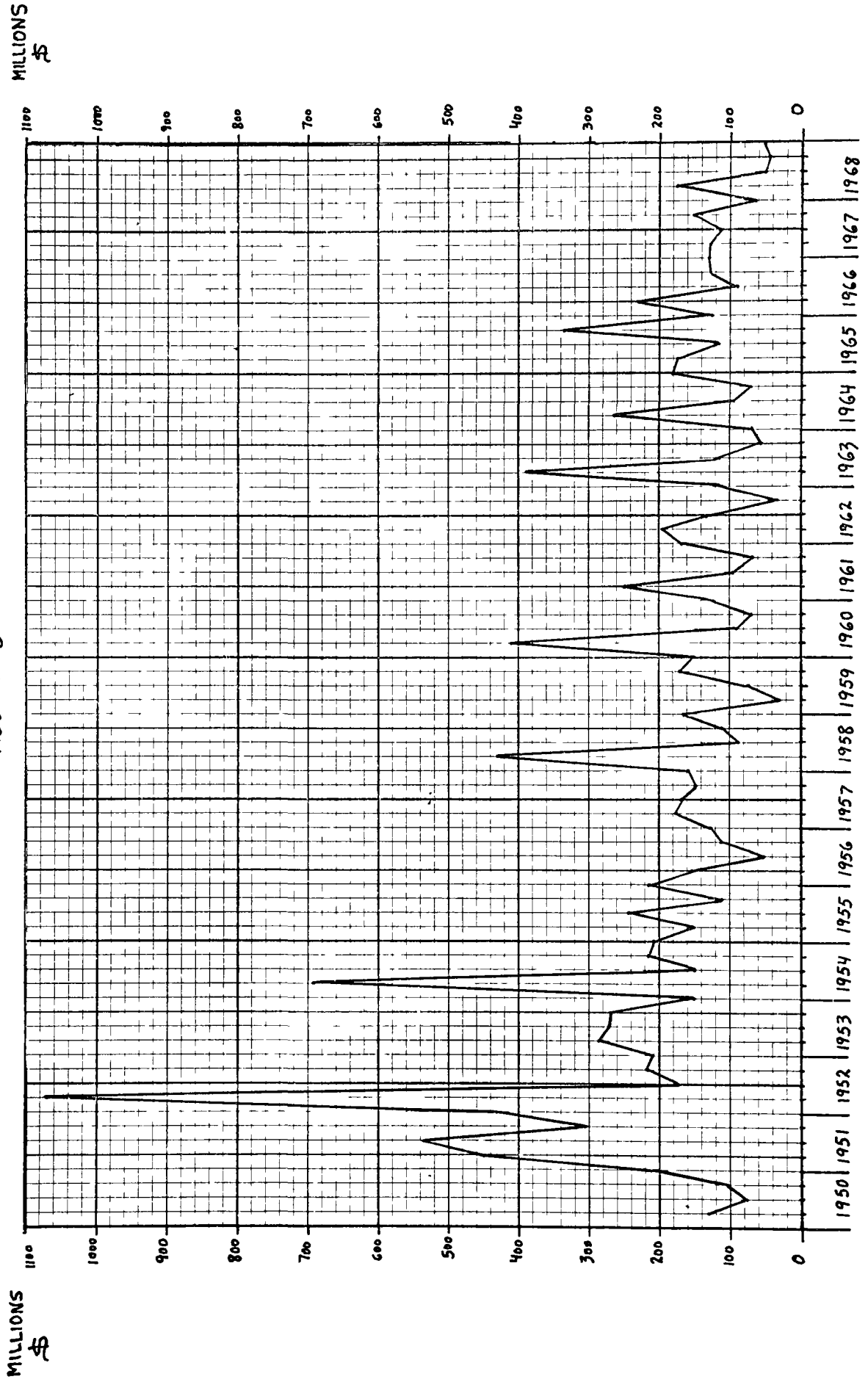
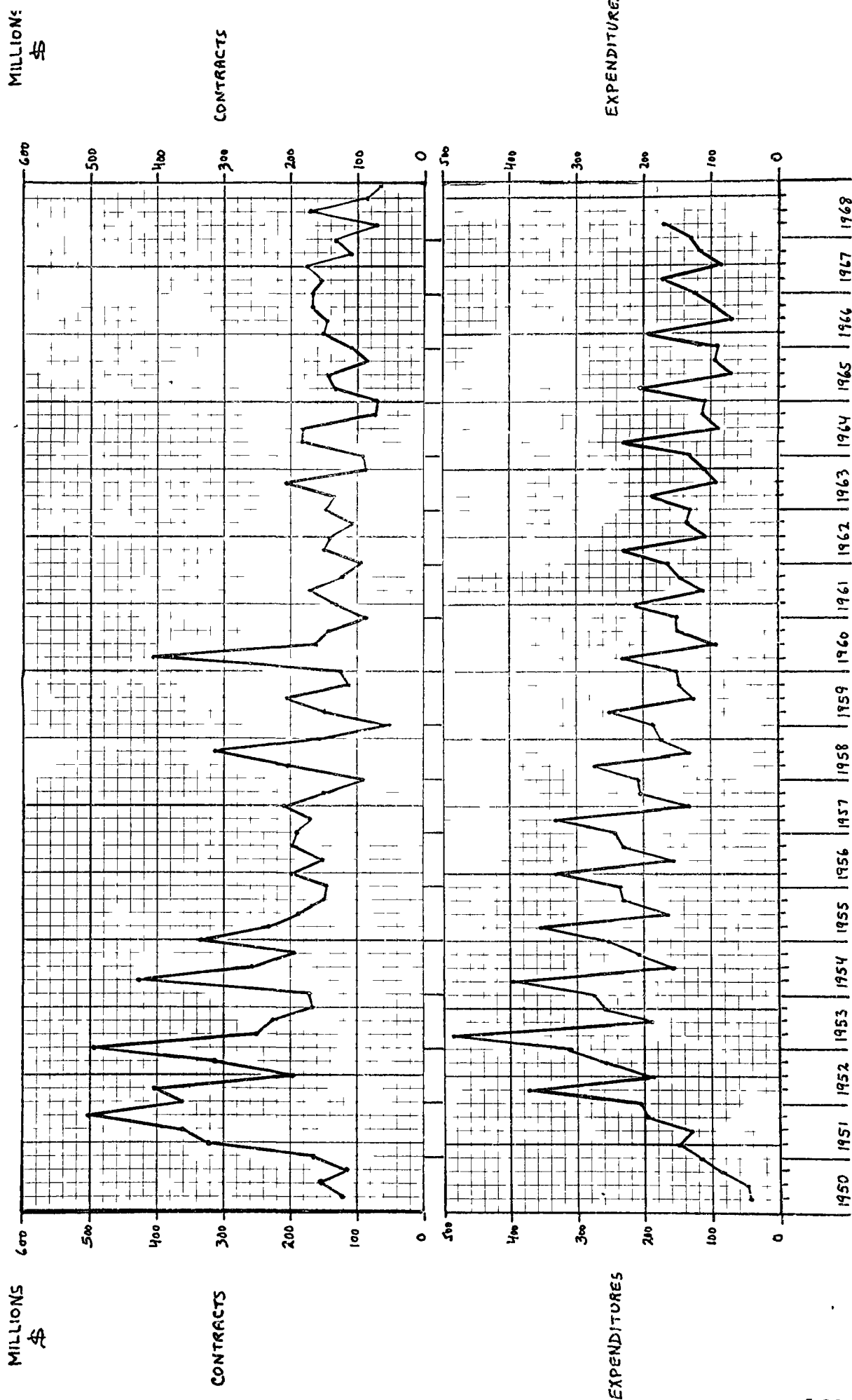


FIG. 9 D.N.D. CONTRACTS AND EXPENDITURES - QUARTERLY

1950 - 1968

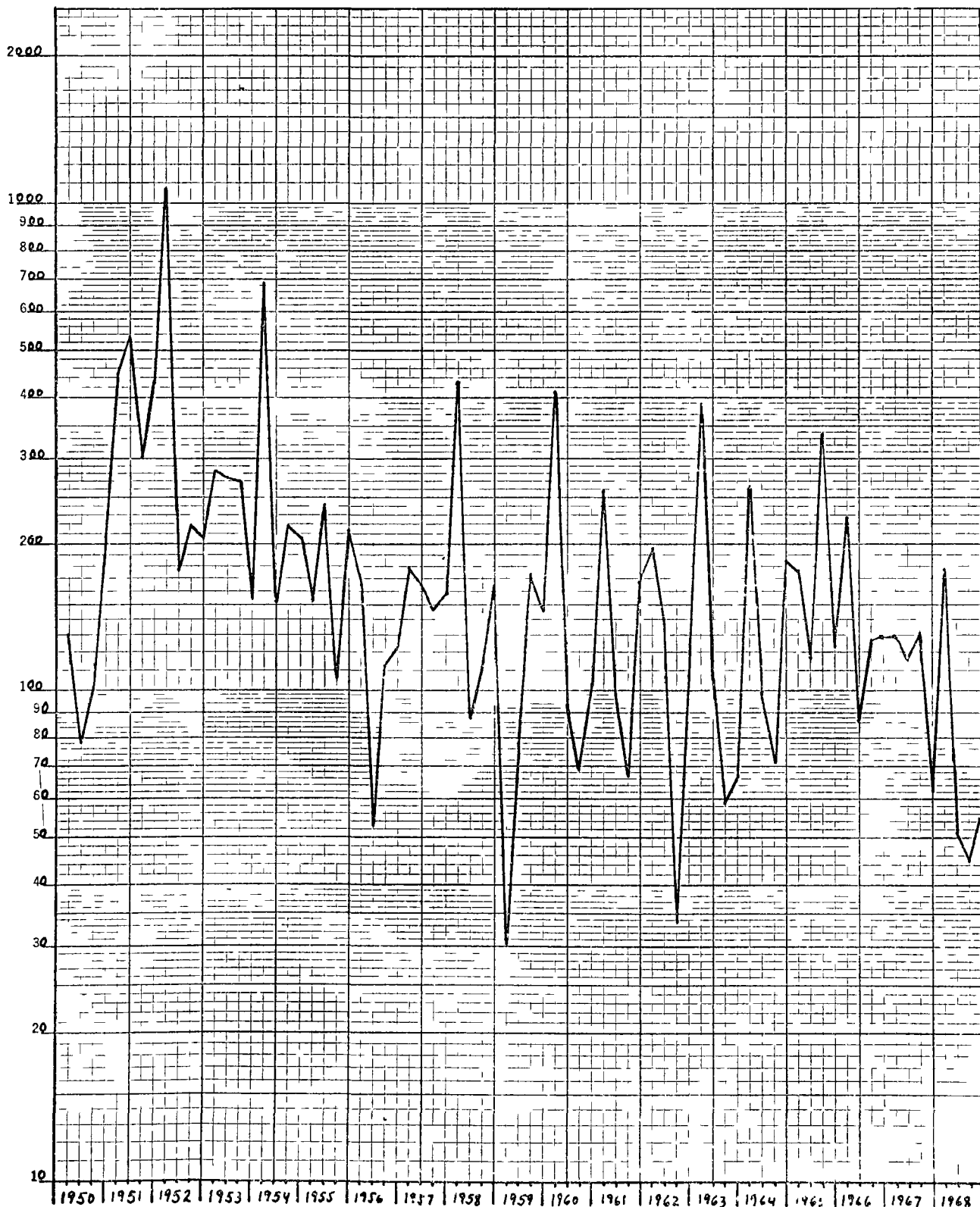


SOURCES 2 APPEND C

# FIG. 10 D.N.D. CONTRACT DEMANDS - QUARTERLY

1950 - 1968

MILLIONS  
of



358-72L KEUFFEL & ESSER CO  
Semi-Logarithmic 3 Cycles X 6 to the 1/2 inch  
MADE IN U.S.A.

FIG. 11 D.N.D. CONTRACTS PLACED BY DDP - QUARTERLY

FIG. 12 D.N.D EXPENDITURES AGAINST DDP CONTRACTS-  
QUARTERLY .

FIG. 11 D.N.D CONTRACTS PLACED BY DDP-QUARTERLY

1950 - 1968

MILLIONS  
\$

35B 72L KEUFFEL & ESSER CO  
Semi-Logarithmic 3 Cycles X 6 to the 1/2 inch  
MADE IN U.S.A.

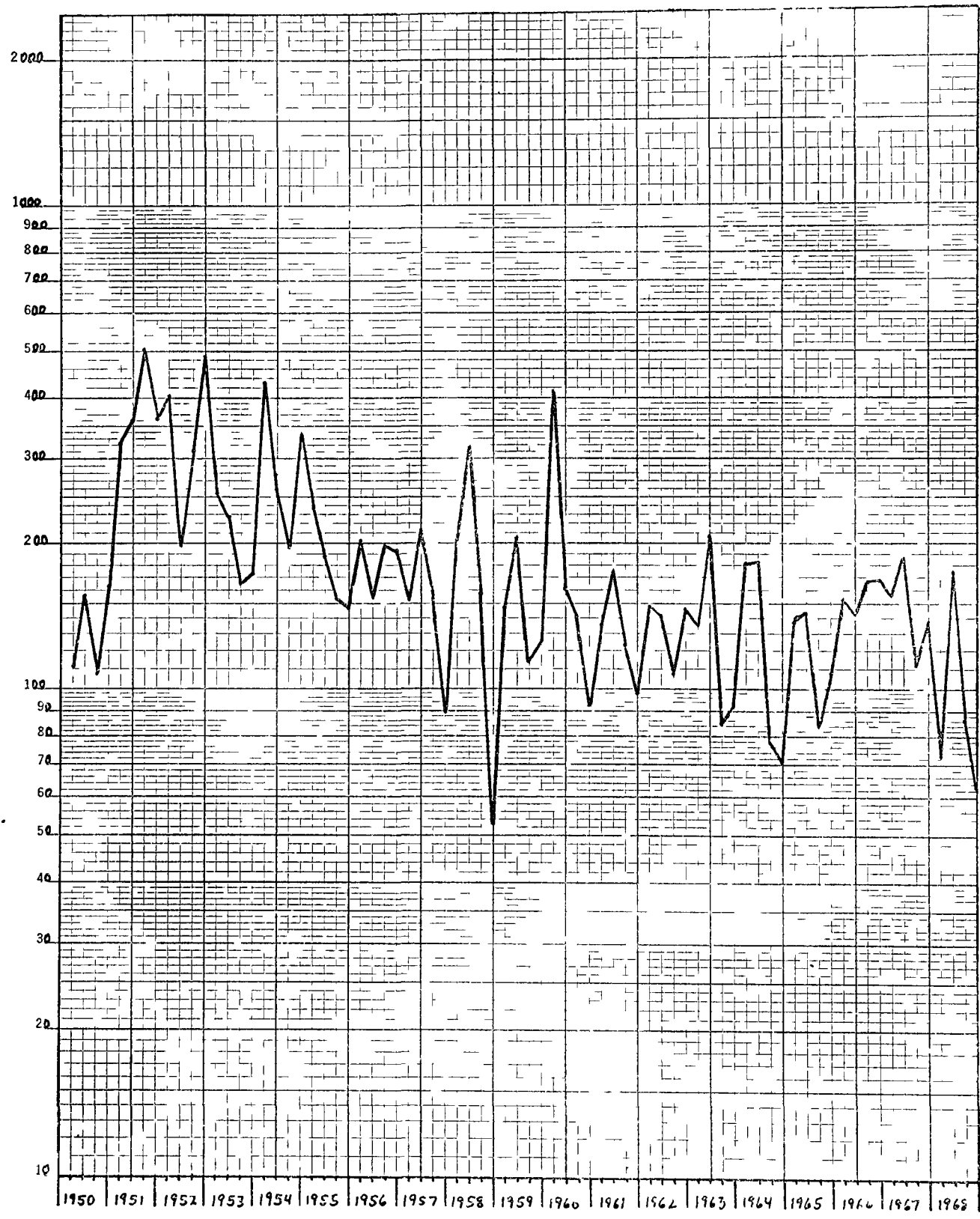


FIG. 12 D.N.D. EXPENDITURES AGAINST DDP CONTRACTS  
 QUARTERLY  
 1950 - 1968

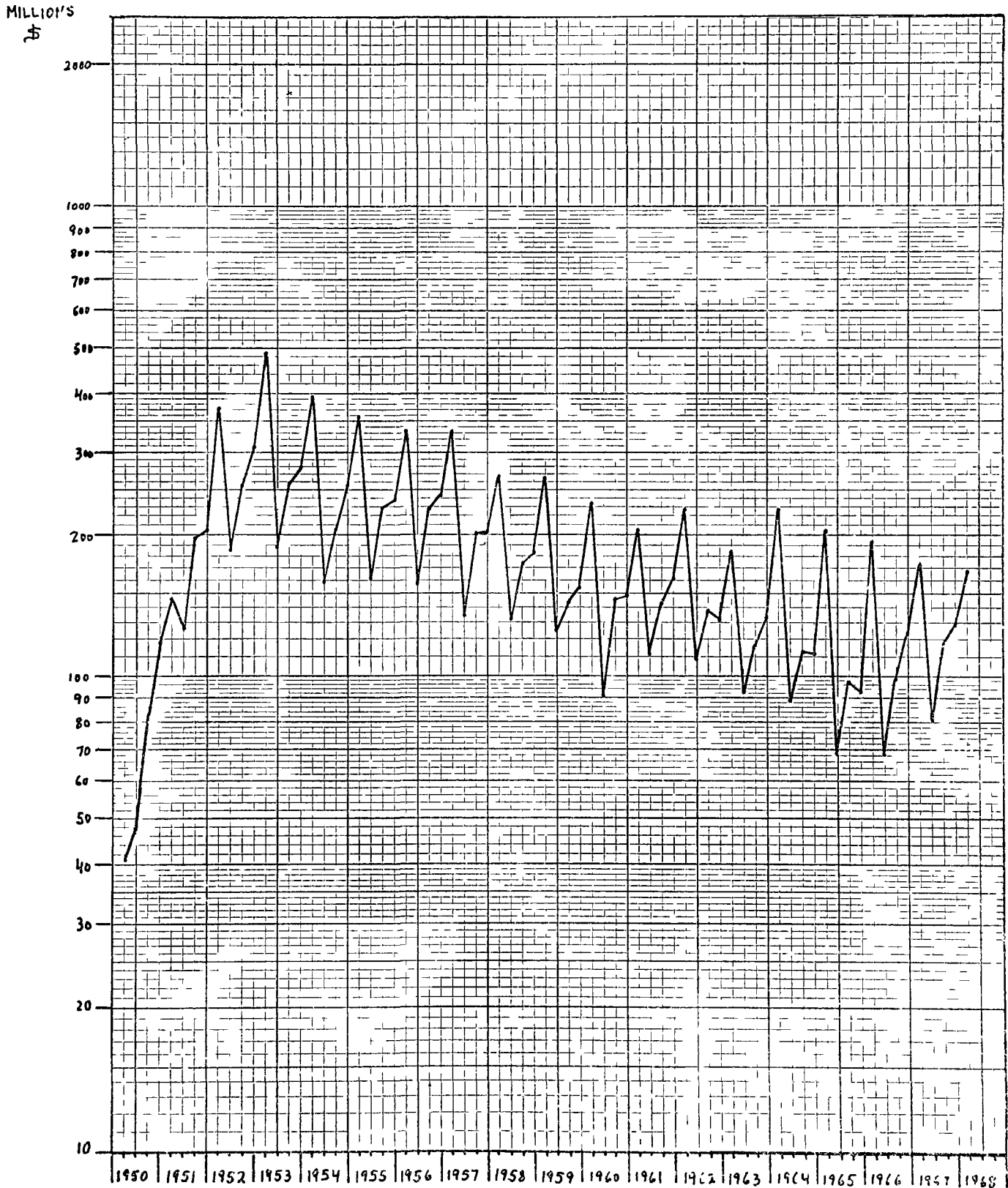


TABLE 17 D.N.D CONTRACT DEMANDS BY PROCUREMENT PROGRAMS - QUARTERLY  
1950 - 1968  
( IN MILLIONS OF DOLLARS )

YEAR	PROCUREMENT PROGRAMS	AIRCRAFT	ARMAMENT	ELECTRONICS + COMMUNICATION	SHIPS	TANK - AUTOMOTIVE - RAILWAY	FUELS + LUBRICANTS	CLOTHING + EQUIPAGE	FOOD + SUBSISTENCE	CONSTRUCTION	CONSTRUCTION EQUIPMENT	PRODUCTION EQUIPMENT	OTHER PROGRAMS	REGIONAL OFFICES IN CANADA	TOTAL
		1950	I	29.15	10.44	21.59	24.53	1.88	8.67	1.36	1.31	21.68	0.62	0.89	7.88
	II	18.64	17.40	4.37	3.82	2.49	0.79	2.31	1.68	19.74	0.76	0.62	8.31	-	79.93
	III	22.08	9.70	5.39	24.52	1.76	0.56	0.72	1.55	29.79	0.82	1.56	3.83	-	102.28
	IV	46.72	4.23	54.99	45.26	1.39	24.66	1.05	0.69	16.52	0.27	0.50	11.52	-	207.80
1951	I	244.55	9.54	58.12	46.26	0.25	17.75	1.21	2.44	20.82	0.42	4.73	43.77	-	449.86
	II	148.94	179.67	12.13	38.10	21.35	0.38	32.82	1.71	40.16	16.99	4.79	27.08	14.22	538.34
	III	52.35	47.75	24.44	15.84	15.14	0.27	53.82	1.01	43.83	5.70	5.82	15.37	20.16	301.50
	IV	197.23	17.54	30.73	33.37	11.95	11.90	20.23	0.36	53.98	15.03	5.24	20.15	17.92	435.63
1952	I	546.51	92.26	58.30	45.34	70.50	10.08	67.06	12.97	48.30	13.20	12.93	73.07	19.69	1,070.21
	II	16.08	12.17	13.07	29.62	14.72	26.84	4.69	2.52	25.22	1.86	4.02	18.11	9.42	178.34
	III	9.04	25.75	34.35	8.67	22.37	1.70	19.55	2.07	50.18	3.48	5.75	23.23	13.79	219.93
	IV	28.33	44.28	22.98	15.40	29.25	0.32	18.84	0.18	10.15	1.57	6.27	18.53	13.35	209.45
1953	I	107.75	74.86	29.59	10.77	0.75	17.80	15.17 <sup>e</sup>	2.37	16.21	1.16	1.26	17.35	19.01	283.71
	II	163.31	9.72	24.89	56.89	16.67	16.04	8.02 <sup>e</sup>	0.10 <sup>e</sup>	31.27	2.26	2.45	8.28	10.71	274.37
	III	161.84	29.62	11.69	5.79	1.81	2.73	0.72	2.74	20.42	1.39	1.18	15.71	15.21	270.85
	IV	73.58	5.23 <sup>e</sup>	10.12	14.11	1.72	0.46	10.73	0.32	13.76	0.61	1.88	18.22	14.67	154.95
1954	I	460.35	16.07	20.25	30.60	41.32	57.93	2.25 <sup>e</sup>	2.63	26.35	2.00	1.29	18.57	19.60	694.71
	II	46.39	29.30	21.51	5.27	3.00	2.26	0.92	0.37	11.14	1.55	1.57	17.26	11.05	151.59
	III	58.36	16.33	17.99	30.40	7.24	2.33	15.32	3.91	22.34	3.22	5.05	21.30	15.68	219.47
	IV	94.61	7.12	8.96 <sup>e</sup>	6.66	8.93	27.36	5.77	0.57	25.81	2.02	1.47	20.61	15.12	207.09

TABLE 17 (CONT.)

YEAR	PROCUREMENT PROGRAMS													TOTAL	
	AIRCRAFT	ARMAMENT	ELECTRONICS & COMMUNICATION	SHIPS	TANK-AUTOMOTIVE - RAILWAY	FUELS & LUBRICANTS	CLOTHING & EQUIPAGE	FOOD & SUBSISTENCE	CONSTRUCTION	CONSTRUCTION EQUIPMENT	PRODUCTION EQUIPMENT	OTHER PROGRAMS	REGIONAL OFFICES IN CANADA		
1955	I	37.34	7.85	23.86	4.15	2.20 <sup>6</sup>	15.48	2.01 <sup>6</sup>	2.85	20.08	1.78	5.34	17.94	21.34	153.80
	II	82.56	16.85	14.52	12.25	0.90	6.53 <sup>6</sup>	5.58	1.85	55.13	1.57	1.37	42.78	12.39	241.22
	III	16.88	27.24 <sup>6</sup>	11.52	22.48	4.67	2.33	6.92	4.86	33.17	1.56	1.42	20.41	18.40	115.38
	IV	60.92	0.55 <sup>6</sup>	55.77	15.24	3.04	24.69	0.34	0.04	19.49	1.67	1.18	19.32	10.48	213.64
1956	I	79.43	22.47 <sup>6</sup>	13.34	2.39	2.04	13.57	0.01	2.38	30.95	0.94	0.80	22.94	19.63	165.95
	II	60.40 <sup>6</sup>	0.30	19.79	32.61	2.13 <sup>6</sup>	1.93	3.26	0.74	18.48	1.41	0.94	19.81	12.30	53.05
	III	36.61	4.11 <sup>6</sup>	6.40 <sup>6</sup>	5.40	1.47	1.32	2.73	3.07	17.61	0.61	1.55	34.63	16.22	110.71
	IV	38.00	4.70	7.11	6.42	4.04	26.74	1.57	0.06	8.00	1.26	1.31	10.70	13.25	123.16
1957	I	21.73	1.60	66.87	13.54	3.46	18.71	1.98	1.31	6.81	0.77	0.72	23.18	19.24	179.92
	II	61.47	4.11	41.65	8.44	2.27	1.40	4.26	0.03	9.31	0.42	0.18	19.43	12.58	165.55
	III	66.33	6.21	16.87	24.50	3.24	0.90 <sup>6</sup>	0.61	1.21	4.53	0.43	1.14	6.85	17.75	148.77
	IV	96.76	0.32 <sup>6</sup>	0.76 <sup>6</sup>	9.44	0.14	24.44	0.41	0.03	5.35	0.29	0.89	10.47	12.74	154.88
1958	I	221.70	17.37	50.62	40.29	1.48	17.09	1.05	2.12	14.39	0.36	4.10	38.12	18.83	427.52
	II	7.52	14.57	3.81	21.36	2.83	2.85 <sup>6</sup>	2.01	1.47	16.33	0.67	0.54	7.24	12.54	88.04
	III	19.23	1.53 <sup>6</sup>	4.70	39.42	0.95	0.73	0.63	1.35	25.94	0.71	1.35	3.34	16.91	113.73
	IV	40.70	5.19	47.89	3.32	0.13 <sup>6</sup>	23.14	0.92	0.60	18.13	0.24	0.43	10.03	13.74	164.20
1959	I	7.07	2.08	2.01	1.10	0.11	2.10	0.05	0.09	4.07	0.23	0.70	3.90	6.60	30.11
	II	3.23 <sup>6</sup>	0.77	2.30	8.18	0.22 <sup>6</sup>	2.36 <sup>6</sup>	0.97	2.63	24.50	0.58	1.15	20.68	18.95	76.90
	III	136.70	6.20	12.93 <sup>6</sup>	3.26	3.08	2.18 <sup>6</sup>	2.00	0.90	7.60	0.54	1.02	4.65	20.15	170.99
	IV	54.63	6.01	11.08	5.08	1.88	23.84	0.45	1.25	6.48	1.40	2.00	10.12	16.00	145.22

TABLE 17 (CONT.)

YEAR	PROCUREMENT PROGRAMS													TOTAL
	AIRCRAFT	ARMAMENT	ELECTRONICS & COMMUNICATION	SHIPS	TANK- MOTORIVE - RAILWAY	FUELS & LUBRICANTS	CLOTHING & EQUIPASE	FOOD & SUBSISTENCE	CONSTRUCTION	CONSTRUCTION EQUIPMENT	PRODUCTION EQUIPMENT	OTHER PROGRAMS	REGIONAL OFFICES IN CANADA	
1960 I	249.37	2.47	46.14	28.51	0.24	15.36	1.48	15.31	15.38	4.24	0.97	18.28	18.22	415.97
II	26.54	11.83	7.91	7.79	2.42	0.69	1.48	2.25	10.49	1.12	0.56	7.46	12.31	92.85
III	9.32	3.14	15.94	3.24	1.71	0.48	2.43	1.33	11.45	0.38	0.68	4.23	15.26	69.59
IV	35.16	1.16	20.05	6.82	1.35	21.33	0.92	0.48	14.10	1.00	0.62	5.54	13.36	121.89
1961 I	97.39	6.07	38.02	9.27	7.97	18.07	3.03	17.08	12.62	0.87	1.52	20.12	19.48	251.51
II	20.21	2.93	19.19	4.81	1.67 <sup>u</sup>	1.95	2.10	1.39	30.99	0.77	0.69	4.62	10.90	98.88
III	7.07	0.38	13.09	4.03	1.24	1.23	2.76	0.24	11.79	2.22	1.70	6.96	14.60	67.31
IV	72.35	3.92	13.40	6.93	2.71	25.99	8.23	0.94	9.45	1.64	1.92	7.40	12.67	167.55
1962 I	38.73	20.55	41.86	13.48	3.36	15.07	4.85	18.11	5.33	2.66	2.63	10.92	20.14	197.69
II	71.62	4.38	7.03	7.93	4.83	3.02	4.66	1.01	9.51	1.37	0.87	8.38	11.93	136.54
III	4.56	1.09	3.16	4.70	0.66	0.46 <sup>u</sup>	0.51 <sup>u</sup>	0.65 <sup>u</sup>	1.94	0.25	0.98	3.20	15.02	33.94
IV	55.21	0.83	8.05	3.44	0.24	16.79	0.97	0.56	4.12	1.16	0.65	4.55	9.76	106.33
1963 I	96.04	80.53	47.90	62.75	2.91	22.63	2.95	21.26	13.93	1.54	3.32	13.29	17.36	386.41
II	13.02	6.53	43.82	17.53	2.57	2.83	2.32	1.51	4.90	0.62	0.92	5.38	12.27	114.22
III	4.40 <sup>u</sup>	6.52	14.50	0.94	8.92	1.78	2.34	1.17	5.96	2.05	1.68	5.19	12.23	58.88
IV	21.57	63.15 <sup>u</sup>	13.37	45.98	2.21	17.41	3.37	0.38	2.52	0.64	4.65	3.70	14.74	67.39
1964 I	144.16	4.11	27.36	1.92 <sup>u</sup>	17.50	18.48	2.16	16.68	6.47	1.29	1.07	5.40	18.25	261.01
II	7.93	7.41	35.55	4.89	1.13	4.30	6.22	2.89	6.24	0.81	4.18	4.78	12.26	98.59
III	8.13	2.80	12.09	13.24	1.42	2.82	2.20	0.04 <sup>u</sup>	8.13	1.13	1.14	5.59	12.88	71.53
IV	59.38	15.00	22.18	3.53	29.27	24.69	1.85	1.89	2.02	1.17	1.63	5.44	12.53	180.58

TABLE 17 CONT.

PROCUREMENT PROGRAMS		AIRCRAFT	ARMAMENT	ELECTRONICS + COMMUNICATION	SHIPS	TANK- MOTORIVE - RAILWAY	FUELS + LUBRICANTS	CLOTHING + EQUIPAGE	FOOD + SUBSISTENCE	CONSTRUCTION	CONSTRUCTION EQUIPMENT	PRODUCTION EQUIPMENT	OTHER PROGRAMS	REGIONAL OFFICES IN CANADA	TOTAL
YEAR															
1965	I	50.29	13.49	39.10	6.73	2.75 <sup>h</sup>	12.76	2.76	15.86	7.96	1.21	2.80	6.61	19.34	176.16
	II	10.94	20.55	28.10	28.63	1.76	0.87	6.82	1.43		1.69	1.52	6.24	9.17	117.72
	III	267.59	10.25	9.94	18.29	3.22	1.65	2.68	0.02		3.04	2.72	3.53	16.09	339.02
	IV	32.51	1.67	15.09	43.68	1.69	1.69	2.01	0.24		7.76	1.14	3.25	12.03	122.76
1966	I	62.43	37.74	51.85	5.75	17.78	14.51	2.55	2.94		2.90	1.80	8.43	18.49	227.17
	II	12.59	16.59	13.89	11.79	1.37	2.17	3.48	1.42		0.81	2.27	8.68	12.28	87.34
	III	11.66	7.32	19.16	48.02	15.83	0.69	1.66	0.02		3.21	1.75	3.69	13.39	126.40
	IV	52.35	20.96	25.63	3.63	0.65 <sup>h</sup>	2.45	2.86	1.09		1.47	1.63	4.28	12.44	128.14
1967	I	24.41	14.56	32.31	3.61	3.14	22.44	2.72	0.53		1.83	1.68	6.02	14.35	127.60
	II	25.40	20.22	20.28	8.35	1.58	8.15	1.81	1.34		1.34	1.29	7.93	17.89	115.58
	III	73.44	7.83	6.43	16.49	4.61	2.21	1.94	-		0.72	2.47	3.36	10.92	130.42
	IV	11.65	12.92	10.05	2.04	2.44	3.07	0.78	0.99		0.45	4.18	3.50	10.24	62.31
1968	I	60.91	9.93	36.88	7.14	1.05	22.75	1.84	0.67		0.12	3.58	18.49	15.44	178.80
	II	1.87	1.12	8.27	5.85	2.22	7.95	0.34	1.11		0.13	1.05	9.50	11.56	50.97
	III	3.97	10.08	5.24	2.94	3.22 <sup>h</sup>	2.07	0.75	0.13		0.34	5.52	4.69	12.38	44.89
	IV	10.56	2.92	4.57	2.04	0.63 <sup>h</sup>	0.19 <sup>h</sup>	15.12	0.88		1.48	3.20	3.27	10.96	54.18

SOURCE: I APPEND. 'C'

TABLE 18 D.N.D CONTRACTS PLACED BY PROCUREMENT PROGRAMS - QUARTERLY  
1950 - 1968  
( IN MILLIONS OF DOLLARS )

PROCUREMENT PROGRAMS		AIRCRAFT	ARMAMENT	ELECTRONICS + COMMUNICATION	SHIPS	TANK- AUTOMOTIVE - RAILWAY	FUELS + LUBRICANTS	CLOTHING + EQUIPAGE	FOOD + SUSISTENCE	CONSTRUCTION	CONSTRUCTION EQUIPMENT	PRODUCTION EQUIPMENT	OTHER PROGRAMS	REGIONAL OFFICES IN CANADA	TOTAL
YEAR															
1950	I	60.86	1.81	16.58	4.56	1.56	3.79	6.28	2.53	12.75	4.32	*	6.70		121.74
	II	77.62	1.40	21.08	8.55	1.08	4.84	8.01	3.23	16.25	5.50	0.02	8.54		156.12
	III	52.07	2.99	14.47	12.51	4.77	3.26	5.40	2.18	10.95	3.71	0.01	5.75		118.07
	IV	52.90	19.03	12.19	12.61	34.81	3.29	5.44	2.19	11.05	3.74	0.03	5.80		163.08
1951	I	140.27	13.39	38.27	33.56	12.81	8.75	14.48	5.84	29.40	9.95	0.06	15.44	-	322.22
	II	130.01	43.84	22.96	25.44	14.41	7.68	33.10	0.94	41.40	7.88	3.93	13.42	15.16	360.17
	III	180.07	61.20	33.52	35.52	20.13	10.73	46.21	1.31	57.81	11.00	5.48	18.38	21.09	502.45
	IV	130.10	44.13	23.88	25.60	14.51	7.73	33.32	0.94	41.68	7.93	3.95	12.51	15.20	361.48
1952	I	142.87	48.83	27.54	28.34	16.06	8.56	36.87	1.04	46.12	8.78	4.37	14.50	16.84	400.72
	II	25.10	12.65	49.24	9.79	16.44	20.38	8.59	1.21	27.55	2.52	4.01	7.20	15.19	199.87
	III	120.10	27.92	24.83	28.96	25.48	3.70	3.64	0.36	55.12	1.29	3.00	6.13	13.91	314.44
	IV	291.56	47.48	29.71	11.09	30.70	1.00	7.69	0.49	49.41	3.11	3.31	7.00	12.18	494.73
1953	I	110.39	11.50	12.45	9.72	29.74	18.48	11.87	1.07	21.84	1.78	3.33	8.28	13.83	254.28
	II	37.49	53.44	39.20	33.19	3.15	16.07	2.69	0.80	20.63	1.24	1.64	4.81	12.54	226.89
	III	45.00	10.88	27.87	8.52	11.91	7.14	2.72	0.05	29.02	0.69	2.46	5.65	12.38	164.49
	IV	50.01	5.80	37.49	23.18	9.07	2.87	6.58	0.80	16.72	3.05	1.57	4.02	12.02	173.18
1954	I	258.85	11.99	31.71	30.31	28.92	22.39	7.08	1.12	11.18	1.08	2.88	7.44	14.58	429.53
	II	99.61	15.16	28.39	23.83	15.42	13.35	2.90	1.64	33.87	1.14	1.94	6.61	16.01	259.87
	III	82.27	25.68	20.00	4.63	3.62	5.45	1.77	0.49	28.25	0.65	1.58	6.26	14.43	195.08
	IV	230.14	5.77	22.83	7.45	8.45	2.66	2.61	2.05	28.88	1.88	1.76	8.15	14.28	336.91

TABLE 18 (CONT.)

PROCUREMENT PROGRAMS		AIRCRAFT	ARMAMENT	ELECTRONICS & COMMUNICATION	SHIPS	TANK-AUTOMOTIVE-RAILWAY	FUELS & LUBRICANTS	CLOTHING & EQUIPAGE	FOOD & SUBSISTENCE	CONSTRUCTION	CONSTRUCTION EQUIPMENT	PRODUCTION EQUIPMENT	OTHER PROGRAMS	REGIONAL OFFICES IN CANADA	TOTAL
YEAR															
1955	I	79.10	21.73	10.08	36.15	5.48	24.01	12.45	0.80	16.46	1.08	2.74	12.89	15.94	238.91
	II	44.39	1.40	37.45	4.78	1.18	19.90	2.87	1.02	46.33	1.16	1.37	7.67	19.12	188.64
	III	33.30	8.28	22.11	8.40	2.73	6.07	3.04	0.34	39.86	0.86	1.30	10.62	15.86	152.77
	IV	18.00	10.42	23.13	24.31	4.25	1.42	6.91	2.37	31.83	2.20	1.91	5.58	13.55	145.88
1956	I	75.01	4.65	29.08	7.79	4.40	28.07	3.24	0.33	25.28	1.87	1.79	3.12	15.61	200.24
	II	17.58	9.63	36.48	6.45	2.08	21.90	2.36	0.49 <sup>u</sup>	28.97	1.82	1.62	8.22	19.07	155.71
	III	55.08	3.46	25.71	37.20	1.86	5.51	2.67	0.41	38.66	2.25	0.85	10.12	15.26	199.04
	IV	98.05	0.51	19.29	8.46	3.06	5.45	3.46	2.09	27.72	1.04	2.76	6.60	13.02	191.51
1957	I	48.79	21.55 <sup>u</sup>	35.06	12.31	3.17	29.31	1.98	1.09	16.78	1.31	2.11	6.08	14.59	151.03
	II	71.10	2.89	40.72	15.00	4.10	19.87	1.11	0.70	23.29	3.69	1.69	8.22	19.04	211.42
	III	55.09	5.11	29.36	17.10	1.74	5.56	2.08	0.85	11.17	1.89	1.67	7.01	15.31	153.94
	IV	23.41	1.92	23.06	10.54	1.32	0.33	2.08	1.30	5.37	1.51	1.71	5.29	11.82	89.66
1958	I	80.10	1.72	45.30	8.38	2.29	25.94	1.37	0.49	9.85	2.38	4.04	5.72	14.30	201.88
	II	158.43	19.78	39.78	32.45	2.82	17.92	0.60	0.84	14.81	2.40	0.70	6.56	19.57	316.66
	III	47.14	7.79	26.08	26.96	2.08	5.37	2.87	0.76	13.87	0.90	1.29	9.54	14.45	159.10
	IV	22.21	1.70	29.29 <sup>u</sup>	8.56	1.53	1.50	0.92	1.42	24.70	2.53	0.84	3.66	12.72	53.00
1959	I	55.21	6.33	7.08	0.96	1.12	20.25	16.07	0.94	16.87	1.34	1.50	5.25	14.79	147.71
	II	61.36	0.32	51.01	10.15	2.05	26.83	0.06	0.99	17.80	1.22	1.58	12.10	19.93	205.40
	III	30.02	10.62	15.26	6.94	0.59	1.56	1.15	1.65	20.81	1.57	1.50	6.81	14.43	112.91
	IV	62.12	1.61	15.74	7.14	2.16	5.93	1.16	0.93	7.91	1.82	1.29	5.36	12.38	125.55

TABLE 18 (CONT.)

YEAR	PROCUREMENT PROGRAMS	AIRCRAFT	ARMAMENT	ELECTRONICS or COMMUNICATION	SHIPS	TANK- AUTOMOTIVE - RAILWAY	FUELS + LUBRICANTS	CLOTHING + EQUIPASE	FOOD + SUBSISTENCE	CONSTRUCTION	CONSTRUCTION EQUIPMENT	PRODUCTION EQUIPMENT	OTHER PROGRAMS	REGIONAL OFFICES IN CANADA	TOTAL
		1960	I	253.77	7.46	63.91	24.59	1.63	24.69	1.26	1.08	2.98	1.72	2.18	7.66
	II	37.00	3.36	22.89	38.45	0.62 <sup>5</sup>	13.89	1.01	0.32	17.70	2.53	1.14	6.01	17.63	161.31
	III	33.08	8.06	33.01	13.98	1.59	2.69	2.02	1.44	20.80	3.25	1.07	5.52	14.30	140.81
	IV	25.08	1.81	24.32	5.73	2.45	6.14	1.64	0.77	6.48	0.92	0.63	4.79	12.57	93.33
1961	I	55.02	0.30	22.51	1.76	2.48	20.24	1.16	0.98	7.41	2.00	1.92	4.80	15.22	135.80
	II	31.88	5.10	50.01	15.11	1.46	12.95	2.39	0.49	19.92	2.35	3.57	9.44	18.02	172.69
	III	9.97	3.59	34.96	4.47	0.86	3.50	1.97	1.14	40.70	0.21	1.63	6.92	13.20	123.12
	IV	6.96	3.26	20.75	5.37	4.29	9.20	6.02	0.71	19.03	0.99	2.68	5.99	12.81	98.06
1962	I	47.84	4.80	20.63	4.67	3.54	20.57	3.23	1.35	13.67	2.14	1.73	7.28	16.71	148.16
	II	40.31	2.81	31.14	8.12	2.19	10.24	2.82	0.59	9.11	3.10	2.49	8.02	20.00	140.94
	III	21.68	16.12	26.08	3.70	0.39	4.55	3.01	1.32	8.94	1.07	1.15	7.92	12.93	108.36
	IV	86.58	1.68	16.93	10.59	0.92	0.18	3.40	0.53	4.13	2.18	2.68	5.55	9.73	145.08
1963	I	51.78	3.73	14.45	11.72	3.43	18.29	2.44	1.54	7.82	0.65	1.34	4.54	13.94	136.17
	II	78.71	3.01	40.69	21.08	2.16	20.51	2.90	0.72	7.96	2.99	1.91	8.74	16.64	208.02
	III	2.69	2.45	38.75	2.49	4.37	2.98	2.55	1.18	5.57	1.07	1.86	4.91	14.36	85.23
	IV	23.84	4.87	21.41	5.19	5.92	1.97	2.53	0.49	8.47	1.34	1.72	4.10	11.00	92.85
1964	I	77.56	5.41	13.43	14.47	18.29	19.76	2.74	1.50	5.02	1.68	3.10	3.76	14.23	180.95
	II	57.33	7.97	52.82	3.92	2.37	12.19	2.51	0.71	11.46	1.79	5.32	6.44	16.70	181.53
	III	9.15	0.78	18.85	9.12	4.38	5.90	2.19	0.86	8.27	1.08	0.21 <sup>6</sup>	4.14	13.42	77.93
	IV	4.76	10.69	16.53	8.79	0.89	2.87	3.30	0.66	4.78	1.73	1.97	3.35	10.21	70.53

TABLE 18 (CONT.)

PROCUREMENT PROGRAMS		AIRCRAFT	ARMAMENT	ELECTRONICS & COMMUNICATION	SHIPS	TANK - AUTOMOTIVE - RAILWAY	FUELS & LUBRICANTS	CLOTHING & EQUIPAGE	FOOD & SUBSISTENCE	CONSTRUCTION	CONSTRUCTION EQUIPMENT	PRODUCTION EQUIPMENT	OTHER PROGRAMS	REGIONAL OFFICES IN CANADA	TOTAL
YEAR															
1965	I	20.89	5.85	19.68	26.11	8.52	23.68	2.44	1.49	2.63	1.82	3.98	4.83	14.05	135.97
	II	46.77	5.38	44.26	6.39	2.82	11.53	3.16	0.54		1.60	0.97	5.30	14.46	143.18
	III	19.52	4.04	25.49	5.13	2.32	2.06	3.88	0.67		1.83	2.04	5.11	13.71	85.80
	IV	35.03	12.44	18.99	13.03	2.22	2.48	4.52	0.86		2.16	2.58	4.33	9.94	108.58
1966	I	50.44	3.70	31.35	11.35	13.98	12.32	3.94	0.82		2.77	2.29	5.88	15.69	154.53
	II	46.97	3.93	28.68	5.44	2.14	21.83	2.88	1.12		2.50	1.73	8.47	18.05	143.74
	III	57.55	23.00	36.60	15.83	0.69	3.40	3.96	0.74		1.89	2.46	7.25	14.09	167.46
	IV	47.10	14.71	18.29	60.48	3.02	1.86	1.87	0.71		3.14	2.24	5.36	10.21	168.99
1967	I	27.76	23.09	21.82	48.57	2.03	2.16	2.99	0.87		3.12	3.73	6.16	14.82	157.12
	II	50.50	4.82	53.80	13.50	4.99	27.17	2.33	0.41		1.02	2.54	8.69	19.25	189.02
	III	35.86	4.48	14.49	6.49	2.20	6.48	2.91	0.82		1.34	6.68	11.75	13.74	112.24
	IV	72.66	16.06	11.47	2.64	7.80	2.75	1.19	1.10		0.68	4.50	6.35	9.93	137.13
1968	I	19.91	6.05	13.41	4.85	2.99	3.27	1.09	0.51		0.54	2.06	4.92	14.23	73.83
	II	0.38	2.10	30.99	62.68	4.85	22.55	2.16	0.81		1.36	3.02	27.66	16.37	174.93
	III	15.70	3.88	26.26	3.62	3.89	8.78	0.72	0.43		0.43	1.93	9.24	11.51	86.39
	IV	21.89	4.92	9.25	4.21	0.50 <sup>6</sup>	2.33	0.51	0.74		0.51	4.77	5.51	8.63	62.77

SOURCE 2 APPEND. "C"

TABLE 19 D.N.D. EXPENDITURES AGAINST CONTRACTS BY PROCUREMENT PROGRAMS - QUARTERS  
1950-1968  
( IN MILLIONS OF DOLLARS )

YEAR	PROCUREMENT PROGRAMS	AIRCRAFT	ARMAMENT	ELECTRONICS & COMMUNICATION	SHIPS	TANK-AUTOMOTIVE-RAILWAY	FUELS & LUBRICANTS	CLOTHING & EQUIPASE	FOOD & SUBSISTENCE	CONSTRUCTION	CONSTRUCTION EQUIPMENT	PRODUCTION EQUIPMENT	OTHER PROGRAMS	REGIONAL OFFICES IN CANADA	TOTAL
		1950	I	8.91	0.96	4.26	2.32	0.75	3.76	2.61	2.53	7.20	4.09	0.01	3.33
	II	12.65	1.57	6.92	2.87	1.02	2.56	4.90	1.16	8.44	2.20	0.02	3.52	-	47.83
	III	23.94	3.27	5.84	3.02	5.15	3.47	2.13	3.27	19.60	5.78	0.01	7.29	-	82.77
	IV	20.13	12.40	3.00	13.08	30.98	5.26	3.79	3.06	13.58	4.68	0.02	8.20	-	118.18
1951	I	35.57	3.84	6.80	7.37	19.78	10.06	8.94	4.45	32.23	7.85	1.47	7.58	-	145.94
	II	42.08	7.68	7.95	8.53	5.63	3.93	11.04	3.06	18.75	3.68	2.73	11.54	-	126.60
	III	67.02	12.13	11.96	13.46	8.88	6.20	17.42	4.83	29.59	5.80	4.32	18.23	-	199.84
	IV	67.62	12.34	12.79	13.71	9.04	6.31	17.74	4.91	30.13	5.90	4.40	18.55	-	203.44
1952	I	124.42	22.73	23.53	25.22	16.64	11.61	32.64	9.04	55.43	10.87	8.09	34.11	-	374.33
	II	73.42	6.00	8.62	9.90	10.27	2.98	21.07	1.12	28.54	3.18	2.91	7.47	10.12	185.60
	III	82.69	6.85	19.02	16.40	15.73	6.54	22.56	0.47	57.66	3.57	2.82	9.08	14.34	257.73
	IV	117.56	13.07	19.72	20.27	20.57	8.30	18.68	0.25	58.74	4.99	3.38	10.71	12.75	308.99
1953	I	161.54	41.18	37.89	49.53	48.72	16.37	16.46	0.76	71.38	7.72	6.80	6.56	17.89	482.80
	II	90.16	6.48	15.87	15.10	5.44	4.11	9.71	0.47	24.93	2.20	1.19	3.06	8.56	187.28
	III	122.39	8.08	21.02	18.82	10.60	6.52	8.30	1.29	41.81	2.95	2.86	2.26	12.53	259.43
	IV	127.01	16.70	30.49	23.78	7.77	10.16	6.21	0.45	33.11	2.67	2.62	4.62	12.14	277.73
1954	I	147.76	43.19	44.97	47.98	23.39	20.50	8.10	0.98	27.24	0.24	2.93	12.39	18.58	398.25
	II	78.34	9.04	16.03	14.38	4.12	3.96	3.67	0.17	11.66	1.41	3.24	2.99	10.47	159.48
	III	83.05	10.90	25.30	12.35	13.16	7.80	3.82	1.77	23.96	1.24	1.95	4.83	14.86	204.99
	IV	107.30	21.50	25.61	19.28	9.98	9.44	4.65	0.65	28.34	1.25	2.66	8.42	14.32	253.41

TABLE 19 (CONT.)

PROCUREMENT PROGRAMS		AIRCRAFT	ARMAMENT	ELECTRONICS & COMMUNICATION	SHIPS	TANK-AUTOMOTIVE - RAILWAY	FUELS & LUBRICANTS	CLOTHING & EQUIPAGE	FOOD & SUBSISTENCE	CONSTRUCTION	CONSTRUCTION EQUIPMENT	PRODUCTION EQUIPMENT	OTHER PROGRAMS	REGIONAL OFFICES IN CANADA	TOTAL
YEAR															
1955	I	128.74	45.59	48.03	35.64	13.78	15.45	3.59	1.67	26.94	2.93	2.95	11.35	20.70	357.36
	II	78.23	5.82	15.21	11.05	3.76	7.95	3.84	0.36	16.10	0.66	1.46	4.26	12.02	160.72
	III	90.69	14.91	24.68	18.76	6.55	10.91	5.57	0.88	27.66	1.15	1.34	7.36	17.84	228.30
	IV	81.26	17.43	30.72	22.75	9.29	10.49	5.34	0.96	35.08	1.08	1.61	6.10	14.00	236.11
1956	I	115.31	35.05	48.06	31.82	7.42	14.66	5.82	1.47	39.81	2.50	2.85	7.01	20.28	332.06
	II	58.31	5.40	24.15	12.30	3.34	7.16	3.37	0.39	23.12	1.65	1.49	3.40	12.71	156.79
	III	72.99	11.78	37.62	16.02	5.24	9.67	3.47	1.00	45.56	2.07	1.05	5.99	16.76	229.22
	IV	84.77	12.69	30.56	19.80	4.37	12.99	2.96	0.45	47.04	2.17	1.75	7.25	13.70	240.44
1957	I	111.49	26.87	48.65	39.68	5.96	16.56	3.77	1.86	42.27	3.55	2.35	9.39	18.79	331.19
	II	56.55	3.03	17.53	7.18	1.97	7.13	2.42	0.60	17.26	2.07	1.05	5.30	12.29	134.38
	III	85.89	8.84	22.20	16.14	1.66	10.05	1.98	0.79	25.07	1.75	1.28	7.46	17.34	200.45
	IV	93.72	7.91	25.09	19.79	2.46	10.92	2.12	0.92	17.07	1.88	1.90	7.42	12.44	203.64
1958	I	109.56	20.43	49.34	20.56	3.50	17.56	2.96	1.25	11.84	2.85	3.53	7.85	18.39	269.62
	II	67.98	4.31	15.45	9.07	1.06	6.42	1.23	0.51	5.60	1.20	1.30	4.58	12.24	130.95
	III	76.95	10.82	22.83	10.51	2.25	9.48	1.12	0.81	13.09	2.05	1.79	5.37	16.51	173.58
	IV	89.70	7.39	24.32	9.01	3.14	9.90	1.42	0.80	14.29	2.03	1.30	6.86	13.42	183.58
1959	I	90.56	24.52	41.76	15.93	2.41	13.77	17.02	1.08	13.70	3.79	2.50	6.63	19.36	253.03
	II	49.79	7.84	23.96	5.04	0.83	6.31	1.25	0.65	8.41	1.37	1.31	5.28	12.98	125.02
	III	51.70	8.16	21.79	6.65	0.88	7.93	0.99	0.69	19.47	2.12	1.23	5.24	15.78	142.63
	IV	53.70	10.06	23.35	6.63	1.48	9.22	1.01	0.99	22.37	1.05	1.29	7.91	13.71	152.77

TABLE 19 (CONT.)

PROCUREMENT PROGRAMS		AIRCRAFT	ARMAMENT	ELECTRONICS & COMMUNICATION	SHIPS	TANK-AUTOMOBILE-RAILWAY	FUELS & LUBRICANTS	CLOTHING & EQUIPME	FOOD & SUBSISTENCE	CONSTRUCTION	CONSTRUCTION EQUIPMENT	PRODUCTION EQUIPMENT	OTHER PROGRAMS	REGIONAL OFFICES IN CANADA	TOTAL
YEAR															
1960	I	104.59	10.33	36.46	10.49	3.12	14.01	1.39	0.87	16.77	3.18	2.17	10.81	19.04	233.23
	II	33.91	3.35	14.23	4.99	0.68	6.26	0.63	0.71	8.87	1.77	1.02	4.09	11.21	91.72
	III	54.70	9.07	22.14	7.78	1.59	7.35	0.63	0.67	17.69	1.73	1.17	6.87	15.12	146.51
	IV	60.95	4.42	23.75	7.18	1.31	8.34	1.12	1.20	17.29	1.98	0.96	7.39	13.24	149.13
1961	I	74.96	8.92	41.91	16.15	2.62	13.55	1.80	0.81	16.29	2.76	2.01	8.37	20.15	210.30
	II	43.75	3.54	21.80	5.86	0.93	6.40	1.68	0.73	8.60	1.85	0.94	4.46	11.20	111.74
	III	41.73	4.18	35.01	9.14	1.36	7.22	1.52	0.74	17.65	1.97	1.24	3.77	15.10	140.63
	IV	47.70	6.36	35.99	14.05	1.59	7.78	1.75	1.13	21.77	1.37	1.97	6.07	13.18	160.71
1962	I	67.22	6.75	49.51	20.59	2.73	12.82	3.34	0.84	26.45	3.91	4.63	7.49	21.27	227.55
	II	37.84	2.09	18.78	7.19	1.28	5.73	1.81	0.72	13.59	1.46	2.09	4.71	12.60	109.89
	III	35.56	3.37	26.92	12.82	1.89	7.16	2.40	0.95	21.15	2.19	1.93	5.77	15.86	137.97
	IV	36.80	3.68	29.05	12.12	2.00	8.88	2.85	1.05	15.95	1.01	1.55	5.73	10.31	130.98
1963	I	57.01	10.34	42.09	19.17	4.45	9.00	3.83	0.81	8.54	2.82	2.20	6.42	17.31	183.99
	II	30.72	2.58	19.07	8.88	1.26	4.62	2.39	0.68	3.79	2.11	1.08	4.51	12.23	93.92
	III	32.05	6.18	25.91	11.12	1.23	6.33	2.34	0.94	8.56	0.85	1.34	6.68	12.20	115.73
	IV	41.73	4.98	29.31	12.85	2.06	6.27	3.16	0.63	8.18	2.75	2.03	4.66	14.70	133.31
1964	I	72.94	9.91	49.64	26.55	17.90	8.46	3.93	1.11	8.31	2.24	3.39	7.54	17.61	229.53
	II	26.63	2.64	20.74	4.16	2.74	4.75	1.98	0.62	4.77	2.90	1.57	3.38	11.83	88.71
	III	37.75	2.59	27.71	8.34	1.71	4.94	2.09	0.55	10.33	0.84	1.31	3.52	12.42	114.10
	IV	40.64	2.78	25.81	8.40	1.47	4.86	2.25	0.69	8.45	0.92	1.26	4.27	12.09	113.89

TABLE 19 (CONT)

PROCUREMENT PROGRAMS		AIRCRAFT	ARMAMENT	ELECTRONICS & COMMUNICATION	SHIPS	TANK-PUTS MOTIVE - RAILWAY	FUELS & LUBRICANTS	CLOTHING & EQUIPAGE	FOOD & SUBSISTENCE	CONSTRUCTION	CONSTRUCTION EQUIPMENT	PRODUCTION EQUIPMENT	OTHER PROGRAMS	REGIONAL OFFICES IN CANADA	TOTAL
YEAR															
1965	I	75.61	8.91	40.76	22.79	9.02	8.79	4.82	0.40	7.37	1.17	3.20	3.49	18.03	204.36
	II	19.71	3.22	16.89	4.76	0.78	3.74	1.95	1.55		1.80	1.82	3.31	8.55	68.08
	III	25.84	5.92	25.21	8.95	1.95	4.47	1.98	0.74		1.38	1.89	3.65	15.00	96.98
	IV	29.40	4.70	22.52	8.61	1.69	4.65	2.79	0.61		1.29	1.45	4.41	11.21	93.33
1966	I	61.41	9.93	43.43	14.79	22.31	6.62	3.78	0.95		2.02	3.14	6.33	19.05	193.76
	II	14.91	3.63	13.52	8.22	2.49	2.91	2.06	0.46		1.92	1.79	3.70	12.65	68.26
	III	30.34	2.98	23.55	8.49	1.85	4.57	2.48	0.95		2.11	2.37	4.80	13.79	98.28
	IV	42.74	4.19	29.07	14.10	3.26	5.11	2.80	0.67		1.80	2.14	4.67	12.81	123.36
1967	I	60.43	10.39	35.08	16.92	4.93	6.59	5.66	0.77		2.79	3.22	7.02	17.91	171.71
	II	21.41	3.14	11.48	5.55	3.22	4.26	2.76	0.35		1.73	1.67	3.84	22.33	81.74
	III	44.86	4.68	21.35	13.19	2.43	4.51	2.79	0.44		1.63	2.63	4.77	13.63	116.91
	IV	52.32	9.57	25.42	7.67	2.17	4.93	2.73	0.73		1.02	3.74	6.14	12.77	129.21
1968	I	54.31	18.27	28.80	18.31	6.18	5.89	2.91	0.86		2.73	4.92	8.29	17.03	168.50

SOURCE: 2 APPEND. "C"

APPENDIX "B"

TABLES AND CHARTS FOR:

(2) A SUMMARY OF RESULTS OF  
COMPUTER EXPERIMENTS

TABLE 20(a) SUMMARY STATISTICS : EXPENDITURES ESTIMATED OF LAGGED VALUES  
OF CONTRACTS  
AIRCRAFT PROGRAM

LAGGED QUARTERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NO. OF VARIABLES ... ..				6	7	8	9	10	11	12	13	14	15	16	17	18
NO. OF OBSERVATIONS...				69	68	67	66	65	64	63	62	61	60	59	58	57
VARIANCE ... ..				559.50	528.22	508.46	484.38	428.38	433.14	441.60	441.61	438.56	382.19	397.82	401.34	333.08
STANDARD ERROR OF ESTIMATES ... ..				23.65	22.98	22.55	22.01	20.70	20.81	21.01	21.01	20.94	19.55	19.95	20.03	18.25
COEFFICIENT OF VARIATIONS ... ..				34.81	33.59	32.77	31.97	30.06	30.61	30.95	31.06	31.33	29.95	30.76	31.37	29.08
$R^2$ ... ..				0.52	0.56	0.58	0.62	0.67	0.67	0.67	0.68	0.69	0.70	0.69	0.69	0.73
$R^2$ - ADJUSTED ... ..				0.48	0.51	0.53	0.56	0.62	0.60	0.60	0.61	0.60	0.60	0.59	0.56	0.62
DURBIN-WATSON ... ..				1.42	1.54	1.67	1.87	1.90	1.88	1.92	2.01	1.82	1.88	1.90	2.09	2.16
NO. OF SIGNIFICANT COEFF. OF REGRESSION ... ..				4	4	4	5	4	4	5	3	4	6	5	3	4

TABLE 20(b) SUMMARY STATISTICS : VALUE OF CONTRACTS ESTIMATED OF LAGGED VALUES  
 OF CONTRACT DEMANDS.  
 AIRCRAFT PROGRAM

LAGGED QUARTERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NO. OF VARIABLES ...				6	7	8	9	10	11	12	13	14	15	16	17	18
NO. OF OBSERVATIONS...				69	68	67	66	65	64	63	62	61	60	59	58	57
VARIANCE ... ..				2233.05	2253.57	2236.51	2089.30	1933.71	1924.99	1868.28	1928.64	1421.76	1467.83	1514.92	1574.16	1584.13
STANDARD ERROR OF ESTIMATES ... ..				47.26	47.47	47.29	45.71	43.97	43.87	43.22	43.92	37.71	38.31	38.92	39.70	39.80
COEFFICIENT OF VARIATIONS... ..				69.44	70.87	71.61	71.07	69.46	70.70	68.99	71.15	65.06	67.12	67.79	68.89	68.91
$R^2$ ... ..				0.45	0.45	0.46	0.49	0.53	0.54	0.57	0.56	0.59	0.59	0.59	0.59	0.61
$R^2$ - ADJUSTED ... ..				0.40	0.39	0.40	0.41	0.46	0.45	0.47	0.46	0.48	0.46	0.45	0.43	0.44
DURBIN-WATSON ...				1.83	1.88	1.92	1.95	1.99	2.06	2.09	1.94	2.17	2.16	2.16	2.12	2.11
NO. OF SIGNIFICANT COEFF OF REGRESSION ... ..				3	3	3	3	4	4	4	3	4	4	3	4	4

TABLE 21(a) SUMMARY STATISTICS : EXPENDITURES ESTIMATED OF LAGGED VALUES  
OF CONTRACTS  
ARMAMENT PROGRAM

LAGGED QUARTERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NO. OF VARIABLES ... ..				6	7	8	9	10	11	12	13	14	15	16	17	18
NO. OF OBSERVATIONS...				69	68	67	66	65	64	63	62	61	60	59	58	57
VARIANCE ... ..				87.79	83.96	79.26	78.45	77.42	66.89	65.45	65.61	67.87	52.52	52.96	54.62	56.28
STANDARD ERROR OF ESTIMATES ... ..				9.37	9.16	8.90	8.86	8.80	8.18	8.09	8.10	8.24	7.24	7.28	7.39	7.50
COEFFICIENT OF VARIATIONS ... ..				88.79	86.03	83.24	82.98	82.63	78.20	76.83	76.50	78.98	72.20	72.07	72.93	74.88
$R^2$ ... ..				0.10	0.16	0.23	0.27	0.30	0.41	0.44	0.46	0.46	0.52	0.54	0.55	0.55
$R^2$ - ADJUSTED ... ..				0.03	0.08	0.15	0.17	0.19	0.29	0.32	0.33	0.31	0.38	0.38	0.37	0.36
DURBIN-WATSON ... ..				1.86	1.99	2.07	2.06	1.98	2.09	2.20	2.18	2.16	2.38	2.41	2.41	2.33
NO. OF SIGNIFICANT COEFF. OF REGRESSION ... ..				1	2	2	3	4	6	5	4	4	6	3	3	3

TABLE 21(b) SUMMARY STATISTICS : VALUE OF CONTRACTS ESTIMATED OF LAGGED VALUES  
OF CONTRACT DEMANDS.

ARMAMENT PROGRAM

LAGGED QUARTERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NO. OF VARIABLES ...		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
NO. OF OBSERVATIONS...		71	70	69	68	67	66	65	64	63	62	61	60	59	58	57
VARIANCE ... ..		91.82	87.39	80.57	77.89	73.60	74.63	68.48	61.47	63.03	64.93	57.36	56.39	52.31	54.18	54.23
STANDARD ERROR OF ESTIMATES ... ..		9.58	9.35	8.98	8.83	8.58	8.64	8.28	7.84	7.94	8.06	7.57	7.51	7.23	7.36	7.36
COEFFICIENT OF VARIATIONS... ..		86.14	83.17	80.67	79.55	80.90	87.80	88.87	90.18	91.99	96.85	98.64	98.63	xxx	xxx	xxx
$R^2$ ... ..		0.55	0.59	0.63	0.65	0.65	0.57	0.57	0.54	0.55	0.53	0.48	0.51	0.26	0.27	0.30
$R^2$ - ADJUSTED ... ..		0.53	0.56	0.60	0.62	0.61	0.51	0.50	0.46	0.45	0.41	0.34	0.36	0.003	-0.02	-0.004
DURBIN-WATSON ...		2.29	2.07	2.01	2.13	2.11	2.13	2.05	2.12	2.12	2.14	2.16	2.00	1.99	1.94	1.96
NO. OF SIGNIFICANT COEFF. OF REGRESSION ... ..		3	4	5	6	5	6	4	5	4	3	3	2	1	0	1

TABLE 22(a) SUMMARY STATISTICS : EXPENDITURES ESTIMATED OF LAGGED VALUES  
OF CONTRACTS  
ELECTRONICS & COMMUNICATIONS PROGRAM

LAGGED QUARTERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NO. OF VARIABLES ... ..					7	8	9	10	11	12	13	14	15	16	17	18
NO. OF OBSERVATIONS...					68	67	66	65	64	63	62	61	60	59	58	57
VARIANCE ... ..					101.67	99.95	86.87	85.00	88.08	86.33	85.95	83.83	86.16	86.08	83.57	92.76
STANDARD ERROR OF ESTIMATES ... ..					10.08	10.00	9.32	9.22	9.38	9.29	9.27	9.16	9.28	9.28	9.41	9.63
COEFFICIENT OF VARIATIONS ... ..					37.08	36.38	33.63	33.00	33.50	32.81	32.57	32.00	32.62	32.36	32.68	33.47
$R^2$ ... ..					0.22	0.22	0.32	0.34	0.34	0.34	0.36	0.40	0.40	0.41	0.41	0.42
$R^2$ - ADJUSTED ... ..					0.14	0.13	0.23	0.23	0.21	0.20	0.20	0.23	0.21	0.20	0.19	0.16
DURBIN-WATSON ... ..					2.08	2.21	2.33	2.40	2.36	2.48	2.47	2.52	2.47	2.58	2.60	2.58
NO. OF SIGNIFICANT COEFF. OF REGRESSION ... ..					3	1	2	3	3	3	2	1	0	1	0	0

TABLE 22(b) SUMMARY STATISTICS : VALUE OF CONTRACTS ESTIMATED OF LAGGED VALUES  
OF CONTRACT DEMANDS.

ELECTRONICS & COMMUNICATIONS PROGRAM

LAGGED QUARTERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NO. OF VARIABLES ...				6	7	8	9	10	11	12	13	14	15	16	17	18
NO. OF OBSERVATIONS...				69	68	67	66	65	64	63	62	61	60	59	58	57
VARIANCE ... ..				166.15	137.19	124.66	112.71	116.26	111.53	115.25	104.48	103.86	96.78	99.74	99.22	96.35
STANDARD ERROR OF ESTIMATES ... ..				12.89	11.71	11.17	10.62	10.78	10.56	10.74	10.22	10.19	9.84	9.99	9.96	9.82
COEFFICIENT OF VARIATIONS... ..				46.93	42.89	40.79	38.92	39.45	38.64	39.79	37.83	37.78	36.15	36.97	36.90	36.61
$R^2$ ... ..				0.18	0.34	0.42	0.49	0.49	0.53	0.51	0.58	0.60	0.63	0.63	0.65	0.67
$R^2$ - ADJUSTED ... ..				0.11	0.27	0.35	0.42	0.41	0.44	0.41	0.47	0.48	0.52	0.51	0.51	0.53
DURBIN-WATSON ...				2.13	1.86	2.06	2.11	2.04	2.05	2.06	2.09	1.92	1.97	1.99	2.11	2.16
N OF SIGNIFICANT COEFF OF REGRESSION ... ..				2	3	3	6	6	6	6	6	6	8	7	7	7

TABLE 23(a) SUMMARY STATISTICS : EXPENDITURES ESTIMATED OF LAGGED VALUES  
OF CONTRACTS  
SHIPS PROGRAM

LAGGED QUARTERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NO. OF VARIABLES ... ..			5	6	7	8	9	10	11	12	13	14	15	16	17	18
NO. OF OBSERVATIONS...			70	69	68	67	66	65	64	63	62	61	60	59	58	57
VARIANCE ... ..			87.13	87.11	87.70	86.79	85.45	79.87	80.87	81.85	82.83	84.53	71.70	73.43	74.67	78.14
STANDARD ERROR OF ESTIMATES ... ..			9.33	9.33	9.36	9.32	9.24	8.94	8.99	9.05	9.10	9.19	8.47	8.57	8.64	8.84
COEFFICIENT OF VARIATIONS ... ..			62.61	62.50	62.24	61.52	60.94	58.83	59.82	59.85	60.29	61.25	58.66	59.41	60.23	62.33
$R^2$ ... ..			0.04	0.07	0.09	0.12	0.16	0.24	0.25	0.26	0.29	0.30	0.27	0.29	0.31	0.30
$R^2$ - ADJUSTED ... ..			-0.02	-0.002	-0.003	0.02	0.04	0.12	0.11	0.11	0.11	0.10	0.05	0.04	0.04	-0.01
DURBIN-WATSON ... ..			1.72	1.73	1.79	1.88	2.01	1.97	1.96	2.01	2.03	1.96	1.99	2.02	2.03	1.89
NO. OF SIGNIFI*ANT COEFF. OF REGRESSION ... ..			1	1	2	2	0	1	1	1	1	1	0	0	0	0

TABLE 23(b) SUMMARY STATISTICS : VALUE OF CONTRACTS ESTIMATED OF LAGGED VALUES  
OF CONTRACT DEMANDS.

SHIPS PROGRAM

LAGGED QUARTERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NO. OF VARIABLES ...				6	7	8	9	10	11	12	13	14	15	16	17	18
NO. OF OBSERVATIONS...				69	68	67	66	65	64	63	62	61	60	59	58	57
VARIANCE ... ..				130.18	132.47	136.43	134.39	130.84	134.21	128.83	133.94	131.21	125.05	122.86	113.28	118.50
STANDARD ERROR OF ESTIMATES ... ..				11.41	11.51	11.68	11.59	11.44	11.58	11.35	11.57	11.45	11.18	11.08	10.64	10.89
COEFFICIENT OF VARIATIONS... ..				74.11	76.08	78.00	79.06	78.91	81.13	79.10	82.00	80.87	78.54	79.65	75.97	78.60
$R^2$ ... ..				0.21	0.20	0.19	0.20	0.24	0.23	0.29	0.27	0.32	0.37	0.39	0.46	0.46
$R^2$ - ADJUSTED ... ..				0.15	0.12	0.10	0.09	0.11	0.08	0.13	0.09	0.13	0.18	0.17	0.25	0.22
DURBIN-WATSON ...				1.63	1.62	1.58	1.67	1.62	1.58	1.57	1.54	1.65	1.47	1.27	1.27	1.24
NO. OF SIGNIFICANT COEFF. OF REGRESSION ... ..				1	1	1	1	2	2	1	2	2	3	4	4	4

TABLE 24(a) SUMMARY STATISTICS : EXPENDITURES ESTIMATED OF LAGGED VALUES  
OF CONTRACTS  
TANK - AUTOMOTIVE - RAILWAY PROGRAM

LAGGED QUARTERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NO. OF VARIABLES ... ..			5	6	7	8	9	10	11	12	13	14	15	16	17	18
NO. OF OBSERVATIONS...			70	69	68	67	66	65	64	63	62	61	60	59	58	57
VARIANCE ... ..			20.66	20.23	19.91	18.79	18.64	16.14	10.26	10.22	10.32	9.16	4.48	4.17	4.22	4.11
STANDARD ERROR OF ESTIMATES ... ..			4.54	4.50	4.46	4.33	4.32	4.02	3.20	3.20	3.21	3.03	2.12	2.04	2.07	2.03
COEFFICIENT OF VARIATIONS ... ..			69.43	72.63	74.45	72.27	72.51	68.01	55.80	56.42	58.38	57.55	46.69	45.19	46.87	46.55
$R^2$ ... ..			0.71	0.68	0.68	0.71	0.72	0.77	0.85	0.86	0.86	0.87	0.86	0.88	0.88	0.88
$R^2$ - ADJUSTED ... ..			0.69	0.66	0.65	0.68	0.68	0.73	0.83	0.83	0.83	0.84	0.82	0.83	0.83	0.83
DURBIN-WATSON ... ..			1.98	2.04	1.86	1.95	1.98	2.23	2.03	2.07	2.10	1.45	2.22	2.14	2.20	2.25
NO. OF SIGNIFICANT COEFF. OF REGRESSION ... ..			1	2	2	1	1	4	3	3	4	5	7	7	6	6

TABLE 24(b) SUMMARY STATISTICS : VALUE OF CONTRACTS ESTIMATED OF LAGGED VALUES  
OF CONTRACT DEMANDS.

TANK - AUTOMOTIVE - RAILWAY PROGRAM

LAGGED QUARTERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NO. OF VARIABLES ...				6	7	8	9	10	11	12	13	14	15	16	17	18
NO. OF OBSERVATIONS ...				69	68	67	66	65	64	63	62	61	60	59	58	57
VARIANCE ... ..				23.48	22.16	21.81	20.26	18.30	16.76	15.07	14.73	13.58	9.94	9.00	9.40	9.70
STANDARD ERROR OF ESTIMATES ... ..				4.85	4.70	4.67	4.50	4.28	4.09	3.88	3.84	3.69	3.15	3.00	3.07	3.11
COEFFICIENT OF VARIATIONS... ..				77.84	76.81	77.78	77.73	75.63	74.51	72.97	76.82	80.58	75.90	71.91	75.94	78.83
$R^2$ ... ..				0.61	0.64	0.65	0.66	0.70	0.73	0.75	0.74	0.69	0.68	0.72	0.72	0.71
$R^2$ - ADJUSTED ... ..				0.58	0.60	0.61	0.62	0.65	0.68	0.70	0.67	0.60	0.58	0.63	0.60	0.59
DURBIN-WATSON ...				1.55	1.69	1.73	1.87	1.69	1.95	1.87	1.97	2.27	2.07	2.08	2.09	2.13
NO. OF SIGNIFICANT COEFF. OF REGRESSION ... ..				3	3	3	4	6	5	5	4	4	3	3	2	2

TABLE 25(a) SUMMARY STATISTICS : EXPENDITURES ESTIMATED OF LAGGED VALUES  
 OF CONTRACTS  
 FUELS & LUBRICANT PROGRAM

LAGGED QUARTERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NO. OF VARIABLES ... ..			5	6	7	8	9	10	11	12	13	14	15	16		
NO. OF OBSERVATIONS...			70	69	68	67	66	65	64	63	62	61	60	59		
VARIANCE ... ..			7.66	7.28	6.37	6.47	6.58	6.76	6.06	5.70	5.23	5.39	4.56	4.26		
STANDARD ERROR OF ESTIMATES ... ..			2.77	2.70	2.52	2.54	2.56	2.60	2.46	2.39	2.29	2.32	2.13	2.06		
COEFFICIENT OF VARIATIONS ... ..			33.61	32.59	30.58	30.59	30.73	31.04	29.56	28.39	27.11	27.49	25.67	24.62		
$R^2$ ... ..			0.50	0.53	0.60	0.60	0.61	0.61	0.66	0.68	0.72	0.72	0.76	0.78		
$R^2$ - ADJUSTED ... ..			0.47	0.50	0.56	0.56	0.55	0.55	0.59	0.61	0.65	0.64	0.68	0.70		
DURBIN-WATSON ... ..			2.22	2.02	2.15	2.14	2.15	2.10	1.93	1.99	2.03	2.03	1.78	1.82		
NO. OF SIGNIFICANT COEFF. OF REGRESSION ... ..			4	4	5	4	4	4	6	5	6	6	6	9		

TABLE 25(b) SUMMARY STATISTICS : VALUE OF CONTRACTS ESTIMATED OF LAGGED VALUES  
OF CONTRACT DEMANDS.  
FUELS & LUBRICANTS PROGRAM

LAGGED QUARTERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NO. OF VARIABLES .....			5	6	7	8	9	10	11	12	13	14	15	16		
NO. OF OBSERVATIONS .....			70	69	68	67	66	65	64	63	62	61	60	59		
VARIANCE .....			40.77	39.78	33.20	31.76	30.21	31.07	28.62	28.92	29.37	30.52	28.36	29.44		
STANDARD ERROR OF ESTIMATES .....			6.39	6.31	5.76	5.64	5.50	5.57	5.35	5.38	5.42	5.52	5.33	5.43		
COEFFICIENT OF VARIATIONS .....			58.26	56.97	51.88	50.51	49.23	49.70	47.52	48.39	48.25	48.46	47.21	48.44		
$R^2$ .....			0.49	0.51	0.60	0.63	0.66	0.66	0.70	0.71	0.71	0.70	0.73	0.74		
$R^2$ - ADJUSTED .....			0.46	0.47	0.56	0.59	0.62	0.61	0.65	0.64	0.64	0.62	0.65	0.64		
DURBIN-WATSON .....			2.13	1.97	2.30	2.14	2.23	2.15	2.34	2.33	2.35	2.34	2.46	2.42		
NO. OF SIGNIFICANT COEFF. OF REGRESSION .....			4	4	4	4	5	3	4	4	4	4	3	3		

TABLE 26(a) SUMMARY STATISTICS : EXPENDITURES ESTIMATED OF LAGGED VALUES  
OF CONTRACTS  
CLOTHING & EQUIPAGE PROGRAM

LAGGED QUARTERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NO. OF VARIABLES ... ..			5	6	7	8	9	10	11	12	13	14				
NO. OF OBSERVATIONS...			70	69	68	67	66	65	64	63	62	61				
VARIANCE ... ..			5.89	4.28	3.93	3.66	3.33	2.72	2.72	2.77	2.74	2.65				
STANDARD ERROR OF ESTIMATES ... ..			2.43	2.07	1.98	1.91	1.83	1.65	1.65	1.66	1.65	1.63				
COEFFICIENT OF VARIATIONS ... ..			46.10	39.13	37.92	37.20	36.81	34.62	38.12	40.98	43.99	46.25				
$R^2$ ... ..			0.85	0.90	0.91	0.92	0.92	0.93	0.90	0.88	0.83	0.78				
$R^2$ - ADJUSTED ... ..			0.84	0.89	0.90	0.91	0.91	0.92	0.88	0.85	0.79	0.72				
DURBIN-WATSON ... ..			1.46	1.70	1.74	1.79	1.89	1.98	2.04	1.98	2.10	2.10				
NO. OF SIGNIFICANT COEFF. OF REGRESSION ... ..			4	4	5	4	4	5	5	5	2	1				

TABLE 26(b) SUMMARY STATISTICS : VALUE OF CONTRACTS ESTIMATED OF LAGGED VALUES  
OF CONTRACT DEMANDS  
CLOTHING & EQUIPAGE PROGRAM

LAGGED QUARTERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NO. OF VARIABLES .....			5	6	7	8	9	10	11	12	13	14				
NO. OF OBSERVATIONS ...			70	69	68	67	66	65	64	63	62	61				
VARIANCE ... ..			21.74	22.27	18.14	10.39	8.93	8.10	6.04	5.79	5.87	5.65				
STANDARD ERROR OF ESTIMATES ... ..			4.66	4.72	4.26	3.22	3.00	2.85	2.46	2.41	2.42	2.38				
COEFFICIENT OF VARIATIONS ... ..			84.93	85.95	79.48	65.20	69.21	73.50	73.22	73.50	74.12	74.36				
$R^2$ ... ..			0.72	0.72	0.78	0.85	0.79	0.72	0.37	0.38	0.40	0.42				
$R^2$ - ADJUSTED ... ..			0.70	0.70	0.76	0.84	0.76	0.68	0.25	0.25	0.25	0.26				
DURBIN-WATSON ... ..			1.18	1.17	1.66	1.81	1.88	2.04	2.24	2.21	2.15	2.21				
NO. OF SIGNIFICANT COEFF. OF REGRESSION ... ..			3	4	5	6	7	9	3	4	1	3				

TABLE 27(a) SUMMARY STATISTICS : EXPENDITURES ESTIMATED OF LAGGED VALUES  
OF CONTRACTS  
FOOD & SUBSISTENCE PROGRAM

LAGGED QUARTERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NO. OF VARIABLES ... ..		4	5	6	7	8	9	10	11	12						
NO. OF OBSERVATIONS...		71	70	69	68	67	66	65	64	63						
VARIANCE ... ..		1.34	1.18	0.59	0.53	0.43	0.44	0.44	0.09	0.09						
STANDARD ERROR OF ESTIMATES ... ..		1.16	1.09	0.77	0.73	0.65	0.66	0.66	0.30	0.30						
COEFFICIENT OF VARIATIONS ... ..		96.67	93.12	67.26	66.46	61.59	65.62	70.00	36.46	37.19						
$R^2$ ... ..		0.29	0.37	0.69	0.70	0.76	0.72	0.68	0.38	0.38						
$R^2$ - ADJUSTED ... ..		0.26	0.34	0.66	0.67	0.73	0.68	0.62	0.27	0.25						
DURBIN-WATSON ... ..		1.37	1.80	2.17	1.81	1.85	1.76	1.78	2.82	2.82						
NO OF SIGNIFICANT COEFF. OF REGRESSION ... ..		3	3	4	6	7	4	3	2	2						

TABLE 27(b) SUMMARY STATISTICS : VALUE OF CONTRACTS ESTIMATED OF LAGGED VALUES  
OF CONTRACT DEMANDS.  
FOOD & SUBSISTENCE PROGRAM

LAGGED QUARTERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NO. OF VARIABLES .....		4	5	6	7	8	9	10	11	12	13	14	15	16	17	
NO. OF OBSERVATIONS .....		71	70	69	68	67	66	65	64	63	62	61	60	59	58	
VARIANCE .....		0.61	0.60	0.59	0.23	0.23	0.24	0.24	0.25	0.25	0.24	0.25	0.25	0.26	0.26	
STANDARD ERROR OF ESTIMATES .....		0.78	0.77	0.77	0.48	0.48	0.48	0.49	0.50	0.50	0.49	0.50	0.50	0.51	0.51	
COEFFICIENT OF VARIATIONS .....		76.53	77.01	78.14	52.30	52.42	53.41	54.23	55.32	56.16	53.90	54.10	55.12	56.16	54.74	
$R^2$ .....		0.02	0.04	0.04	0.08	0.10	0.10	0.11	0.11	0.12	0.19	0.19	0.20	0.20	0.21	
$R^2$ - ADJUSTED .....		-0.02	-0.02	-0.04	-0.02	-0.01	-0.03	-0.04	-0.06	-0.07	-0.01	-0.03	-0.05	-0.07	-0.10	
DURBIN-WATSON .....		1.75	1.81	1.53	2.39	2.41	2.42	2.43	2.41	2.30	2.39	2.42	2.41	2.41	2.35	
No. OF SIGNIFICANT COEFF. OF REGRESSION .....		1	1	1	1	1	1	1	1	1	2	2	2	2	1	

TABLE 28(a) SUMMARY STATISTICS : EXPENDITURES ESTIMATED OF LAGGED VALUES  
OF CONTRACTS

CONSTRUCTION PROGRAM

LAGGED QUARTERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NO. OF VARIABLES ...				6	7	8	9	10	11	12	13	14				
NO. OF OBSERVATIONS ...				57	56	55	54	53	52	51	50	49				
VARIANCE ...				57.43	46.05	46.85	46.29	43.20	41.67	33.82	30.08	30.04				
STANDARD ERROR OF ESTIMATES ...				7.58	6.79	6.84	6.80	6.57	6.46	5.82	5.48	5.48				
COEFFICIENT OF VARIATIONS ...				32.86	29.63	29.79	29.77	28.93	29.23	26.48	25.81	26.76				
$R^2$ ...				0.77	0.82	0.82	0.83	0.85	0.85	0.88	0.89	0.88				
$R^2$ - ADJUSTED ...				0.75	0.80	0.80	0.80	0.82	0.81	0.85	0.85	0.83				
DURBIN-WATSON ...				2.19	2.52	2.45	2.55	2.45	2.22	2.44	2.75	2.68				
No. OF SIGNIFICANT COEFF. OF REGRESSION ...				3	5	4	4	4	4	5	5	4				

TABLE 28(b) SUMMARY STATISTICS : VALUE OF CONTRACTS ESTIMATED OF LAGGED VALUES  
OF CONTRACT DEMANDS.

CONSTRUCTION PROGRAM

LAGGED QUARTERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NO. OF VARIABLES ...				6	7	8	9	10	11	12	13	14				
NO. OF OBSERVATIONS ...				57	56	55	54	53	52	51	50	49				
VARIANCE ... ..				53.80	48.87	44.86	41.70	41.78	42.53	37.14	31.60	33.22				
STANDARD ERROR OF ESTIMATES ... ..				7.33	7.00	6.70	6.46	6.46	6.52	6.09	5.62	5.76				
COEFFICIENT OF VARIATIONS... ..				34.55	33.16	32.34	31.72	32.95	34.13	32.17	30.85	32.78				
$R^2$ ... ..				0.76	0.79	0.81	0.80	0.80	0.79	0.82	0.83	0.80				
$R^2$ - ADJUSTED ... ..				0.74	0.76	0.78	0.76	0.76	0.74	0.77	0.77	0.73				
DURBIN-WATSON ...				1.82	1.64	1.78	1.78	1.80	1.65	1.50	1.62	1.63				
No. OF SIGNIFICANT COEFF. OF REGRESSION ... ..				3	3	5	4	5	5	5	5	5				

TABLE 29(a) SUMMARY STATISTICS : EXPENDITURES ESTIMATED OF LAGGED VALUES  
 OF CONTRACTS  
 CONSTRUCTION EQUIPMENT PROGRAM

LAGGED QUARTERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NO. OF VARIABLES .....			5	6	7	8	9	10	11	12						
NO. OF OBSERVATIONS ...			70	69	68	67	66	65	64	63						
VARIANCE .....			1.47	1.18	1.17	1.06	1.04	1.06	0.75	0.69						
STANDARD ERROR OF ESTIMATES .....			1.21	1.08	1.08	1.03	1.02	1.03	0.86	0.83						
COEFFICIENT OF VARIATIONS .....			48.75	44.06	45.53	43.64	44.23	45.85	40.87	39.67						
$R^2$ .....			0.56	0.65	0.61	0.66	0.65	0.63	0.51	0.56						
$R^2$ - ADJUSTED .....			0.53	0.63	0.57	0.62	0.60	0.56	0.42	0.46						
DURBIN-WATSON .....			2.27	2.43	2.31	2.56	2.62	2.49	2.67	2.55						
NO. OF SIGNIFICANT COEFF OF REGRESSION .....			3	3	3	3	2	2	4	5						

TABLE 29(b) SUMMARY STATISTICS : VALUE OF CONTRACTS ESTIMATED OF LAGGED VALUES  
OF CONTRACT DEMANDS.

CONSTRUCTION EQUIPMENT PROGRAM

LAGGED QUARTERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NO. OF VARIABLES ...		4	5	6	7	8	9	10	11	12	13	14	15			
NO. OF OBSERVATIONS ...		71	70	69	68	67	66	65	64	63	62	61	60			
VARIANCE ... ..		2.31	2.28	2.26	1.09	1.06	0.92	0.72	0.61	0.58	0.56	0.51	0.48			
STANDARD ERROR OF ESTIMATES ... ..		1.52	1.51	1.50	1.04	1.03	0.96	0.85	0.78	0.76	0.75	0.72	0.69			
COEFFICIENT OF VARIATIONS... ..		65.27	65.35	65.66	47.97	49.27	48.90	45.47	44.53	43.57	42.81	41.50	39.86			
$R^2$ ... ..		0.49	0.51	0.52	0.72	0.69	0.58	0.55	0.18	0.24	0.29	0.34	0.42			
$R^2$ - ADJUSTED ... ..		0.46	0.48	0.48	0.69	0.66	0.52	0.48	0.02	0.08	0.11	0.16	0.23			
DURBIN-WATSON ...		1.35	1.41	1.13	1.59	1.60	1.91	2.24	2.05	2.16	2.08	1.98	2.06			
No. OF SIGNIFICANT COEFF. OF REGRESSION ... ..		3	3	3	3	3	3	5	2	2	2	4	4			

TABLE 30(a) SUMMARY STATISTICS : EXPENDITURES ESTIMATED OF LAGGED VALUES  
OF CONTRACTS

PRODUCTION EQUIPMENT PROGRAM

LAGGED QUARTERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NO. OF VARIABLES .....		4	5	6	7	8	9	10	11	12	13	14				
NO. OF OBSERVATIONS ...		71	70	69	68	67	66	65	64	63	62	61				
VARIANCE .....		1.07	1.07	1.10	1.10	1.11	1.11	1.14	0.77	0.78	0.73	0.73				
STANDARD ERROR OF ESTIMATES .....		1.03	1.03	1.05	1.05	1.06	1.06	1.07	0.88	0.88	0.85	0.86				
COEFFICIENT OF VARIATIONS .....		45.94	45.33	45.38	45.16	45.53	46.21	47.24	40.53	41.09	39.84	40.34				
$R^2$ .....		0.44	0.43	0.41	0.42	0.43	0.43	0.42	0.44	0.45	0.50	0.51				
$R^2$ - ADJUSTED .....		0.41	0.40	0.36	0.36	0.37	0.35	0.32	0.33	0.33	0.38	0.37				
DURBIN-WATSON .....		2.12	2.09	2.06	2.13	2.14	2.19	2.14	2.32	2.35	2.53	2.12				
NO. OF SIGNIFICANT COEFF. OF REGRESSION .....		3	2	2	3	3	4	3	3	3	3	3				

TABLE 30(b) SUMMARY STATISTICS ; VALUE OF CONTRACTS ESTIMATED OF LAGGED VALUES  
OF CONTRACT DEMANDS  
PRODUCTION EQUIPMENT PROGRAM

LAGGED QUARTERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NO. OF VARIABLES .....		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
NO. OF OBSERVATIONS .....		71	70	69	68	67	66	65	64	63	62	61	60	59	58	57
VARIANCE .....		1.32	1.29	1.29	1.17	1.21	1.16	1.18	1.19	1.20	1.21	1.26	1.27	1.17	1.14	1.12
STANDARD ERROR OF ESTIMATES .....		1.15	1.14	1.13	1.08	1.10	1.07	1.09	1.09	1.10	1.10	1.12	1.13	1.08	1.07	1.10
COEFFICIENT OF VARIATIONS .....		51.73	50.57	49.71	46.82	47.98	47.96	48.99	49.93	50.94	51.46	52.96	53.70	51.29	50.99	51.99
$R^2$ .....		0.26	0.27	0.26	0.32	0.30	0.28	0.27	0.25	0.24	0.26	0.24	0.26	0.34	0.39	0.39
$R^2$ - ADJUSTED .....		0.23	0.22	0.20	0.25	0.22	0.18	0.15	0.11	0.07	0.07	0.03	0.03	0.12	0.15	0.12
DURBIN-WATSON .....		1.77	1.84	1.89	1.97	1.94	2.00	1.98	2.00	2.05	2.05	2.05	1.94	1.80	1.82	1.81
N. OF SIGNIFICANT COEFF. OF REGRESSION .....		2	3	3	2	2	3	2	3	2	2	2	2	4	6	4

TABLE 31(a) SUMMARY STATISTICS : EXPENDITURES ESTIMATED OF LAGGED VALUES  
OF CONTRACTS

OTHER PROGRAMS

LAGGED QUARTERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NO. OF VARIABLES ...		4	5	6	7	8	9	10	11	12						
NO. OF OBSERVATIONS ...		71	70	69	68	67	66	65	64	63						
VARIANCE ...		8.44	8.43	8.63	8.12	8.31	8.39	8.59	4.13	3.75						
STANDARD ERROR OF ESTIMATES ...		2.91	2.90	2.94	2.85	2.88	2.90	2.93	2.03	1.94						
COEFFICIENT OF VARIATIONS ...		42.03	42.03	42.64	41.42	42.34	43.65	45.42	33.76	32.27						
$R^2$ ...		0.59	0.60	0.60	0.64	0.64	0.61	0.56	0.27	0.36						
$R^2$ - ADJUSTED ...		0.57	0.58	0.57	0.60	0.60	0.55	0.49	0.13	0.22						
DURBIN-WATSON ...		2.04	2.07	2.01	1.98	1.99	1.97	1.84	1.97	2.08						
NO. OF SIGNIFICANT COEFF. OF REGRESSION		3	3	3	3	4	4	4	4	3						

TABLE 31(b) SUMMARY STATISTICS : VALUE OF CONTRACTS ESTIMATED OF LAGGED VALUES  
OF CONTRACT DEMANDS.  
OTHER PROGRAM

LAGGED QUARTERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NO. OF VARIABLES .....		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
NO. OF OBSERVATIONS .....		71	75	69	68	67	66	65	64	63	62	61	60	59	58	57
VARIANCE .....		6.79	6.53	6.45	6.16	6.01	4.44	4.08	4.02	3.74	3.72	3.42	3.42	3.15	3.11	3.20
STANDARD ERROR OF ESTIMATES .....		2.61	2.56	2.54	2.48	2.45	2.11	2.02	2.01	1.93	1.93	1.85	1.85	1.78	1.76	1.79
COEFFICIENT OF VARIATIONS .....		36.42	35.62	35.30	35.10	35.13	30.97	30.07	30.40	29.34	29.23	28.06	28.18	26.94	26.70	26.89
$R^2$ .....		0.26	0.31	0.34	0.31	0.30	0.32	0.34	0.23	0.31	0.34	0.42	0.44	0.50	0.53	0.53
$R^2$ - ADJUSTED .....		0.23	0.27	0.28	0.24	0.21	0.22	0.23	0.08	0.16	0.18	0.26	0.26	0.32	0.34	0.32
DURBIN-WATSON .....		1.35	1.43	1.42	1.48	1.50	1.69	1.83	1.64	1.78	1.64	1.78	1.64	1.53	1.55	1.50
No. OF SIGNIFICANT COEFF. OF REGRESSION .....		2	4	5	3	5	3	3	2	3	3	4	4	5	5	3

TABLE 32(a) SUMMARY STATISTICS : EXPENDITURES ESTIMATED OF LAGGED VALUES  
OF CONTRACTS

REGIONAL OFFICES IN CANADA

LAGGED QUARTERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NO. OF VARIABLES ... ..		4	5	6	7	8	9	10	11	12	13	14				
NO. OF OBSERVATIONS ...		62	61	60	59	58	57	56	55	54	53	52				
VARIANCE ... ..		12.57	10.68	10.18	10.04	10.41	10.78	9.71	9.74	10.18	10.43	10.02				
STANDARD ERROR OF ESTIMATES ... ..		3.55	3.27	3.19	3.17	3.23	3.28	3.12	3.12	3.19	3.23	3.16				
COEFFICIENT OF VARIATIONS ... ..		23.72	21.81	21.36	21.07	21.39	21.73	20.66	20.59	21.04	21.27	20.99				
$R^2$ ... ..		0.04	0.20	0.26	0.26	0.25	0.26	0.34	0.34	0.35	0.36	0.39				
$R^2$ - ADJUSTED ... ..		-0.01	0.15	0.19	0.17	0.15	0.13	0.20	0.19	0.17	0.17	0.18				
DURBIN-WATSON ... ..		3.19	3.07	3.14	3.20	3.18	3.04	3.11	3.19	3.17	3.07	2.94				
NO. OF SIGNIFICANT COEFF. OF REGRESSION ... ..		0	2	3	2	1	1	2	2	2	2	1				

TABLE 32(b) SUMMARY STATISTICS : VALUE OF CONTRACTS ESTIMATED OF LAGGED VALUES  
OF CONTRACT DEMANDS.  
REGIONAL OFFICES IN CANADA

LAGGED QUARTERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NO. OF VARIABLES .....		4	5	6	7	8	9	10	11	12	13	14				
NO. OF OBSERVATIONS .....		62	61	60	59	58	57	56	55	54	53	52				
VARIANCE .....		5.58	5.73	5.89	5.05	5.05	5.19	5.31	5.14	5.09	5.09	5.22				
STANDARD ERROR OF ESTIMATES .....		2.36	2.39	2.43	2.25	2.25	2.28	2.31	2.27	2.26	2.26	2.28				
COEFFICIENT OF VARIATIONS .....		16.21	16.39	16.60	15.34	15.30	15.45	15.64	15.40	15.32	15.31	15.53				
$R^2$ .....		0.18	0.18	0.19	0.32	0.34	0.35	0.35	0.40	0.43	0.46	0.47				
$R^2$ - ADJUSTED .....		0.15	0.12	0.11	0.24	0.25	0.24	0.22	0.26	0.28	0.29	0.28				
DURBIN-WATSON .....		1.84	1.85	1.84	1.99	1.95	1.93	1.95	2.03	1.99	2.05	2.03				
NO. OF SIGNIFICANT COEFF. OF REGRESSION .....		2	2	2	3	3	3	3	4	3	3	3				

TABLE 33(a) — NO. OF SIGNIFICANT COEFFICIENTS OF REGRESSION  
BY PROGRAMS AND LAGGED QUARTERS

= IN ESTIMATING EXPENDITURES =

PROGRAMS	LAGGED QUARTERS															
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
AIRCRAFT ... ..	-	-	4	4	4	5	4	4	5	3	4	6	5	3	4	
ARMAMENT	-	-	1	2	2	3	4	6	5	4	4	6	3	3	3	
ELECTRONICS AND COMMUNICATIONS	-	-	-	3	1	2	3	3	3	2	1	0	1	0	0	
SHIPS ... ..	-	1	1	2	2	0	1	1	1	1	1	0	0	0	0	
TANK-AUTOMOTIVE-RAILWAY ...	-	1	2	2	1	1	4	3	3	4	5	7	7	6	6	
FUELS AND LUBRICANTS ...	-	4	4	5	4	4	4	6	5	6	6	6	9	-	-	
CLOTHING AND EQUIPAGE ...	-	4	4	5	4	4	5	5	5	2	1	-	-	-	-	
FOOD AND SUBSISTENCE ...	3	3	4	6	7	4	3	2	2	-	-	-	-	-	-	
CONSTRUCTION ... ..	-	-	3	5	4	4	4	4	5	5	4	-	-	-	-	
CONSTRUCTION EQUIPMENT ...	-	3	3	3	3	2	2	4	5	-	-	-	-	-	-	
PRODUCTION EQUIPMENT ...	3	2	2	3	3	4	3	3	3	3	3	-	-	-	-	
OTHER PROGRAMS ... ..	3	3	3	3	4	4	4	4	3	-	-	-	-	-	-	
REGIONAL PURCHASING ... ..	-	2	3	2	1	1	2	2	2	2	1	-	-	-	-	

TABLE 33(b)—NO. OF SIGNIFICANT COEFFICIENTS OF REGRESSION  
BY PROGRAMS AND LAGGED QUARTERS

= IN ESTIMATING CONTRACTS VALUE =

PROGRAMS	LAGGED QUARTERS															
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
AIRCRAFT ... ..	-	-	3	3	3	3	4	4	4	3	4	4	3	4	4	
ARMAMENT ... ..	3	4	5	6	5	6	4	5	4	3	3	2	1	0	1	
ELECTRONICS AND COMMUNICATIONS	-	-	2	3	3	6	6	6	6	6	6	8	7	7	7	
SHIPS ... ..	-	-	1	1	1	1	2	2	1	2	2	5	4	4	4	
TANK-AUTOMOTIVE-RAILWAY	-	-	3	3	3	4	6	5	5	4	4	3	3	2	2	
FUELS AND LUBRICANTS ...	-	4	4	4	4	5	3	4	4	4	4	3	-	-	-	
CLOTHING AND EQUIPAGE ...	-	3	4	5	6	7	9	3	4	1	3	-	-	-	-	
FOOD AND SUBSISTENCE ...	1	1	1	1	1	1	1	1	1	2	2	2	2	1	-	
CONSTRUCTION ... ..	-	-	3	3	5	4	5	5	5	5	5	-	-	-	-	
CONSTRUCTION EQUIPMENT ...	3	3	3	3	3	3	5	2	2	2	4	4	-	-	-	
PRODUCTION EQUIPMENT ...	2	3	3	2	2	3	2	3	2	2	2	2	4	6	4	
OTHER PROGRAMS ... ..	2	4	5	3	5	3	3	2	3	3	4	4	5	5	3	
REGIONAL PURCHASING ...	2	2	2	3	3	3	3	4	3	3	3	-	-	-	-	

APPENDIX "B"

TABLES AND CHARTS FOR:

(3) ESTIMATED VALUES

TABLE 346: ESTIMATED EXPENDITURES FROM VALUE OF CONTRACTS - QUARTERLY  
 - HIGHEST R<sup>2</sup> ADJUSTED -

(IN MILLIONS OF DOLLARS)

PROCUREMENT PROGRAMS YEAR/ QUARTER	(IN MILLIONS OF DOLLARS)													TOTAL	
	AIRCRAFT	ARMAMENT	ELECTRONICS & COMMUNICATIONS	SHIPS	TANK AUTOMOTIVE RAILWAY	FUELS & LUBRICANTS	CLOTHING & EQUIPAGE	FOOD & SUBSISTENCE	CONSTRUCTION	CONSTRUCTION EQUIPMENT	PRODUCTION EQUIPMENT	OTHER PROGRAMS	REGIONAL OFFICES IN CANADA	ESTIMATED	ACTUAL
QUARTERS LAGGED...	16	14	12	8	12	14	8	6	11	4	2	5	8		
1950 . I															
II														2.80	0.01
III														2.91	0.62
IV														9.70	9.32
1951 I								6.63		3.07				17.46	17.95
II								5.60		2.07	9.79			33.36	33.18
III							4.65	6.37		3.71	18.63			31.07	33.76
IV							4.70	5.28		4.20	16.89			91.67	119.97
1952 I				15.95			33.61	6.81		4.35	22.90			57.36	45.65
II				13.71			20.87	1.84		3.97	12.26			68.12	54.90
III				23.34			21.03	1.41		5.56	13.27			109.26	117.02
IV				17.88			18.63	0.89	57.31	5.41	3.33	5.81		193.96	245.82
1953 I			32.30	28.22	40.11		17.44	6.60	61.00	4.59	3.20	6.50		112.42	77.97
II			26.70	25.53	4.86		9.43	0.96	37.29	1.96	2.51	3.18		133.17	124.51
III		10.97	26.77	22.14	12.83	6.65	7.61	0.33	35.31	1.43	2.57	6.56		138.36	138.58
IV		15.74	28.02	23.80	10.77	8.41	6.82	-0.23	36.15	3.11	1.97	3.80		294.96	398.25
1954 I	128.37	30.62	34.13	20.06	25.79	13.55	7.73	0.50	24.65	1.54	2.51	5.51		189.26	159.48
II	74.25	14.59	24.80	17.28	10.91	6.74	4.75	0.24	14.71	1.93	2.17	3.11	14.28	220.49	204.99
III	89.46	17.82	29.14	17.58	12.54	6.29	3.50	0.46	20.89	1.19	2.06	6.41	13.71	266.43	253.41
IV	126.24	22.76	24.34	18.40	10.82	8.27	3.43	0.24	24.65	2.53	1.86	6.83	16.06		

TABLE 34(a) CONT

(IN MILLIONS OF DOLLARS)

PROCUREMENT PROGRAMS YEAR/ QUARTER	AIRCRAFT	ARMAMENT	ELECTRONICS & COMMUNICATIONS	SHIPS	TANK & AUTOMOTIVE REPLACEMENT	FUELS & LUBRICANTS	CLOTHING & EQUIPMENT	FOOD & SUBSISTENCE	CONSTRUCTION	CONSTRUCTION EQUIPMENT	PRODUCTION EQUIPMENT	OTHER PROGRAMS	REGIONAL OFFICES IN CANADA	TOTAL	
														ESTIMATED	ACTUAL
QUARTERS LAGGED..	16	14	12	8	12	14	8	6	11	4	2	5	8		
1955 I	117.57	29.14	35.85	19.90	15.35	11.88	8.88	1.99	27.06	1.35	2.27	10.19	15.86	297.29	357.36
II	88.64	17.88	23.11	16.70	-0.29	7.83	3.40	1.81	17.32	1.41	1.92	7.88	16.73	204.34	160.72
III	100.54	19.55	31.22	19.10	0.72	9.00	4.48	1.15	30.95	1.19	1.76	13.33	17.82	250.81	278.30
IV	107.41	20.31	23.93	21.51	6.83	9.44	5.62	1.18	46.25	2.21	1.74	8.16	16.45	271.04	236.11
1956 I	93.29	19.69	34.57	18.51	6.86	15.48	4.40	1.86	34.29	1.67	1.81	8.21	17.73	258.37	332.06
II	61.82	11.77	22.42	15.58	8.49	7.87	4.18	1.21	31.97	1.67	1.84	5.02	15.98	189.82	156.79
III	80.16	15.80	29.37	16.23	6.39	10.01	3.42	-0.07	35.93	1.84	1.42	5.64	16.73	222.87	229.72
IV	100.82	20.37	26.20	11.05	2.32	11.23	3.40	1.01	44.73	1.77	2.06	5.47	14.77	244.70	240.44
1957 I	84.49	13.83	34.25	21.61	7.63	18.84	2.98	0.36	34.17	1.84	2.07	8.43	18.02	248.52	331.19
II	53.58	13.10	23.99	11.62	6.02	9.10	2.02	-0.64	21.14	2.89	2.12	8.92	14.05	167.91	134.38
III	61.29	3.36	27.22	15.70	1.23	11.50	2.07	0.47	27.28	2.01	1.88	6.18	15.57	175.76	200.45
IV	74.86	7.05	30.13	14.67	2.10	11.75	2.10	2.02	22.48	1.50	1.80	5.49	13.85	189.80	203.64
1958 I	88.34	13.91	34.06	14.55	2.76	16.58	1.61	1.54	9.08	2.20	2.86	6.04	17.39	210.92	269.62
II	85.59	2.67	22.68	17.91	2.76	6.52	1.00	0.41	9.36	2.93	1.92	5.54	14.19	173.48	130.95
III	58.21	1.48	25.00	18.83	0.95	9.76	2.05	0.74	9.77	1.55	1.87	6.31	15.51	152.03	173.58
IV	72.25	8.30	37.88	12.47	1.57	9.32	0.97	0.82	12.84	2.29	1.11	4.11	12.61	176.54	183.58
1959 I	68.46	19.77	34.25	15.18	1.44	13.74	9.26	0.63	15.84	2.00	1.42	7.65	19.50	209.14	253.03
II	57.69	1.15	23.44	17.26	1.94	6.45	0.69	0.74	12.38	1.91	1.52	7.47	13.99	146.63	125.02
III	47.83	4.12	16.43	13.52	0.45	6.87	3.64	0.69	16.30	1.63	1.64	5.50	15.74	134.36	142.63
IV	52.31	9.62	38.26	14.09	1.73	9.35	2.06	1.87	22.91	2.25	1.55	7.94	13.21	177.15	152.77

TABLE 34(a). CONT.

(IN MILLIONS OF DOLLARS)

PROCUREMENT PROGRAMS YEAR/ QUARTER	(IN MILLIONS OF DOLLARS)														TOTAL	
	AIRCRAFT	ARMAMENT	ELECTRONICS & COMMUNICATIONS	SHIPS	TANK AUTOMOTIVE RAILWAY	FUELS & LUBRICANTS	CLOTHING & EQUIPAGE	FOOD & SUBSISTENCE	CONSTRUCTION	CONSTRUCTION EQUIPMENT	PRODUCTION EQUIPMENT	OTHER PROGRAMS	REGIONAL OFFICES IN CANADA	ESTIMATED	ACTUAL	
	16	14	12	8	12	14	8	6	11	4	2	5	8			
1960																
QUARTERS LAGGED...																
I	92.64	11.00	34.25	17.34	1.06	14.11	2.86	1.19	13.32	1.73	1.88	8.37	20.08	219.83	233.23	
II	49.07	-1.19	20.36	21.08	-0.23	6.71	2.08	1.50	11.48	2.07	1.58	6.38	12.94	133.53	91.72	
III	58.72	1.03	14.44	12.96	1.14	6.38	1.90	1.23	18.95	2.48	1.49	4.44	14.40	139.56	146.51	
IV	62.23	11.85	40.57	11.94	2.41	10.13	0.84	1.22	19.05	1.48	1.05	4.49	13.58	180.84	149.13	
1961																
I	75.16	8.39	33.89	10.17	1.86	12.82	1.53	0.80	11.07	2.13	1.52	4.65	18.51	182.50	210.30	
II	63.23	6.71	24.90	14.54	1.28	4.37	1.64	0.53	8.15	2.60	2.48	5.45	13.20	149.08	111.74	
III	41.05	5.01	18.57	10.21	1.57	6.91	1.48	0.95	15.36	1.73	2.27	4.65	14.65	124.41	140.63	
IV	42.10	11.61	41.73	16.73	3.54	10.33	3.84	0.89	31.79	1.41	2.63	7.58	13.65	187.83	160.71	
1962																
I	67.09	6.66	33.28	18.80	3.41	9.21	2.42	0.48	23.53	2.32	2.04	7.37	18.21	194.82	227.55	
II	60.53	7.42	23.23	19.38	2.09	4.56	2.89	0.76	13.28	2.63	2.38	7.55	14.76	161.46	169.89	
III	35.20	1.15	23.84	8.67	-0.63	5.95	2.91	0.74	20.15	0.90	1.76	6.48	16.04	123.16	157.97	
IV	45.47	8.53	32.70	9.17	1.00	6.68	3.36	1.11	19.19	1.90	2.28	6.59	13.39	151.37	130.98	
1963																
I	65.18	9.72	31.11	7.43	2.26	8.27	2.83	0.84	12.89	1.68	1.77	6.51	17.42	167.91	183.99	
II	44.65	9.51	27.73	11.83	1.31	4.62	3.03	1.04	6.12	3.02	2.02	6.60	11.73	133.21	93.92	
III	40.44	3.27	21.69	5.30	3.68	6.90	2.51	1.05	7.61	1.34	1.85	3.35	12.30	111.29	115.73	
IV	50.50	9.62	25.62	10.43	6.06	7.07	2.72	0.98	7.96	1.88	1.90	5.30	14.57	144.61	133.31	
1964																
I	81.71	7.37	37.82	9.01	20.22	10.51	2.64	1.02	5.23	1.61	2.48	3.43	16.07	199.12	229.53	
II	43.05	5.71	25.86	8.63	3.76	4.51	2.46	1.14	0.91	2.39	3.78	4.62	12.62	119.44	88.71	
III	29.30	3.91	22.60	10.23	6.30	4.39	2.28	0.97	7.37	1.35	2.11	1.13	12.73	104.67	114.10	
IV	33.27	8.03	26.29	11.68	-0.49	6.47	2.85	0.63	9.44	1.81	2.23	3.57	14.92	120.70	113.89	

TABLE 34(a). CONT.

(IN MILLIONS OF DOLLARS)

PROCUREMENT PROGRAMS YEAR/ QUARTER	(IN MILLIONS OF DOLLARS)																TOTAL	
	AIRCRAFT	ARMAMENT	ELECTRONICS & COMMUNICATIONS	SHIPS	TANK AUTOMOTIVE RAILWAY	FUELS & LUBRICANTS	CLOTHING & EQUIPAGE	FOOD & SUBSISTENCE	CONSTRUCTION	CONSTRUCTION EQUIPMENT	PRODUCTION EQUIPMENT	OTHER PROGRAMS	REGIONAL OFFICES IN CANADA	ESTIMATED	ACTUAL			
	16	14	12	8	12	14	8	6	11	4	2	5	8					
1965 I	44.94	6.41	41.04	14.54	8.33	12.21	2.31	0.97	5.47	1.95	2.50	3.22	14.88	158.87	204.36			
II	41.50	7.06	24.72	9.28	-3.32	4.30	2.85	1.09	-	1.83	2.08	3.14	14.60	109.13	68.68			
III	23.87	8.45	23.66	10.49	3.46	7.44	3.13	0.63	-	1.73	2.26	2.81	9.90	97.83	96.98			
IV	35.82	6.42	25.31	10.34	-0.79	6.78	3.64	0.53	-	2.11	2.13	3.55	15.33	111.17	93.33			
1966 I	39.80	7.51	42.23	11.90	16.72	8.06	3.53	1.22	-	2.37	2.36	4.80	13.20	153.70	193.76			
II	46.52	7.83	21.66	8.57	4.25	3.91	3.17	0.28	-	2.14	2.15	5.28	16.25	122.01	68.26			
III	35.02	7.12	22.98	13.81	2.40	5.30	3.78	0.57	-	2.00	2.28	5.65	12.40	113.31	78.28			
IV	46.10	-0.86	28.46	17.88	2.00	7.05	2.69	0.74	-	2.76	2.24	6.76	16.56	132.38	123.36			
1967 I	42.77	6.53	38.73	13.68	4.57	6.24	3.32	0.65	-	2.88	3.01	7.16	14.67	144.22	171.71			
II	48.64	13.18	22.77	11.56	1.79	5.92	2.56	1.06	-	1.80	2.79	6.91	16.92	135.90	81.74			
III	33.24	10.80	23.69	16.16	3.39	2.73	2.90	0.30	-	1.90	4.69	7.73	12.92	120.70	116.91			
IV	45.15	5.90	31.68	17.50	6.63	5.51	1.79	0.25	-	2.13	4.45	7.32	15.24	143.55	129.21			
1968 I	39.39	8.79	37.51	16.28	3.84	6.24	1.73	0.76	-	1.96	3.69	9.80	16.37	143.36	168.50			
R <sup>2</sup>	0.73	0.54	0.40	0.24	0.87	0.78	0.93	0.76	0.89	0.65	0.44	0.64	0.34					
R <sup>2</sup> ADJUSTED	0.62	0.38	0.23	0.12	0.84	0.70	0.92	0.73	0.85	0.63	0.41	0.60	0.20					
DURGIN-WATSON	2.16	2.41	2.52	1.97	1.45	1.82	1.98	1.85	2.75	2.43	2.12	1.98	3.11					

TABLE 34(b): ESTIMATED VALUE OF CONTRACTS FROM VALUE OF CONTRACT DEMANDS - QUARTERLY  
 ( IN MILLIONS OF DOLLARS )  
 - HIGHEST RE ADJUSTED -

PROCUREMENT PROGRAMS YEAR / QUARTER	AIRCRAFT	ARMAMENT	ELECTRONICS & COMMUNICATIONS	SHIPS	TANK AUTOMOTIVE RAILWAY	FUELS & LUBRICANTS	CLOTHING & EQUIPAGE	FOOD & SUBSISTENCE	CONSTRUCTION	CONSTRUCTION EQUIPMENT	PRODUCTION EQUIPMENT	OTHER PROGRAMS	REGIONAL OFFICES IN CANADA	TOTAL	
														ESTIMATED	ACTUAL
QUARTERS LAGGED	12	5	16	15	10	9	6	11	6	5	5	15	11		
1950 I															
1950 II															
1950 III															
1950 IV															
1951 I															
1951 II		35.16								6.71	3.45			45.32	55.65
1951 III		58.01					39.73		44.47	8.83	3.85			154.89	181.70
1951 IV		40.89					32.83		49.29	6.78	3.39			133.18	131.01
1952 I		45.87					36.47		47.02	9.02	5.43			143.81	153.53
1952 II		15.48				19.24	10.21		41.48	4.03	4.11			94.55	75.70
1952 III		30.50			22.31	10.35	8.88		45.80	1.46	3.41			122.71	120.15
1952 IV		27.72			25.93	0.47	9.57	0.75	45.64	1.30	2.94			114.32	143.19
1953 I	101.27	21.22			24.34	11.18	6.18	0.87	24.37	1.80	2.43			193.66	210.00
1953 II	65.75	35.72			11.63	17.65	-1.58	0.89	30.78	2.46	2.81			168.11	137.15
1953 III	33.71	20.49			11.49	13.99	4.81	0.66	31.99	2.03	1.61			120.78	110.07
1953 IV	79.78	14.96		26.57	6.74	5.38	10.88	0.49	25.86	1.59	2.45	3.29		177.99	228.00
1954 I	249.76	4.34	18.55	24.81	24.09	13.10	13.97	1.11	13.06	1.67	2.38	8.69		375.52	429.53
1954 II	112.36	17.71	26.79	19.40	14.64	23.87	4.40	0.93	27.03	2.06	2.03	6.71		257.92	259.87
1954 III	95.15	10.60	20.19	14.39	5.81	10.65	1.19	0.93	22.88	2.51	3.18	6.15		193.63	195.08
1954 IV	156.02	12.54	21.34	19.89	10.00	5.28	6.83	1.11	24.81	2.62	2.52	8.22	-	271.18	336.91

TABLE 34(b) CONT.

( IN MILLIONS OF DOLLARS )

PROCUREMENT PROGRAMS YEAR / QUARTER	AIRCRAFT	ARMAMENT	ELECTRONICS & COMMUNICATIONS	SHIPS	TANK AUTOMOTIVE RAILWAY	FUELS & LUBRICANTS	CLOTHING & EQUIPAGE	FOOD & SUBSISTENCE	CONSTRUCTION	CONSTRUCTION EQUIPMENT	PRODUCTION EQUIPMENT	OTHER PROGRAMS	REGIONAL OFFICES IN CANADA	TOTAL	
														ESTIMATED	ACTUAL
QUARTERS LAGGED	12	5	16	15	10	9	6	11	6	5	5	15	11		
1955 I	93.49	6.87	19.46	29.95	9.46	11.79	4.26	1.07	25.25	1.92	3.22	9.59	16.16	232.94	238.91
II	53.31	5.50	35.07	18.73	0.27	20.26	0.93	0.85	37.82	1.83	2.06	8.82	18.18	203.63	188.64
III	20.87	11.28	27.43	10.38	3.17	9.94	2.18	0.92	43.78	1.76	1.92	10.02	14.28	157.93	152.77
IV	17.44	10.47	26.70	16.19	3.36	6.14	5.54	0.90	29.20	1.97	1.78	6.53	13.10	139.32	145.88
1956 I	95.76	8.91	23.55	18.41	5.91	19.97	4.05	0.90	27.69	1.73	1.49	5.73	16.20	230.30	200.24
II	51.65	7.36	41.71	12.76	-0.26	22.42	0.81	0.80	34.84	1.62	2.06	6.59	18.15	200.51	155.71
III	26.48	1.84	19.14	22.83	0.96	0.52	2.48	0.96	33.59	1.55	2.01	9.49	14.77	136.62	199.04
IV	110.03	5.94	17.90	3.95	2.65	6.44	4.66	0.82	14.93	1.50	2.17	7.64	13.88	192.51	191.51
1957 I	43.21	-0.70	38.03	12.25	2.08	24.86	3.11	0.90	11.56	1.63	1.84	5.41	15.55	159.74	151.03
II	46.28	3.45	26.30	13.04	1.82	15.82	2.58	0.91	16.77	1.29	1.39	6.57	17.75	153.97	211.42
III	47.71	2.04	36.77	16.35	2.56	-0.24	2.28	0.91	9.98	1.22	1.71	7.53	15.36	144.18	153.94
IV	56.66	1.76	27.99	18.63	1.56	6.01	1.72	0.87	7.62	1.17	1.91	6.85	14.32	147.07	89.66
1958 I	109.67	4.21	30.15	9.76	0.76	23.47	0.76	0.92	9.24	1.22	2.91	6.07	14.87	214.01	201.88
II	69.93	7.17	40.72	27.11	1.49	16.06	1.99	0.90	16.59	1.35	2.11	8.93	16.29	210.63	316.66
III	50.00	5.70	31.29	18.42	1.26	1.46	2.53	0.95	20.28	1.46	1.81	8.33	15.58	159.07	159.10
IV	47.20	5.12	-9.03	17.40	0.17	5.77	2.20	0.97	20.46	1.29	1.33	3.04	14.45	110.37	53.00
1959 I	40.06	1.22	9.21	6.95	0.10	20.16	0.59	0.88	12.59	1.09	1.65	5.26	13.83	113.59	147.71
II	19.65	0.86	47.45	11.69	-0.09	12.87	1.05	1.01	18.13	1.22	2.12	10.48	14.89	141.33	205.40
III	38.01	2.63	10.00	13.35	0.87	1.40	2.17	0.78	25.07	1.38	1.89	6.67	16.07	120.29	112.91
IV	41.24	2.14	17.83	10.54	0.88	7.20	2.10	0.95	12.44	1.65	2.23	4.47	16.78	120.45	125.55

TABLE 34(b) CONT.

( IN MILLIONS OF DOLLARS )

PROCUREMENT PROGRAMS YEAR / QUARTER	AIRCRAFT	ARMAMENT	ELECTRONICS & COMMUNICATIONS	SHIPS	TANK AUTOMOTIVE RAILWAY	FUELS & LUBRICANTS	CLOTHING & EQUIPAGE	FOOD & SUBSISTENCE	CONSTRUCTION	CONSTRUCTION EQUIPMENT	PRODUCTION EQUIPMENT	OTHER PROGRAMS	REGIONAL OFFICES IN CANADA	TOTAL	
														ESTIMATED	ACTUAL
QUARTERS LAGGED	12	5	16	15	10	9	6	11	6	5	5	15	11		
1960 I	124.47	2.65	47.38	16.76	0.38	24.12	1.71	1.13	11.12	2.84	1.91	6.77	15.54	256.78	407.70
II	68.25	3.86	27.53	21.75	1.08	12.49	1.54	1.63	15.40	2.73	1.67	6.27	12.91	176.11	161.31
III	56.90	3.61	22.08	5.07	1.42	-1.75	2.31	1.48	17.82	1.15	1.56	7.62	15.33	134.61	140.81
IV	77.26	2.25	31.63	-1.25	0.70	5.17	2.11	0.78	9.81	1.07	1.67	5.92	16.50	153.62	93.33
1961 I	61.08	2.81	29.91	-2.19	3.44	22.53	2.62	1.06	15.51	1.44	2.10	5.95	16.36	162.62	135.80
II	30.50	1.09	40.31	16.18	3.23	15.06	2.31	0.59	23.58	1.67	1.87	9.13	13.27	158.79	172.69
III	27.94	1.88	25.89	7.40	1.70	1.48	3.00	1.10	23.02	1.94	2.02	6.39	14.17	117.94	123.12
IV	15.28	1.48	10.19	15.25	1.73	5.72	5.60	0.35	10.89	2.21	2.13	2.59	16.92	90.35	98.06
1962 I	53.07	4.09	27.85	7.48	3.11	22.36	5.99	1.24	11.05	2.28	2.46	6.69	15.69	165.36	148.16
II	52.65	6.50	36.22	10.94	2.80	15.67	4.90	0.71	13.82	2.15	2.00	8.32	16.78	173.46	140.94
III	19.43	4.24	20.77	-0.55	1.82	2.76	0.76	1.03	15.47	1.22	1.65	6.03	13.61	88.24	108.36
IV	70.46	2.35	13.86	1.06	0.76	4.49	-0.23	0.73	1.60	1.25	1.57	5.56	12.09	115.55	145.08
1963 I	68.27	13.06	25.10	10.09	2.24	21.37	2.11	1.33	9.70	1.80	2.57	6.03	13.91	177.58	136.17
II	34.79	23.47	50.64	30.94	1.86	18.83	4.93	0.68	11.47	1.76	2.32	7.29	16.80	205.78	208.02
III	16.38	13.57	35.15	11.56	3.90	3.27	4.30	1.10	6.23	1.79	2.06	6.32	13.76	119.39	85.23
IV	36.96	22.18	27.96	9.19	3.68	4.57	3.43	0.71	4.10	1.76	2.75	4.81	11.77	133.87	92.85
1964 I	59.50	10.19	27.72	19.69	9.37	18.89	2.16	1.32	7.62	1.48	2.31	5.98	13.81	180.04	180.95
II	42.22	16.65	47.76	10.31	6.49	17.81	4.44	0.80	10.86	1.61	2.95	7.26	16.48	185.64	181.53
III	24.07	9.12	26.89	1.98	3.28	5.72	3.89	0.75	6.46	1.49	1.84	6.35	13.95	105.78	77.93
IV	32.29	-1.72	9.31	17.60	13.37	6.16	2.64	0.81	6.54	1.74	2.03	5.11	11.20	107.04	70.53

TABLE 34.8 CONT.

(IN MILLIONS OF DOLLARS)

PROCUREMENT PROGRAMS YEAR / QUARTER	TOTAL															
	ESTIMATED											ACTUAL				
1965	I	12	5	15	15	10	9	5	11	5	5	15	11	167.94	135.97	
	II	25.00	8.67	40.32	5.83	3.03	15.34	4.86	0.80	-	1.88	2.17	6.18			15.79
1966	I	83.77	10.53	39.22	9.23	4.34	4.08	5.09	0.89	2.45	2.66	6.14	13.88	132.28	85.80	
	II	81.87	5.38	21.06	19.07	6.67	3.73	3.80	0.86	4.46	1.89	6.00	11.39	166.17	108.58	
1967	I	82.22	10.10	26.33	24.10	8.13	15.56	1.35	0.96	4.38	2.06	6.03	14.36	185.58	154.53	
	II	27.67	12.74	38.40	8.75	5.25	17.23	2.65	1.05	1.53	2.28	6.76	17.14	141.45	143.74	
1968	III	29.23	11.01	32.88	7.31	8.57	4.96	3.45	0.38	1.56	2.24	6.76	13.01	121.36	167.42	
	IV	59.35	12.14	8.43	33.51	8.89	3.57	3.83	0.97	2.18	2.20	5.21	11.63	151.96	168.99	
1969	I	23.12	6.63	25.23	22.09	4.47	13.11	2.75	1.09	3.16	1.97	5.46	13.52	121.40	157.12	
	II	-0.42	11.80	42.81	4.32	0.08	16.54	2.64	1.06	1.90	1.98	6.70	16.68	106.09	189.62	
1970	III	63.37	11.01	20.80	21.17	5.35	7.08	2.47	0.74	1.40	2.36	6.86	13.98	156.59	112.24	
	IV	25.90	6.56	11.82	13.44	1.37	2.25	1.77	1.26	1.31	2.99	5.58	11.32	85.57	137.13	
1971	I	27.77	8.04	22.72	0.02	3.46	8.44	1.89	0.91	1.07	3.09	5.66	12.79	95.88	73.83	
	II	0.59	0.65	0.67	0.46	0.75	0.70	0.85	0.19	0.81	0.72	0.32	0.53	0.46		
1972	Adjusted	0.48	0.62	0.53	0.25	0.70	0.65	0.84	-0.01	0.78	0.69	0.25	0.34	0.29		
	DURBIN-WATSON	2.17	2.13	2.16	1.27	1.87	2.34	1.81	2.39	1.78	1.59	1.97	1.55	2.05		

TABLE 35 : SUMMARY STATISTICS OF ESTIMATED AND ACTUAL AGGREGATES

SUMMARY STATISTICS	ESTIMATED VALUE OF	PROGRAMS WITH HIGHEST $\bar{R}^2$ (ADJUSTED)			
		CONTRACTS		EXPENDITURES	
		ESTIMATED	ACTUAL	ESTIMATED	ACTUAL
NUMBER OF OBSERVATIONS		68	68	71	71
MEAN		157.13	159.63	152.31	152.26
VARIANCE OF SAMPLE		27,312.27	30,387.88	27,448.20	29,783.79
UNBIASED ESTIMATE OF POPULATION VARIANCE		27,694.64	30,813.31	27,832.47	30,200.76
UNBIASED ESTIMATE OF STANDARD DEVIATION OF POPUL.		166.41	175.53	166.08	173.78
STANDARD ERROR OF THE MEAN		20.20	21.30	19.72	20.64
95% CONFIDENCE INTERVAL OF THE MEAN		157.13 ± 39.59	159.63 ± 41.75	152.31 ± 38.65	152.26 ± 40.45
SLOPE OF REGRESSION LINE OF Y ON X		0.92		0.94	
Y INTERCEPT OF THE REGRESSION LINE Y ON X		10.27		9.19	
EXPLAINED VARIATION IN Y		1751833.25		1873393.74	
UNEXPLAINED VARIATION IN Y		105401.28		75428.48	
ERROR VARIANCE OF Y		1550.02		1062.37	
STAND. ERROR OF ESTIMATE OF Y ON X		39.37		32.59	
UNBIASED ESTIMATE OF ERROR VARIANCE OF Y		1596.89		1093.17	
UNBIASED STAND. ERROR OF ESTIMATE OF Y ON X		39.96		33.06	
COEFFICIENT OF DETERMINATION		0.6628		0.8494	
COEFFICIENT OF CORRELATION		0.8141		0.9217	
DURBIN-WATSON STATISTICS		1.85		2.90	
COEF. OF VARIATION		25.43		21.39	

FIG. 13(a) : ESTIMATED AND ACTUAL VALUE OF DND CONTRACTS PLACED BY DDP  
= HIGHEST ADJUSTED R<sup>2</sup> OF PROGRAMS =  
- BY QUARTERS -

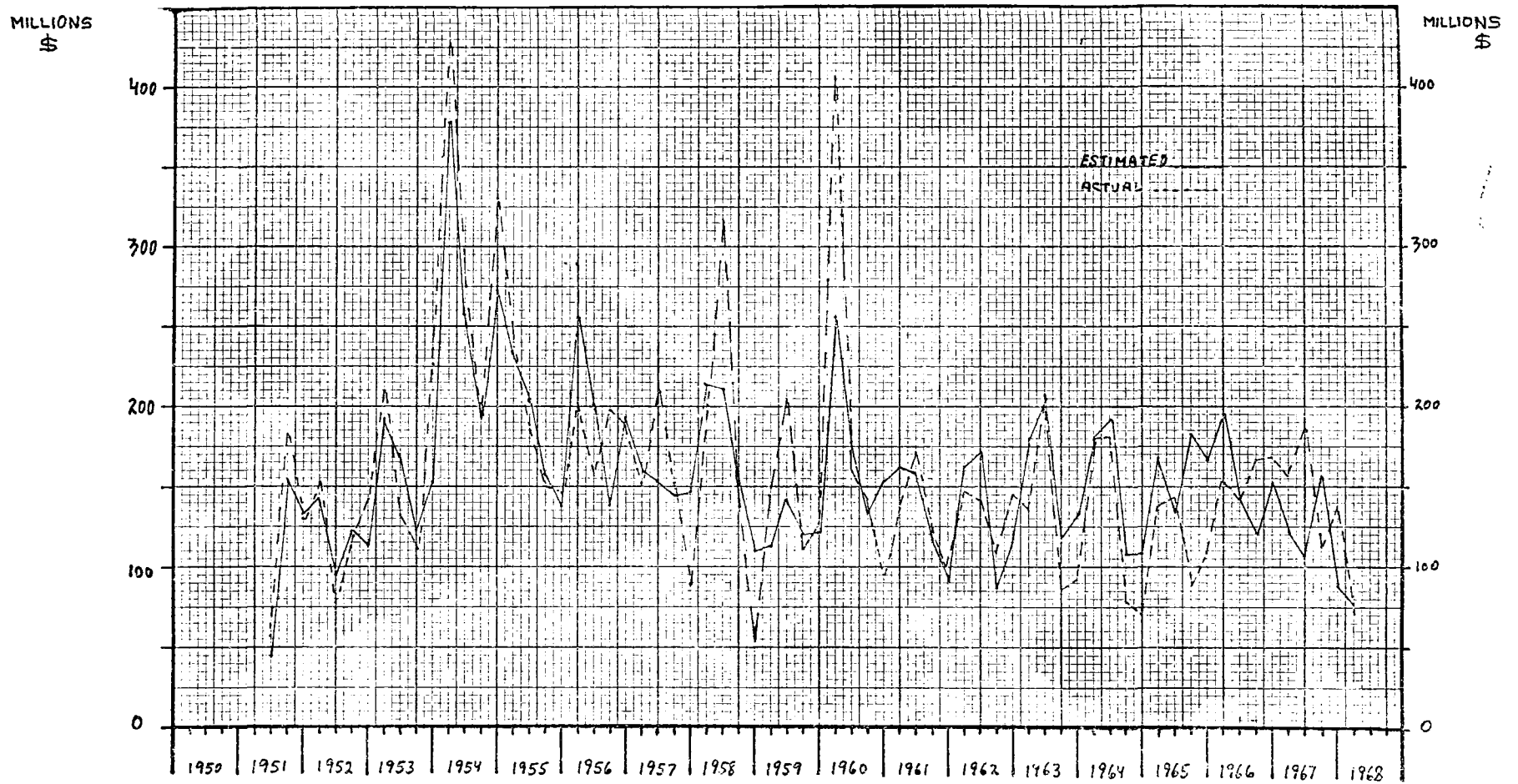


FIG. 13(b) ESTIMATED AND ACTUAL DND EXPENDITURES AGAINST CONTRACTS  
PLACED BY DDP  
- HIGHEST ADJUSTED R<sup>2</sup> OF PROGRAMS -  
- BY QUARTERS -

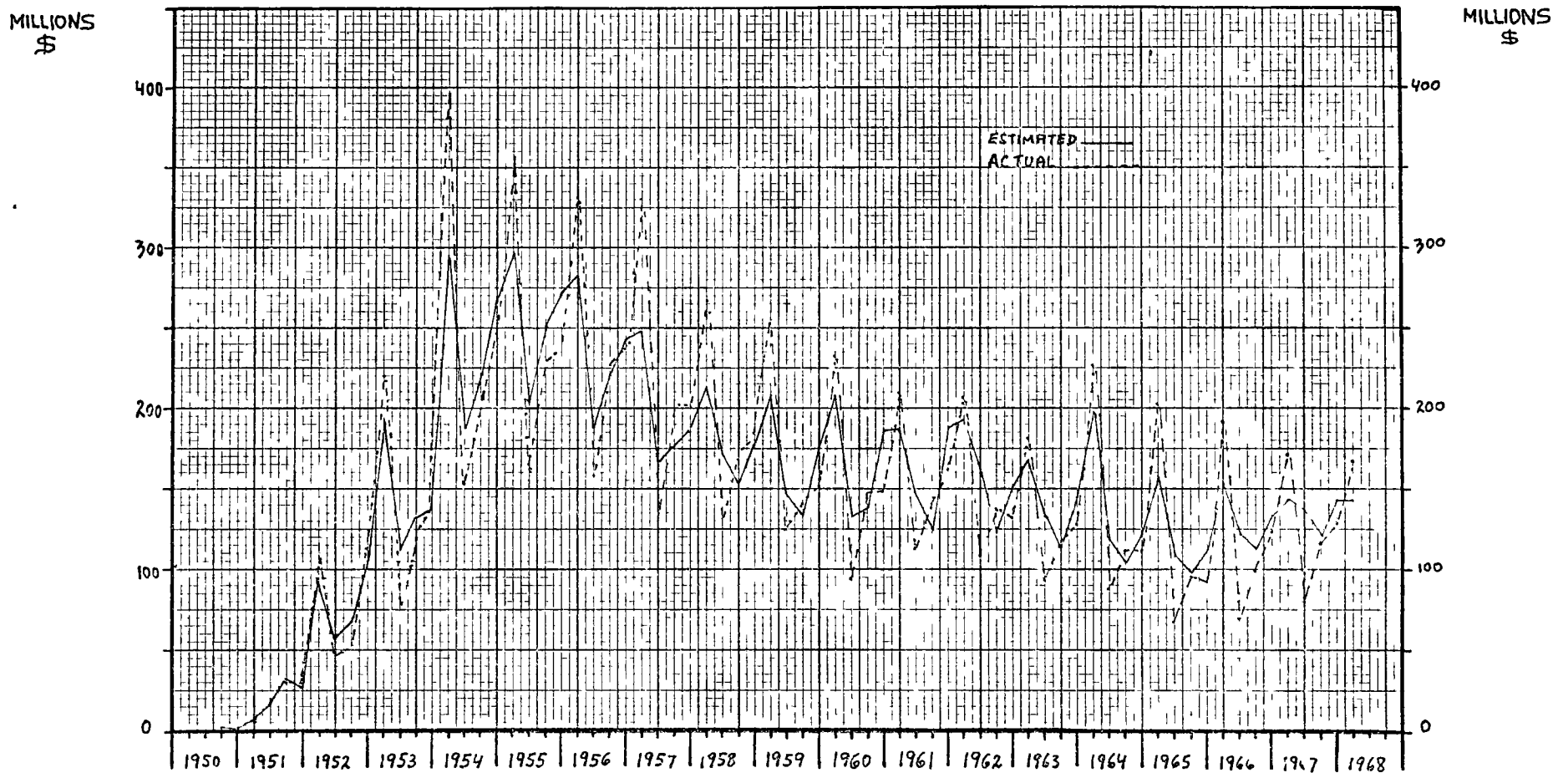






FIG. 14 ESTIMATED AND ACTUAL EXPENDITURES AND VALUE OF CONTRACTS - QUARTERLY  
 — AIRCRAFT —

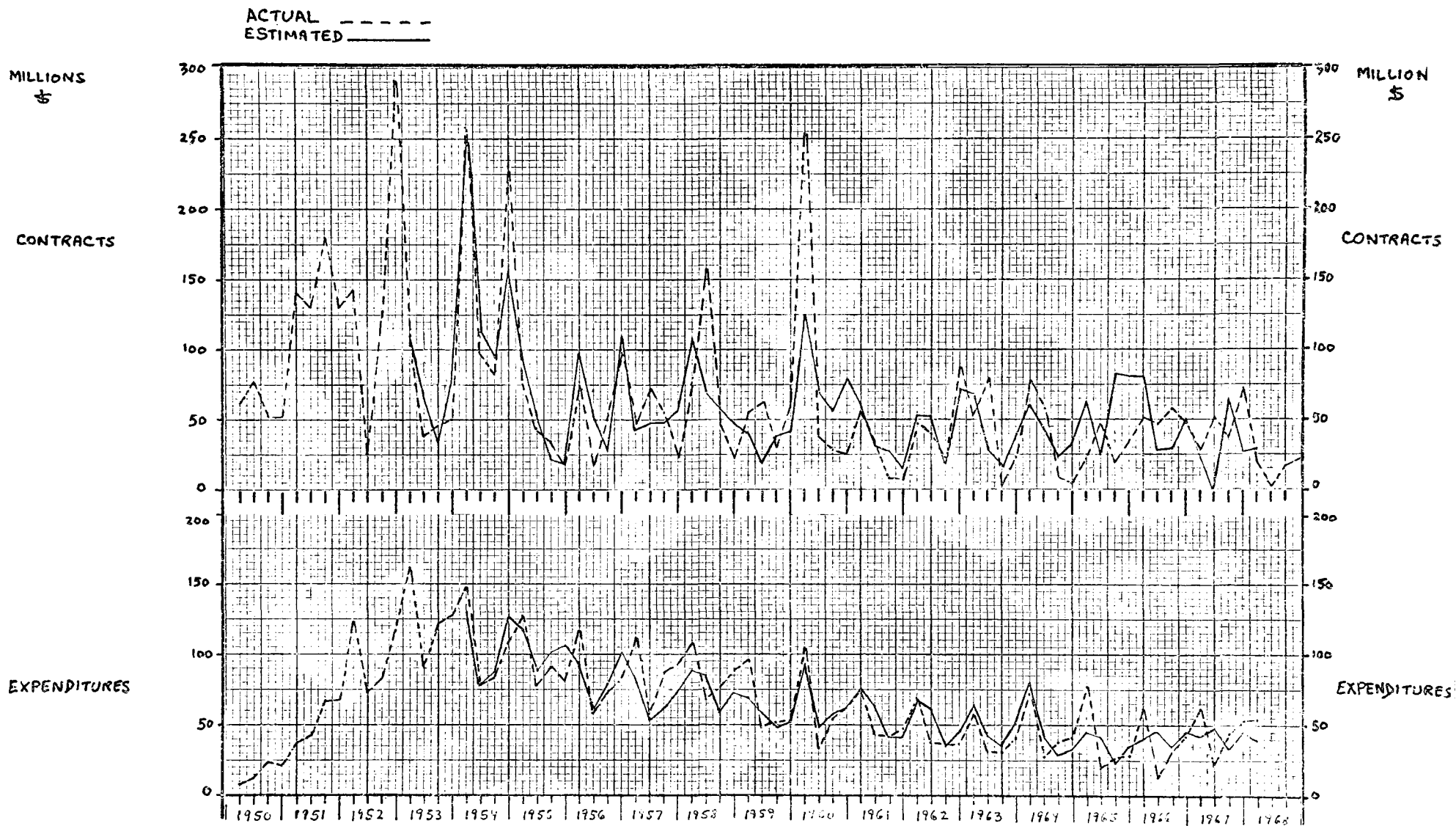


FIG. 15 ESTIMATED AND ACTUAL EXPENDITURES AND VALUE OF CONTRACTS - QUARTERLY  
 — ARMAMENT —

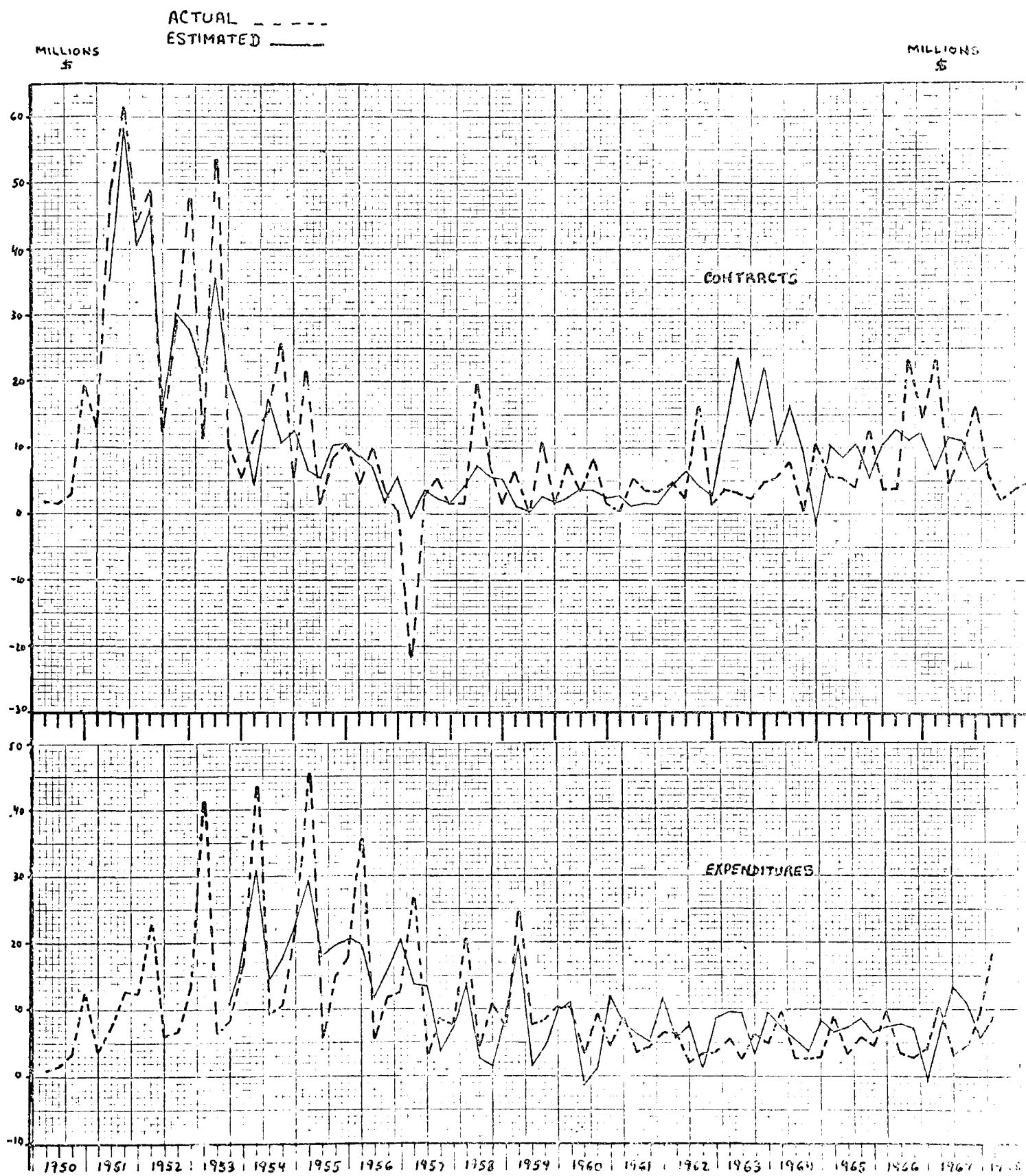


FIG. 16 ESTIMATED AND ACTUAL EXPENDITURES AND VALUE OF CONTRACTS - QUARTERLY

— ELECTRONICS & COMMUNICATIONS —

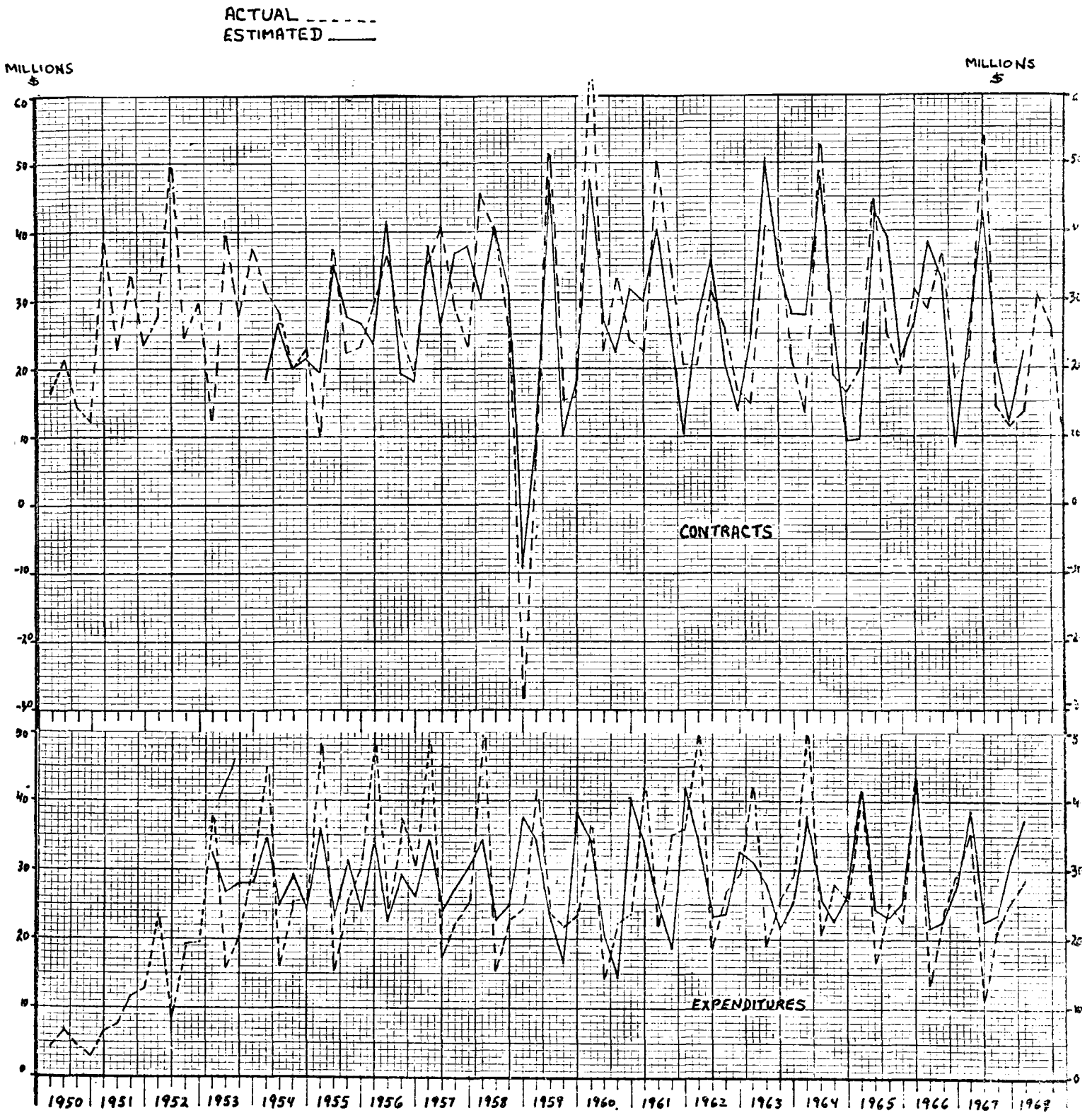


FIG. 17 ESTIMATED AND ACTUAL EXPENDITURES AND VALUE OF CONTRACTS-QUARTERLY

- SHIPS -

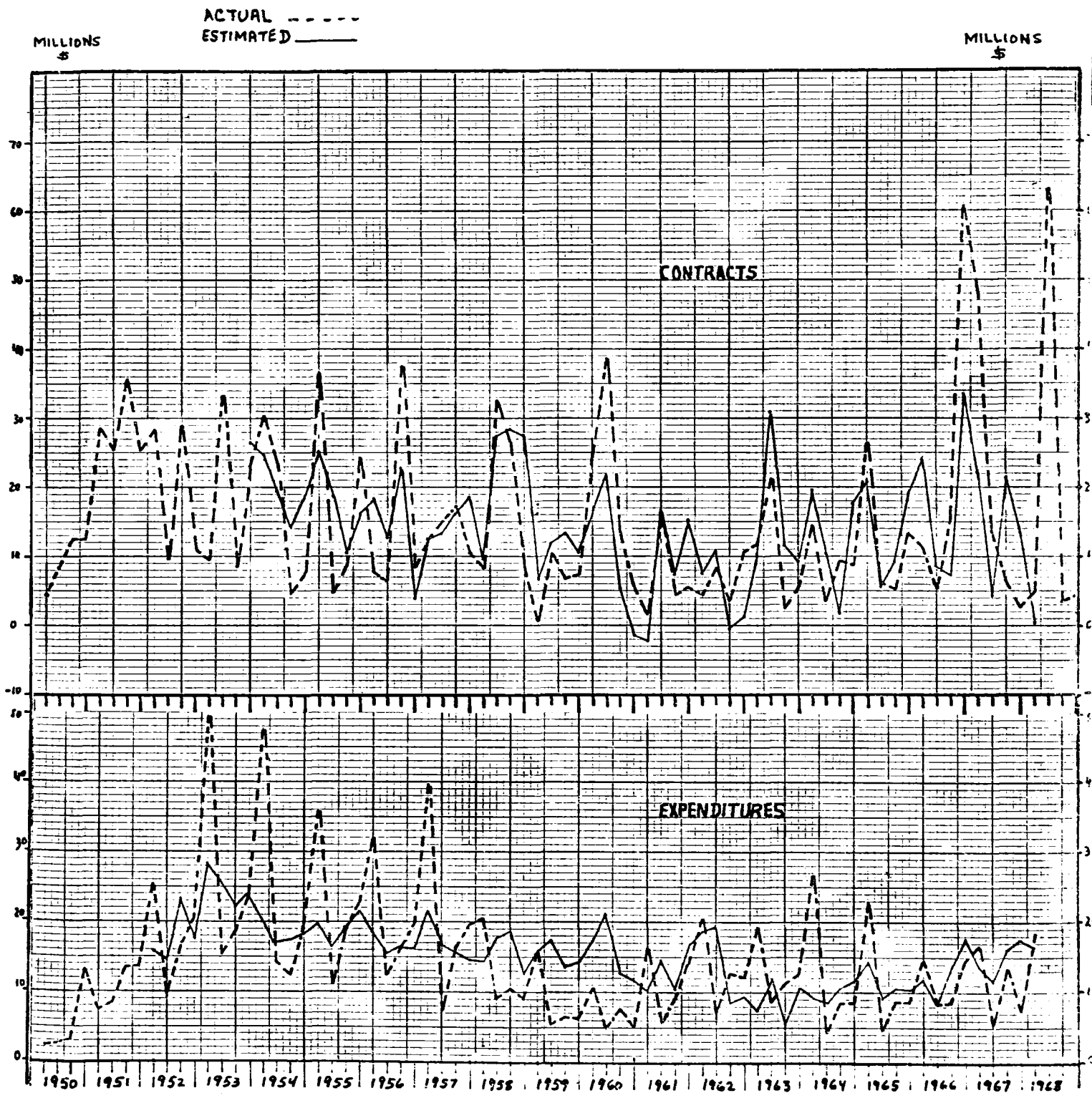


FIG. 18 ESTIMATED AND ACTUAL EXPENDITURES AND VALUE OF CONTRACTS - QUARTERLY  
 — TANK - AUTOMOTIVE - RAILWAY —

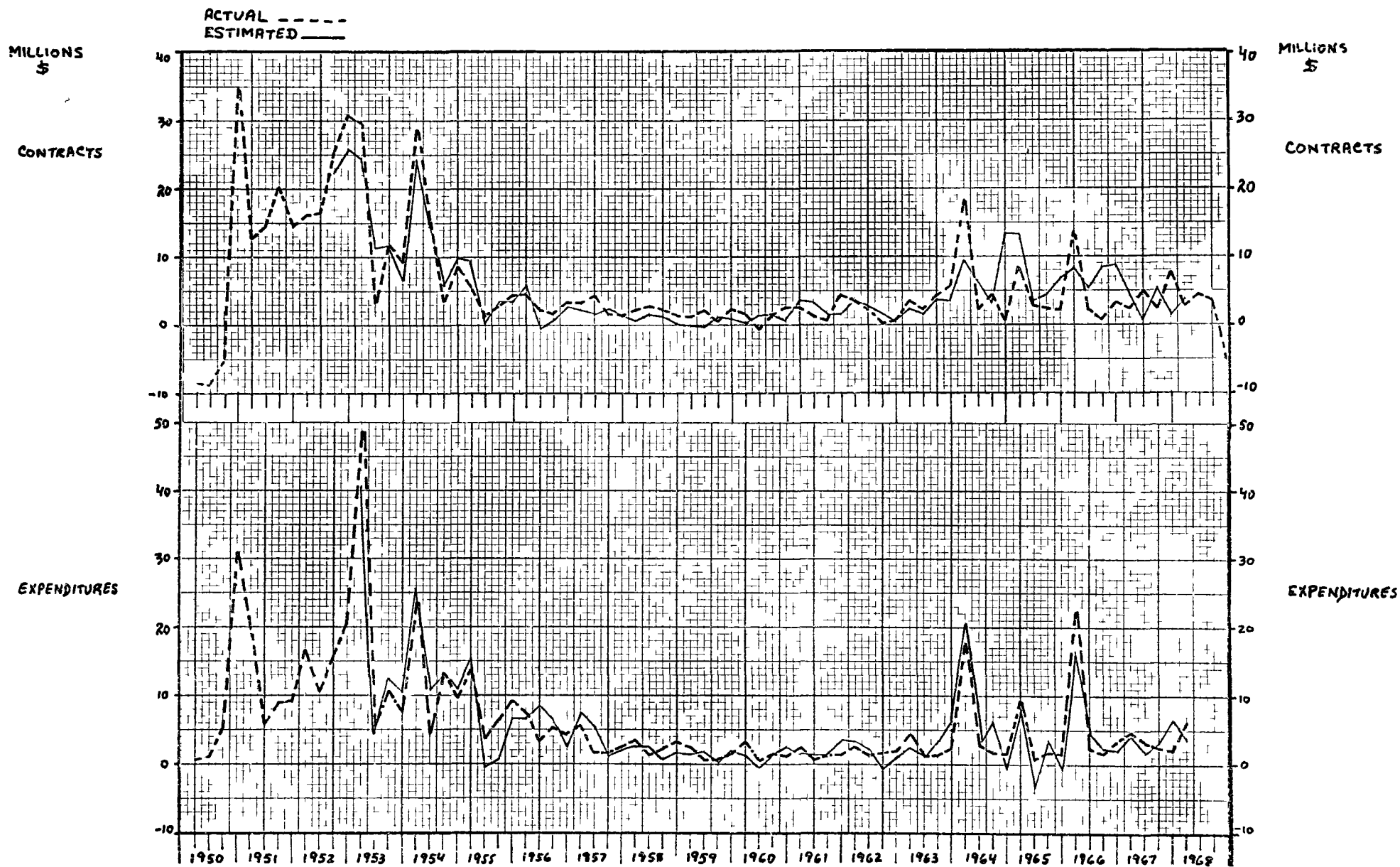


FIG. 19 ESTIMATED AND ACTUAL EXPENDITURES AND VALUE OF CONTRACTS - QUARTERLY  
 - FUELS AND LUBRICANTS -

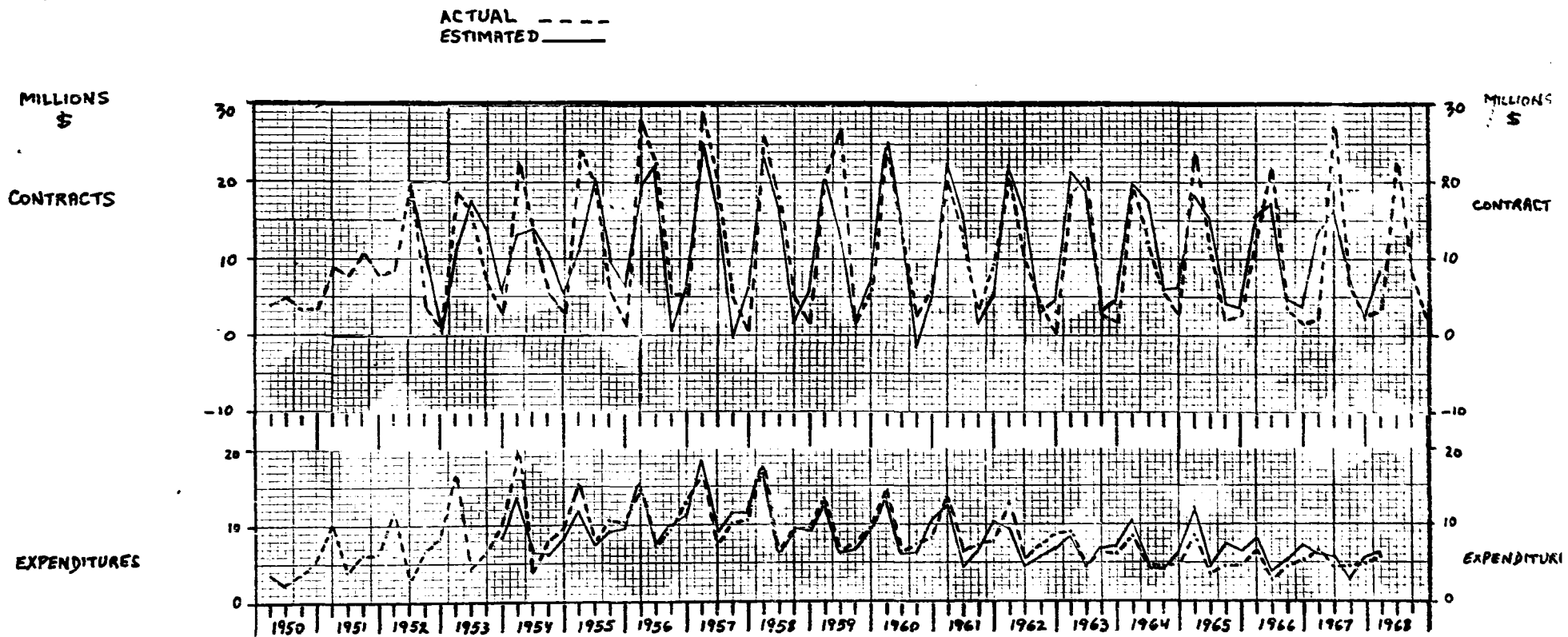


FIG. 20 ESTIMATED AND ACTUAL EXPENDITURES AND VALUE OF CONTRACTS - QUARTERLY  
 — CLOTHING AND EQUIPAGE —

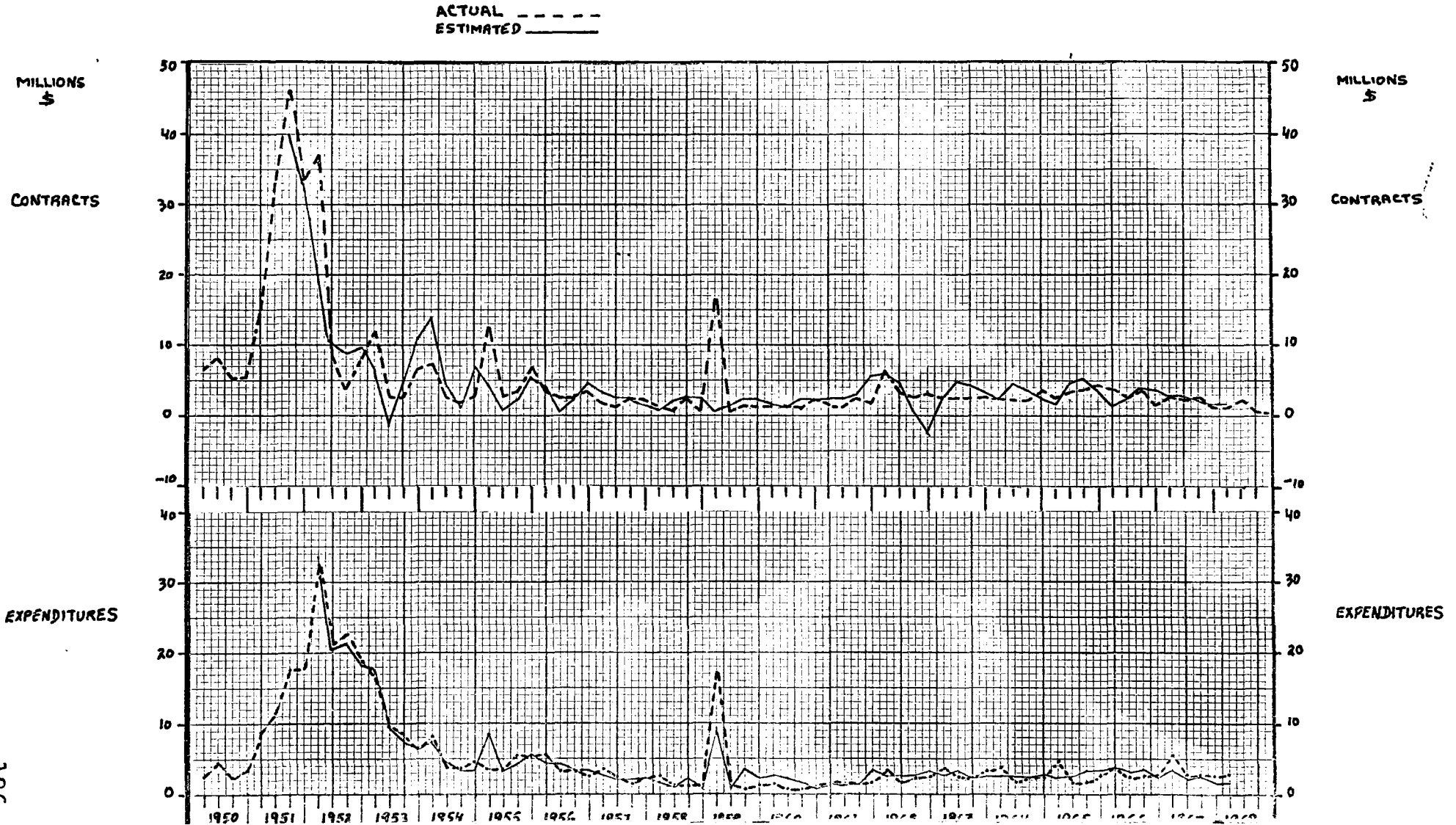


FIG. 21 ESTIMATED AND ACTUAL EXPENDITURES AND VALUE OF CONTRACTS - QUARTERLY  
 — FOOD AND SUBSISTENCE —

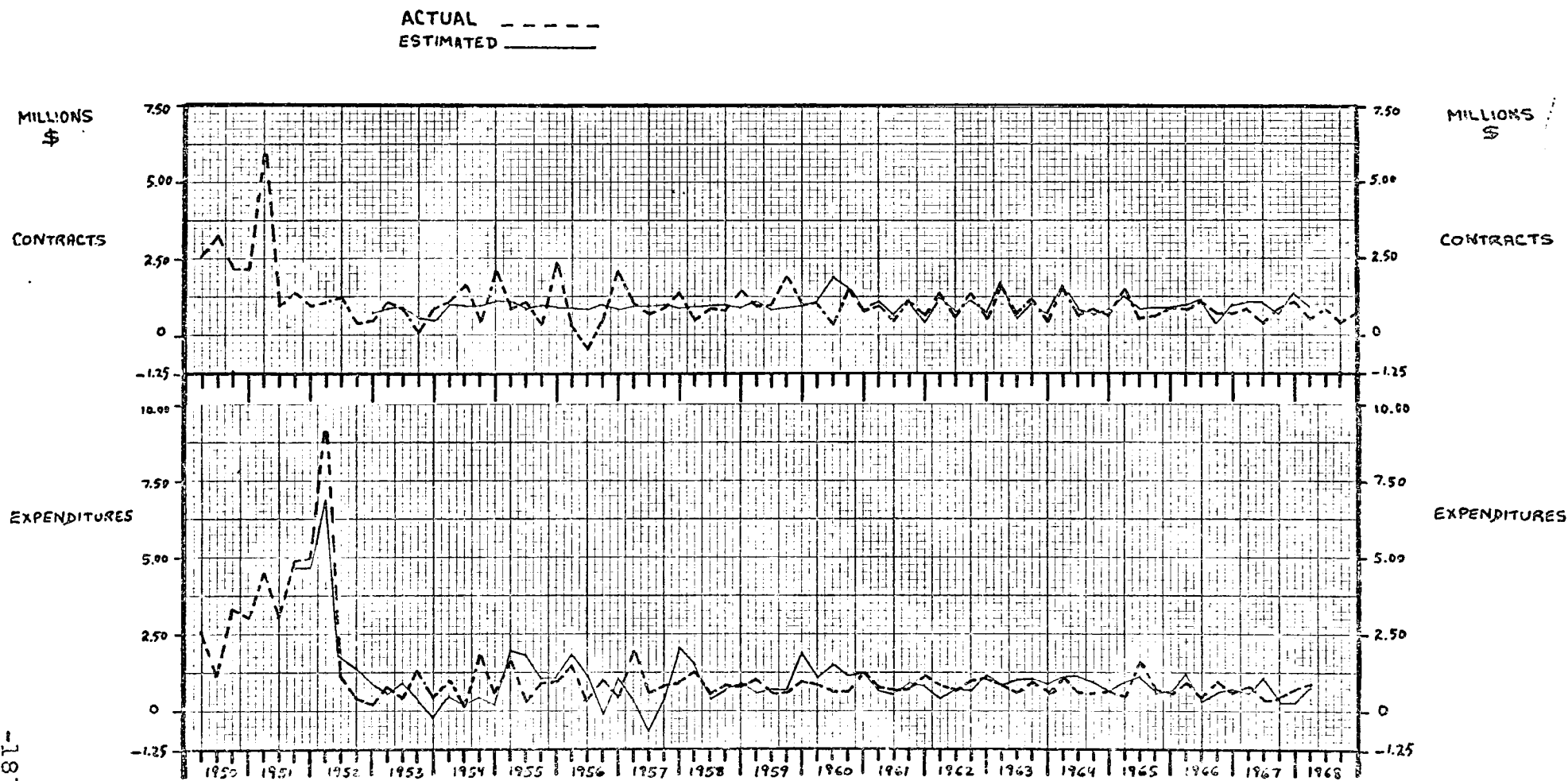


FIG. 22 ESTIMATED AND ACTUAL EXPENDITURES AND VALUE OF CONTRACTS - QUARTERLY - CONSTRUCTION -

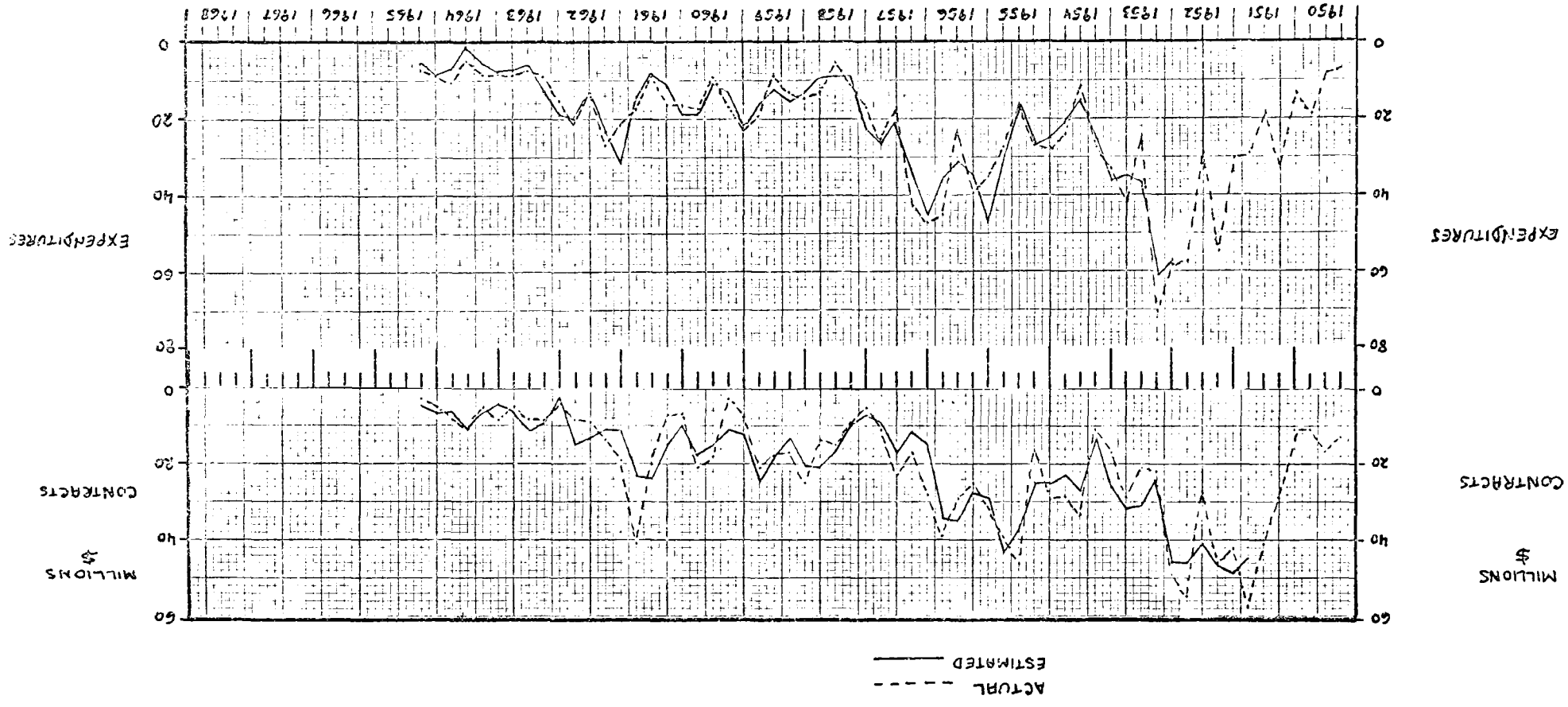


FIG. 23 ESTIMATED AND ACTUAL EXPENDITURES AND VALUE OF CONTRACTS - QUARTERLY

— CONSTRUCTION EQUIPMENT —

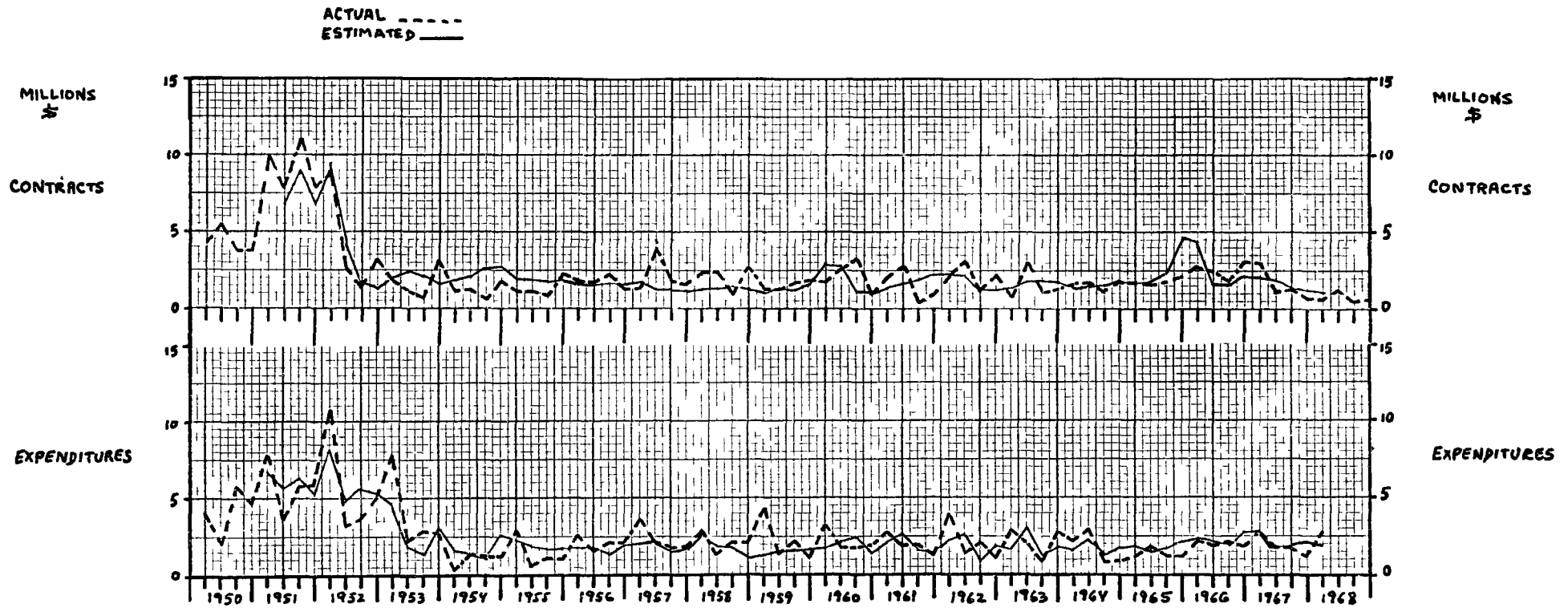


FIG. 24 ESTIMATED AND ACTUAL EXPENDITURES AND VALUE OF CONTRACTS - QUARTERLY  
 - PRODUCTION EQUIPMENT -

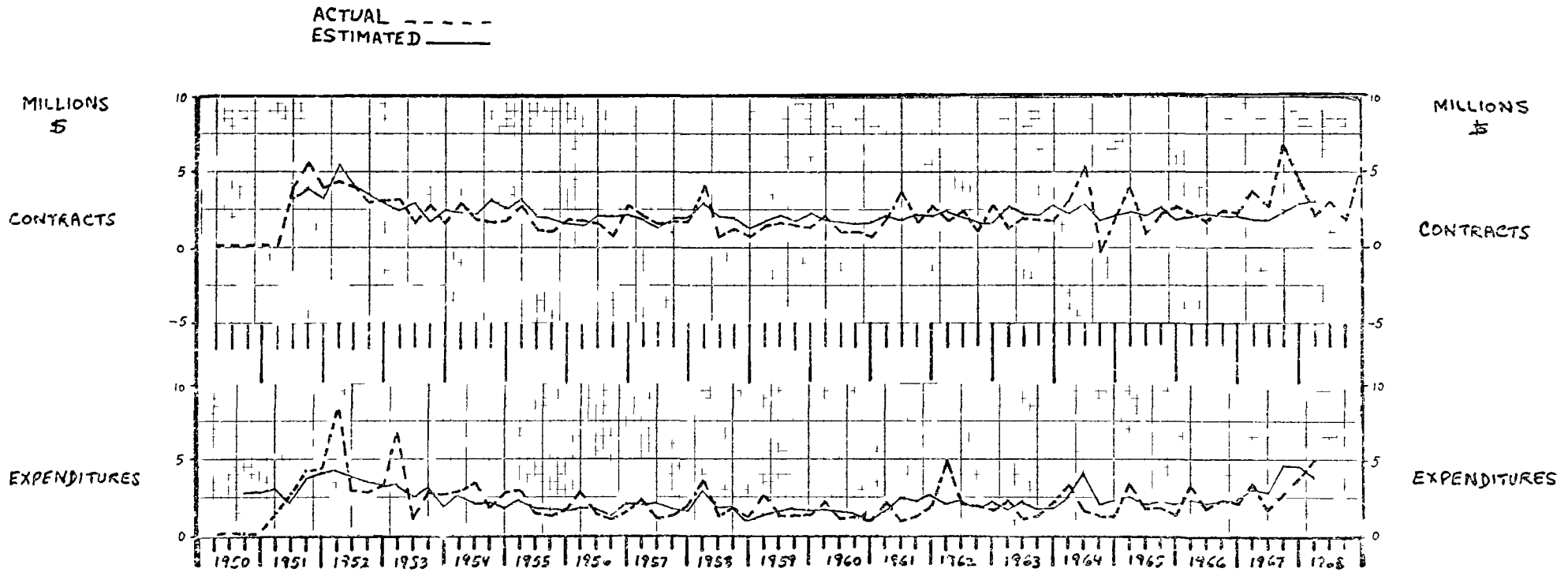


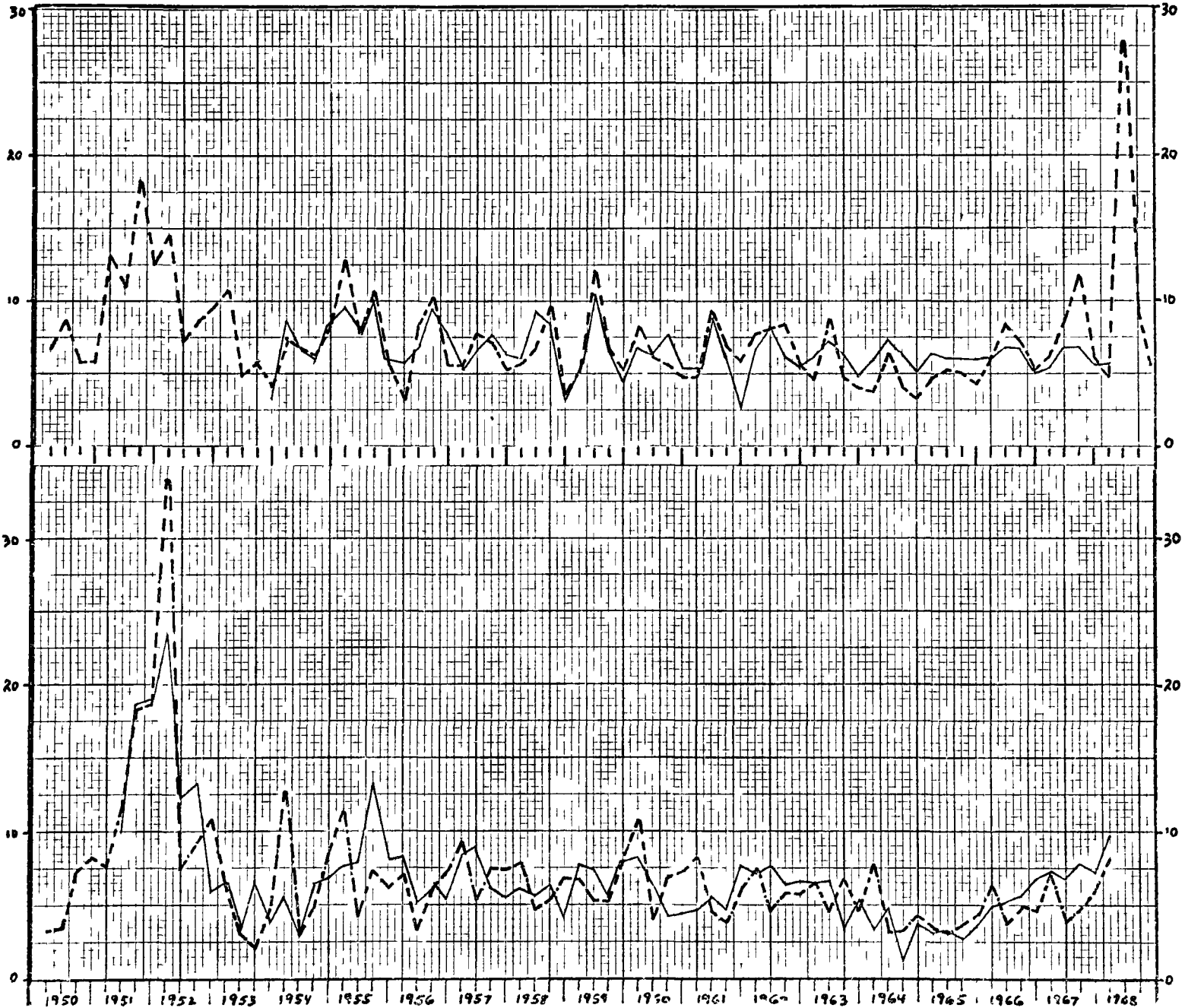
FIG. 25 ESTIMATED AND ACTUAL EXPENDITURES AND VALUE OF CONTRACTS - QUARTERLY

— OTHER PROGRAMS —

ACTUAL - - - -  
ESTIMATED - - - -

MILLIONS  
\$

CONTRACTS



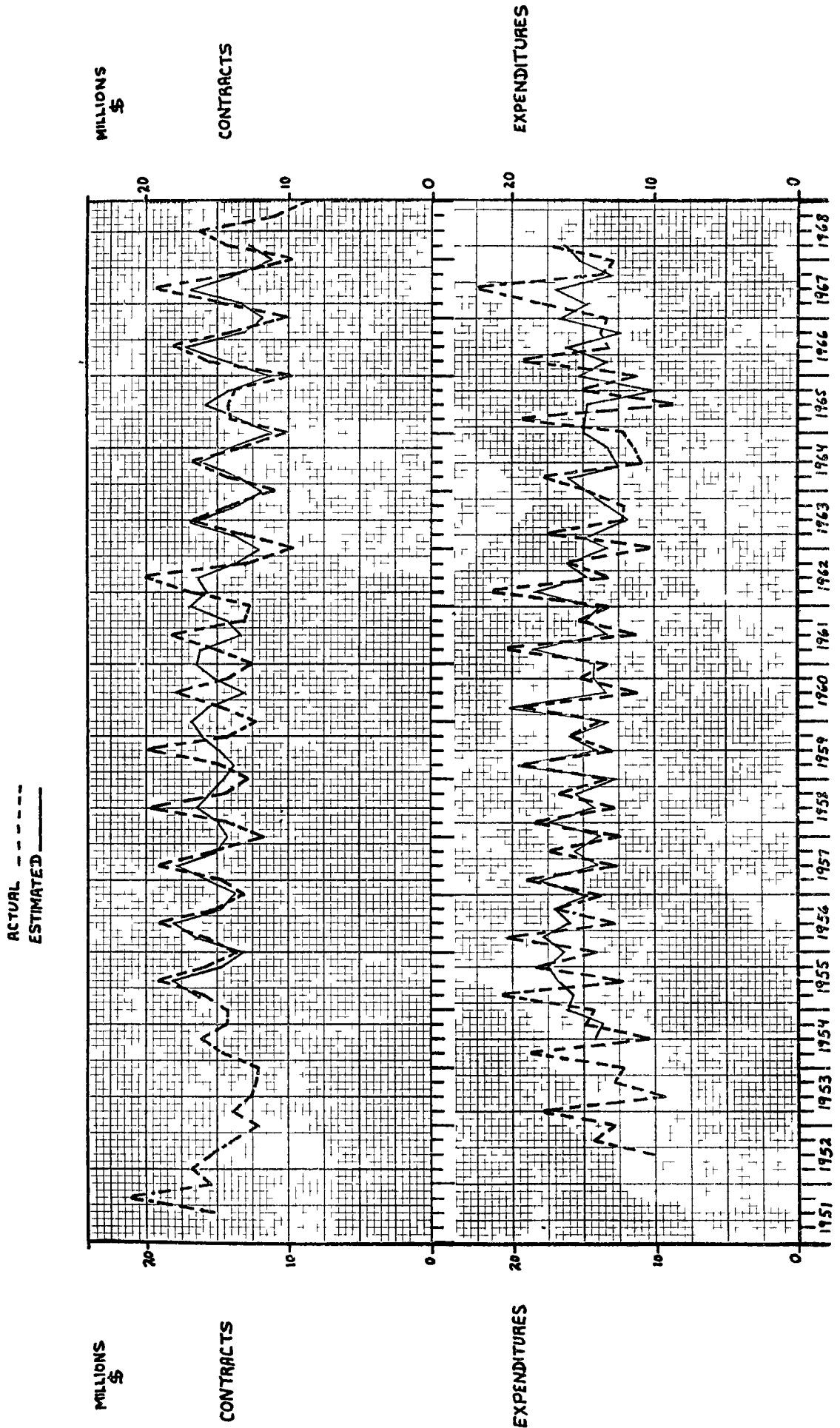
MILLIONS  
\$

CONTRACTS

EXPENDITURES

EXPENDITURES

FIG. 26 ESTIMATED AND ACTUAL EXPENDITURES AND VALUE OF CONTRACTS - QUARTERLY  
 - REGIONAL OFFICES IN CANADA -



APPENDIX "B"

TABLES AND CHARTS FOR:

(4) ANALYSIS OF LAG DISTRIBUTION

TABLE 37(a) : COEFFICIENTS OF REGRESSION OF EQUATIONS CHOSEN TO SHOW LAG DISTRIBUTION OF DND EXPENDITURES AGAINST DDP CONTRACTS

PROGRAM	COEFF	$\alpha$	$\beta_0$	$\beta_1$	$\beta_2$	$\beta_3$	$\beta_4$	$\beta_5$	$\beta_6$	$\beta_7$	$\beta_8$	$\beta_9$	$\beta_{10}$	$\beta_{11}$	$\beta_{12}$	$\beta_{13}$	$\beta_{14}$	$\beta_{15}$	$\beta_{16}$	$R^2$	DW			
AIRCRAFT	SE	17.3759	0.0932	0.0710	0.0282	0.1793	0.1063	0.0424	0.0590	0.1780	...	...	...	...	...	...	...	...	...	...	0.62	0.56	1.87	
	t	6.3846	0.0494	0.0516	0.0507	0.0505	0.0508	0.0519	0.0510	0.0514	...	...	...	...	...	...	...	...	...	...	...	0.41	0.21	2.09
	t	2.7216	1.8880	1.3758	0.5552	3.5486	2.0707	0.8168	1.1576	3.4643	...	...	...	...	...	...	...	...	...	...	...	0.22	0.14	2.08
ARMAMENT	SE	2.1937	0.2268	0.1518	-0.2203	0.2534	0.2232	-0.1782	0.1043	0.0331	-0.0014	-0.3623	...	...	...	...	...	...	...	...	...	0.24	0.12	1.77
	t	1.5977	0.1000	0.1120	0.1047	0.1070	0.1081	0.1091	0.1078	0.1159	0.1250	0.1344	...	...	...	...	...	...	...	...	...	0.68	0.66	2.01
	t	4.5026	2.2674	1.3554	-2.1033	2.3683	2.0638	-1.6336	0.9669	0.2854	-0.0114	-2.6859	...	...	...	...	...	...	...	...	...	0.66	0.59	1.93
ELECTRONICS + COMMUNIC.	SE	31.4721	-0.0407	0.2345	-0.0693	0.0140	-0.1178	-0.1798	...	...	...	...	...	...	...	...	...	...	...	...	...	0.91	0.90	1.74
	t	8.9330	0.0977	0.1016	0.0984	0.1010	0.0976	0.0960	...	...	...	...	...	...	...	...	...	...	...	...	...	0.76	0.73	1.85
	t	3.6883	-0.4165	2.3085	-0.7043	0.1386	-1.1077	-1.8743	...	...	...	...	...	...	...	...	...	...	...	...	...	0.77	0.75	2.19
SHIPS	SE	2.5786	0.2380	0.1356	0.1594	0.0208	0.0978	0.0230	0.1307	-0.1263	0.1222	...	...	...	...	...	...	...	...	...	...	0.56	0.53	2.27
	t	3.8600	0.1178	0.1131	0.1187	0.1037	0.0996	0.1025	0.1022	0.1065	0.1033	...	...	...	...	...	...	...	...	...	...	0.44	0.41	2.12
	t	0.6680	2.4454	1.1986	1.3433	0.2001	0.9817	0.2243	1.2786	-1.1862	1.1825	...	...	...	...	...	...	...	...	...	...	0.64	0.60	1.58
TANK-AUTOMOT.-RAILWAY	SE	0.5554	0.1522	0.0345	-0.1211	0.1250	0.7047	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.26	0.19	3.14
	t	0.7875	0.0870	0.0703	0.0873	0.0913	0.1077	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.26	0.19	3.14
	t	0.7053	1.7499	0.3825	-1.3569	1.3471	6.7308	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.26	0.19	3.14
FUELS + LUBRICANTS	SE	-4.5112	-0.1040	-0.0140	0.0424	0.1549	0.0116	0.2341	0.2545	0.2491	0.0741	0.0271	...	...	...	...	...	...	...	...	...	0.68	0.66	2.01
	t	2.0854	0.0702	0.0733	0.0709	0.0765	0.0924	0.0896	0.0767	0.0773	0.0743	0.0702	...	...	...	...	...	...	...	...	...	0.66	0.59	1.93
	t	-2.1632	-1.4813	-0.1907	0.5478	2.0254	-0.1254	2.6135	3.3161	3.2225	0.9982	3.2341	...	...	...	...	...	...	...	...	...	0.91	0.90	1.74
CLOTHING + EQUIPAGE	SE	0.2282	0.1171	0.1328	0.1335	0.2412	-0.0713	0.3451	...	...	...	...	...	...	...	...	...	...	...	...	...	0.76	0.73	1.85
	t	0.3234	0.0478	0.0516	0.0593	0.0545	0.0548	0.0497	...	...	...	...	...	...	...	...	...	...	...	...	...	0.77	0.75	2.19
	t	0.7060	2.7344	2.4342	2.4588	4.4272	-1.2495	7.8957	...	...	...	...	...	...	...	...	...	...	...	...	...	0.56	0.53	2.27
FOOD + SUBSISTENCE	SE	-1.2695	-0.0614	1.1575	0.1837	0.4193	0.3264	0.6027	-0.3298	...	...	...	...	...	...	...	...	...	...	...	...	0.44	0.41	2.12
	t	0.3271	0.1083	0.1154	0.1101	0.1082	0.1159	0.1191	0.1198	...	...	...	...	...	...	...	...	...	...	...	...	0.64	0.60	1.58
	t	-3.8810	0.5646	10.0311	1.6083	3.8750	2.8170	3.1530	-1.7377	...	...	...	...	...	...	...	...	...	...	...	...	0.64	0.60	1.58
CONSTRUCTION	SE	-1.4280	0.4069	0.4262	-0.1133	0.3649	0.0453	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.77	0.75	2.19
	t	2.3250	0.0987	0.1132	0.1133	0.1135	0.0978	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.56	0.53	2.27
	t	-0.6418	4.1215	3.8516	-1.0003	3.2151	0.4628	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.44	0.41	2.12
CONSTRUCTION EQUIPMENT	SE	0.7504	0.2678	-0.0254	0.1163	0.4313	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.56	0.53	2.27
	t	0.2445	0.1004	0.1193	0.1130	0.1016	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.44	0.41	2.12
	t	3.0699	2.6669	-0.7466	1.0288	4.2460	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.64	0.60	1.58
PRODUCTION EQUIPMENT	SE	0.2704	0.2104	0.4517	0.2414	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.64	0.60	1.58
	t	0.3039	0.1006	0.1008	0.1036	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.64	0.60	1.58
	t	0.8897	2.0911	4.4815	2.3386	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.64	0.60	1.58
OTHER PROGRAMS	SE	-3.4318	-0.3001	0.1869	0.1945	0.7681	0.0582	0.5324	...	...	...	...	...	...	...	...	...	...	...	...	...	0.64	0.60	1.58
	t	1.3737	0.1359	0.1444	0.1462	0.1466	0.1451	0.1448	...	...	...	...	...	...	...	...	...	...	...	...	...	0.64	0.60	1.58
	t	-2.4783	-2.2081	1.2941	1.3392	5.4236	0.4009	3.6762	...	...	...	...	...	...	...	...	...	...	...	...	...	0.64	0.60	1.58
REGIONAL OFFICES IN INDIA	SE	0.6190	-0.6100	0.3007	1.0063	0.5558	0.3352	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.26	0.19	3.14
	t	6.5572	0.3260	0.2610	0.2570	0.2485	0.3167	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.26	0.19	3.14
	t	0.0945	-1.2020	-1.1521	3.9613	2.2366	1.0585	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.26	0.19	3.14





TABLE 38(b) : EXPENDITURES TO CONTRACTS COEFFICIENT OF REGRESSION - CUMULATED AND NORMALIZED

PROGRAM	COEFF.	$\alpha$	$\beta_0$	$\beta_1$	$\beta_2$	$-\beta_3$	$\beta_4$	$\beta_5$	$\beta_6$	$\beta_7$	$\beta_8$	$\beta_9$	$\beta_{10}$	$\beta_{11}$	$\beta_{12}$	$\beta_{13}$	$\beta_{14}$	$\beta_{15}$	$\beta_{16}$	$R^2$	$\bar{R}^2$	DW
AIRCRAFT	17.3759	0.0932	0.0710	0.0282	0.1793	0.1063	0.0424	0.0590	0.1780	...	...	...	...	...	...	...	...	...	...	0.62	0.56	1.87
ARMAMENT	7.1937	0.2268	0.1518	-0.2203	0.2534	0.2232	-0.1782	0.1043	0.0331	-0.0014	-0.3623	...	...	...	...	...	...	...	...	0.41	0.29	2.09
ELECTRONICS + COMMUNIC.	31.4721	-0.0407	0.2345	-0.0693	0.0140	-0.1178	-0.1798	...	...	...	...	...	...	...	...	...	...	...	...	0.22	0.14	2.08
SHIPS	4.5786	0.2880	0.1556	0.1594	0.0208	0.0978	0.0230	0.1307	-0.1263	0.1222	...	...	...	...	...	...	...	...	...	0.24	0.12	1.97
TANK-AUTOMOT.-RAILWAY	0.5554	0.1522	0.0345	-0.1211	0.1230	0.7047	...	...	...	...	...	...	...	...	...	...	...	...	...	0.68	0.66	2.01
FUELS + LUBRICANTS	-4.5112	-0.1040	-0.0140	0.0424	0.1549	0.0116	0.2341	0.2545	0.2491	0.0741	0.2271	...	...	...	...	...	...	...	...	0.66	0.59	1.93
CLOTHING + EQUIPAGE	0.2282	0.1171	0.1328	0.1335	0.2412	-0.0713	0.3451	...	...	...	...	...	...	...	...	...	...	...	...	0.91	0.90	1.74
FOOD + SUBSISTENCE	-1.2695	-0.0612	1.1575	0.1837	0.4193	0.3264	0.6027	-0.3298	...	...	...	...	...	...	...	...	...	...	...	0.76	0.73	1.85
CONSTRUCTION	-1.4280	0.4069	0.4362	-0.1133	0.3649	0.0453	...	...	...	...	...	...	...	...	...	...	...	...	...	0.77	0.75	2.10
CONSTRUCTION EQUIPMENT	0.7806	0.2678	-0.0854	0.1163	0.4313	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.56	0.53	2.23
PRODUCTION EQUIPMENT	0.2704	0.2104	0.4517	0.2414	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.44	0.41	2.12
OTHER PROGRAMS	-3.4318	-0.3001	0.1865	0.1945	0.7691	0.0582	0.5324	...	...	...	...	...	...	...	...	...	...	...	...	0.64	0.60	1.98
REGIONAL OFFICES IN CANADA	0.6190	-0.6200	-0.3007	1.0063	0.5558	0.3352	...	...	...	...	...	...	...	...	...	...	...	...	...	0.26	0.19	3.74

TABLE 39 : COEFFICIENTS OF REGRESSION OF SELECTED PROGRAMS - EXPENDITURES AND CONTRACTS  
INTERCEPT REDUCED TO ZERO

PROGRAM	COEFF	$\alpha$	$\beta_0$	$\beta_1$	$\beta_2$	$\beta_3$	$\beta_4$	$\beta_5$	$\beta_6$	$\beta_7$	$\beta_8$	$\beta_9$	$\beta_{10}$	$\beta_{11}$	$\beta_{12}$	$\beta_{13}$	$\beta_{14}$	$\beta_{15}$	$\beta_{16}$	$R^2$	$\bar{R}^2$			
EXPENDITURES																								
AIRCRAFT	REG	0	0.1229	0.0988	0.0524	0.2056	0.1336	0.0664	0.0830	0.2039											0.56	0.51		
	SE		0.0508	0.0533	0.0516	0.0533	0.0538	0.0519	0.0519	0.0533														
	t		2.4199	1.8529	0.9962	3.9337	2.5971	1.2392	1.2687	1.2687	3.8069													
	PR %		10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0													
ELECTRONICS AND COMMUNICATIONS	REG	0	0.1229	0.2217	0.2771	0.4797	0.6133	0.6797	0.7627	0.9656														
	SE		0.1273	0.1033	0.0942	0.1384	0.1688	0.1688	0.1688	0.1688														
	t		12.73	21.43	28.38	47.67	63.51	70.39	78.99	100.00														
	PR %		12.73	21.43	28.38	47.67	63.51	70.39	78.99	100.00														
SHIPS	REG	0	0.0258	0.1286	0.3601	0.0717	-0.0310	0.3011	0.1163	0.0655	-0.0133													
	SE		0.0902	0.0947	0.0895	0.0865	0.0885	0.0851	0.0830	0.0828	0.0879													
	t		0.2855	1.5289	4.2638	0.8293	-0.3507	3.5383	1.5711	0.7715	-0.4925													
	PR %		10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0													
AIRCRAFT	REG	0	0.1597	-0.0755	-0.0894	0.0034	0.1031	0.3141	0.0977	0.0318	0.1857													
	SE		0.0585	0.0531	0.0528	0.0536	0.0540	0.0548	0.0546	0.0545	0.0616													
	t		2.7287	-0.6692	-0.3675	0.0629	1.9687	5.7244	1.7891	0.5816	3.0144													
	PR %		10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0													
ELECTRONICS AND COMMUNICATIONS	REG	0	0.1597	0.1292	0.1048	0.1082	0.2113	0.3254	0.4231	0.6549	0.8406													
	SE		0.0891	0.0908	0.0870	0.0857	0.0844	0.0853	0.0844	0.0853	0.0953													
	t		-1.6470	4.3038	-1.5857	0.6294	1.8830	4.3366	3.4445	1.6709	10.0													
	PR %		10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0													
SHIPS	REG	0	0.1519	0.2872	0.1859	0.2492	0.2923	0.0698	0.0127	0.1696	0.3866	0.4003	0.4781	0.4253	0.3764	0.4643	0.8648	0.4005	0.0879	0.0638				
	SE		0.0964	0.0964	0.0956	0.0987	0.1001	0.1020	0.1000	0.0983	0.0987	0.1012	0.1019	0.1048	0.0996	0.1036	0.1051	0.1036	0.1051	0.1051				
	t		1.5753	1.4033	-0.9519	1.0467	-0.0684	-2.1825	-0.5703	1.5860	2.1987	0.1350	0.7634	-0.5076	-0.4667	0.8828	3.8645	0.8671	0.8671	0.8671				
	PR %		10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0				

FIG. 27 PERCENTAGE DISTRIBUTION OF REGRESSION COEFFICIENTS OF LAGGED QUARTERS - BY PROGRAM

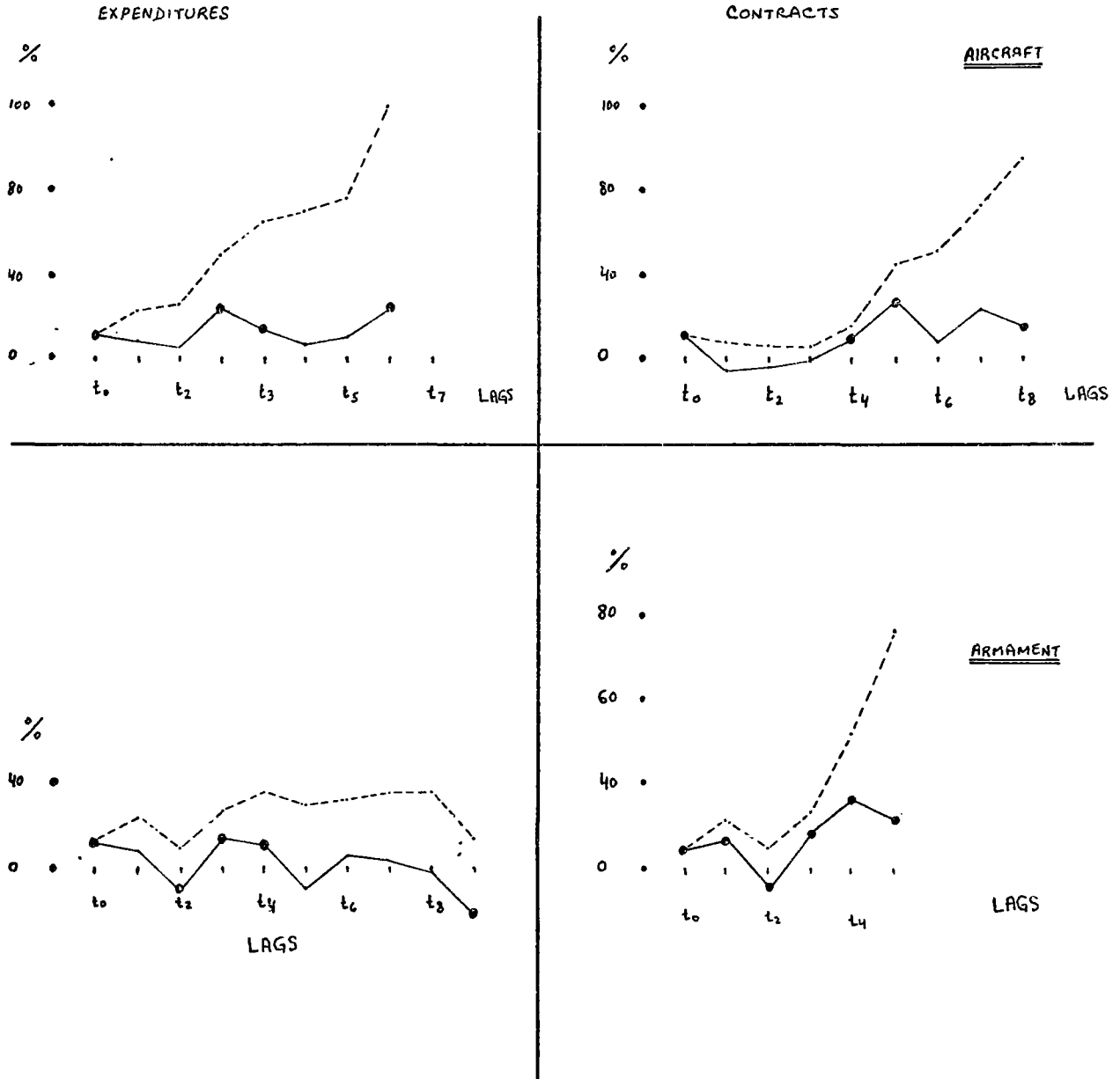
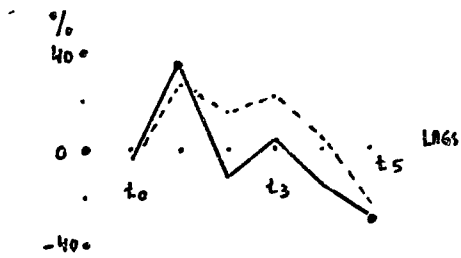


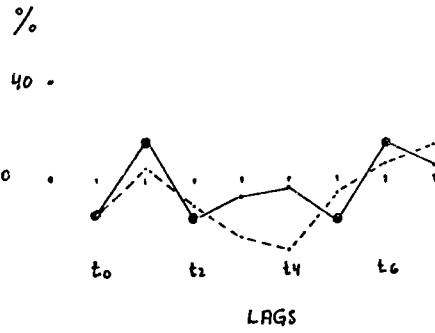
FIG. 27 (CONT.)

EXPENDITURES

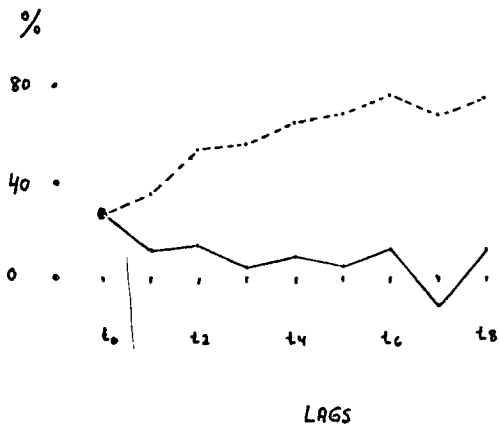


CONTRACTS

ELECTRONICS  
&  
COMMUNICATIONS



SHIPS



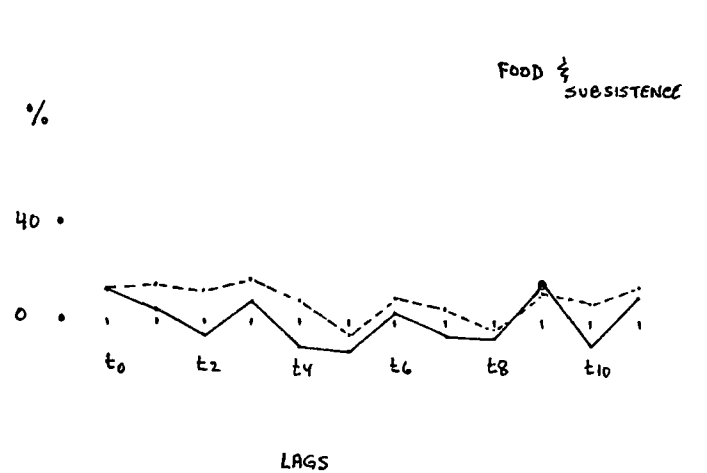
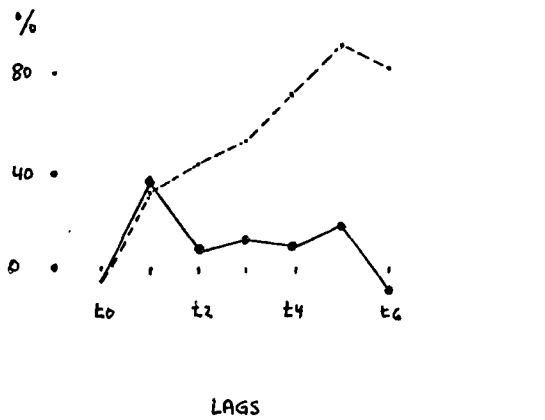
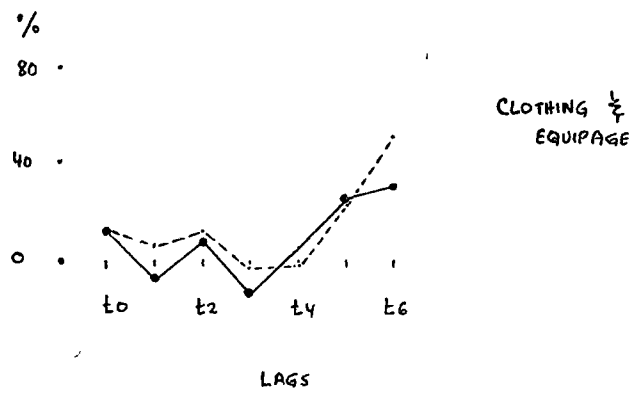
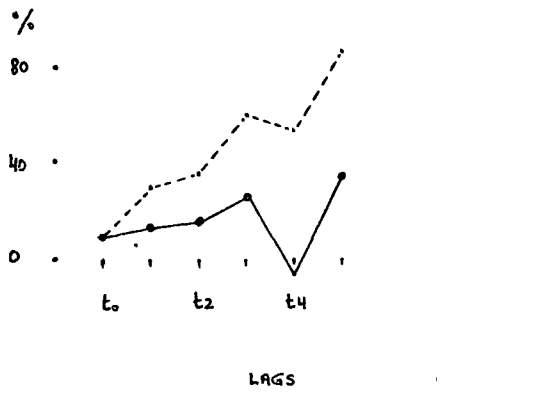
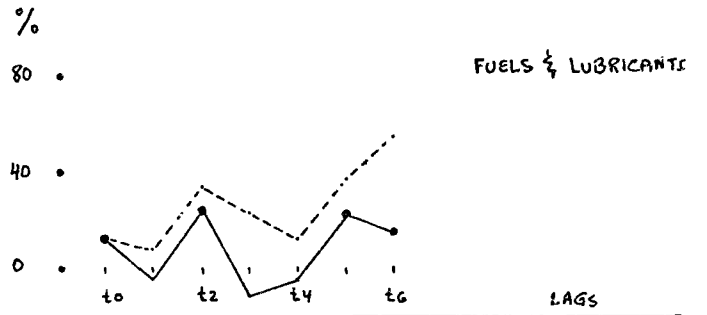
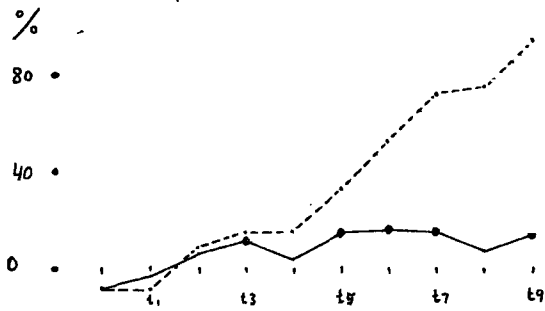
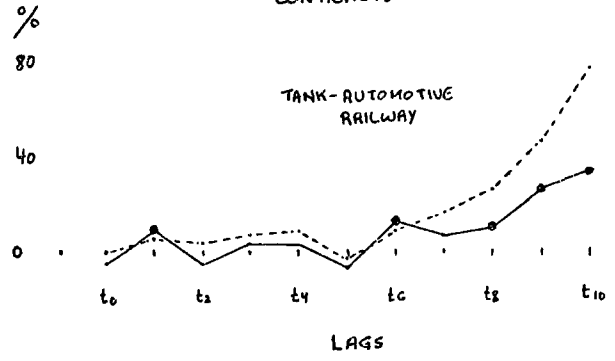
● INDICATES SIGNIFICANT COEFFICIENT  
 --- CUMULATIVE  
 — ACTUAL

FIG. 27 (CONT.)

EXPENDITURES



CONTRACTS



● INDICATES SIGNIFICANT COEFFICIENTS  
 --- CUMULATIVE  
 — ACTUAL

FIG. 27 (CONT.)

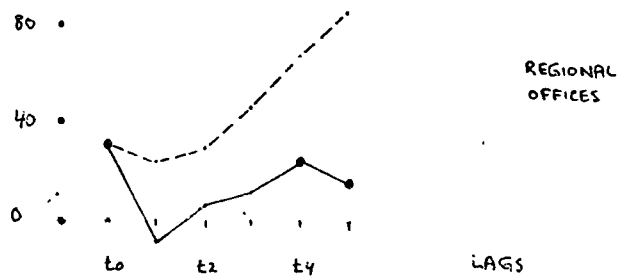
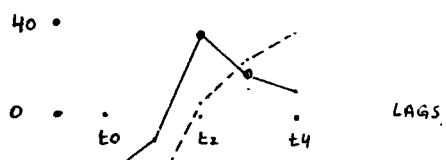
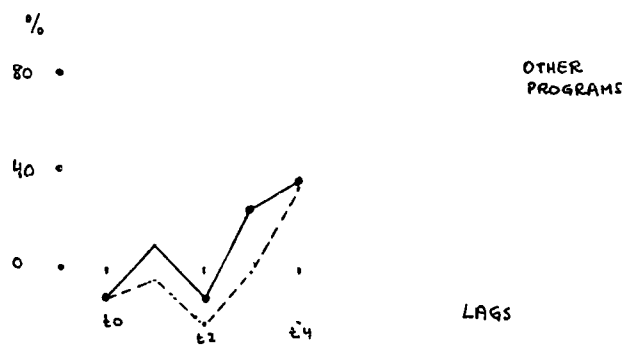
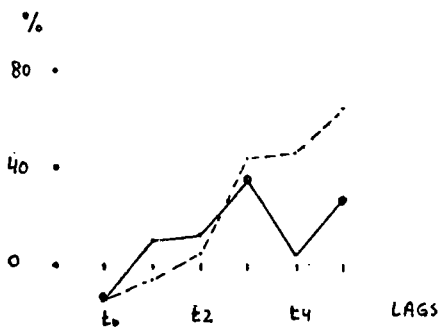
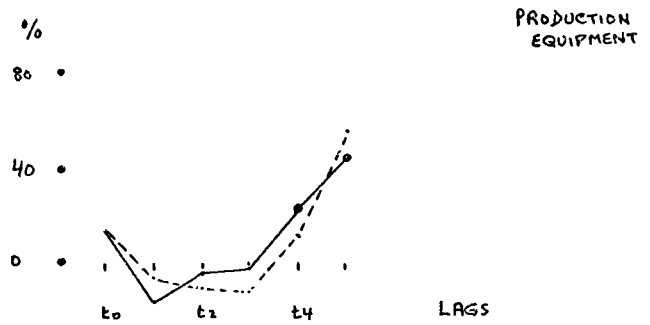
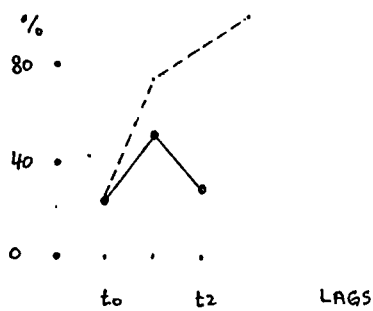
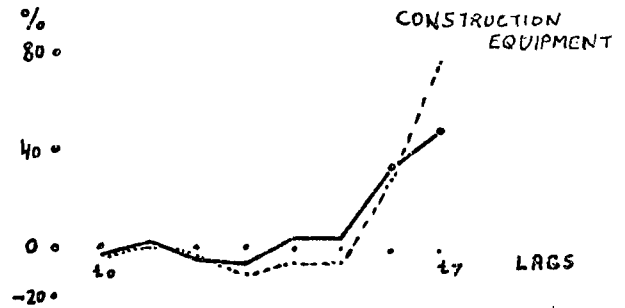
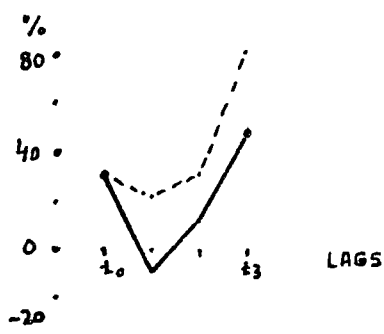
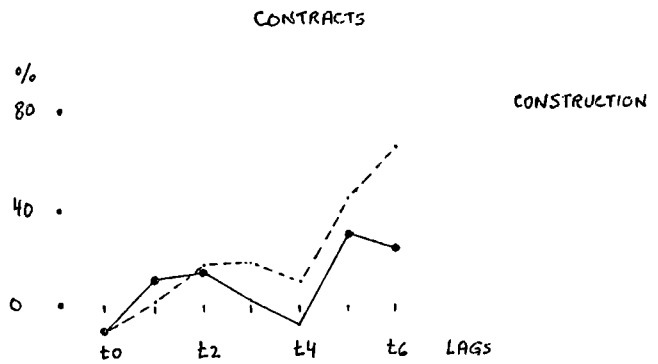
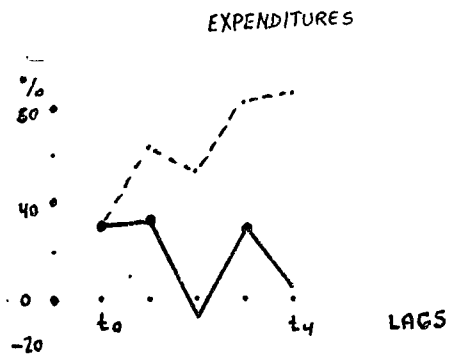


FIG. 28 RESIDUAL ANALYSIS - AIRCRAFT PROGRAM

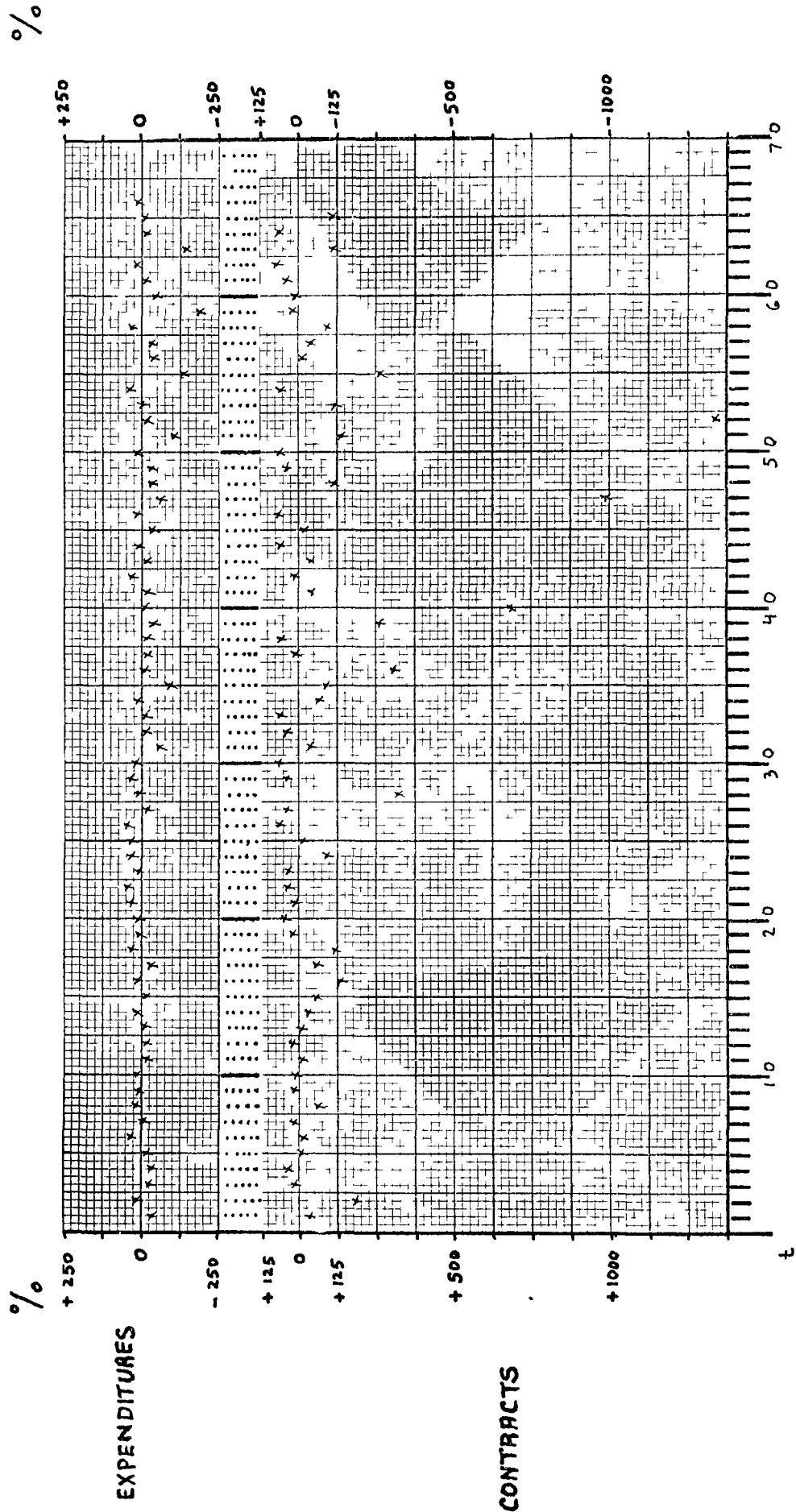


FIG. 28 RESIDUAL ANALYSIS -- ARMAMENT PROGRAM

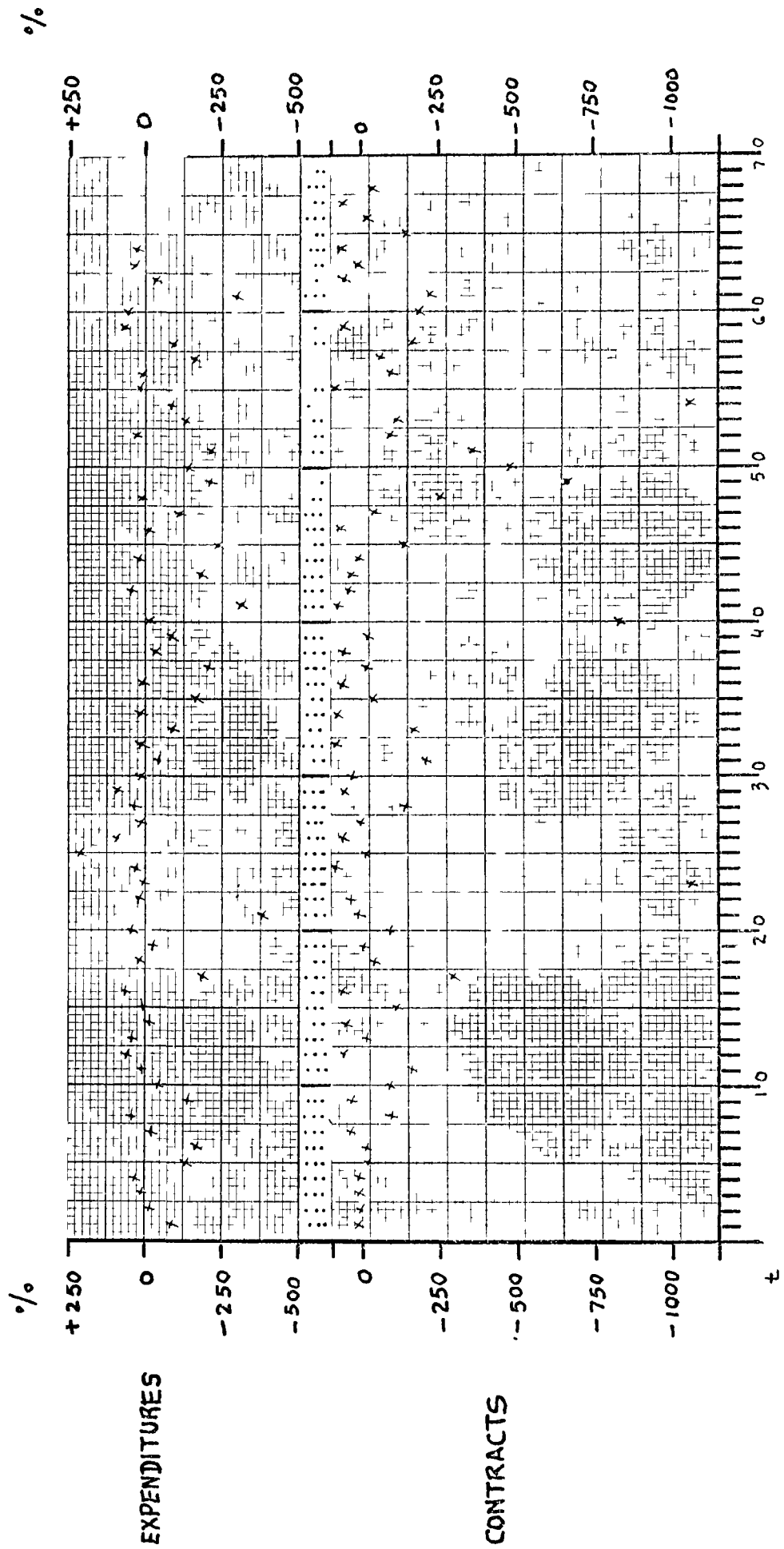


FIG.28 RESIDUAL ANALYSIS - SHIPS PROGRAM

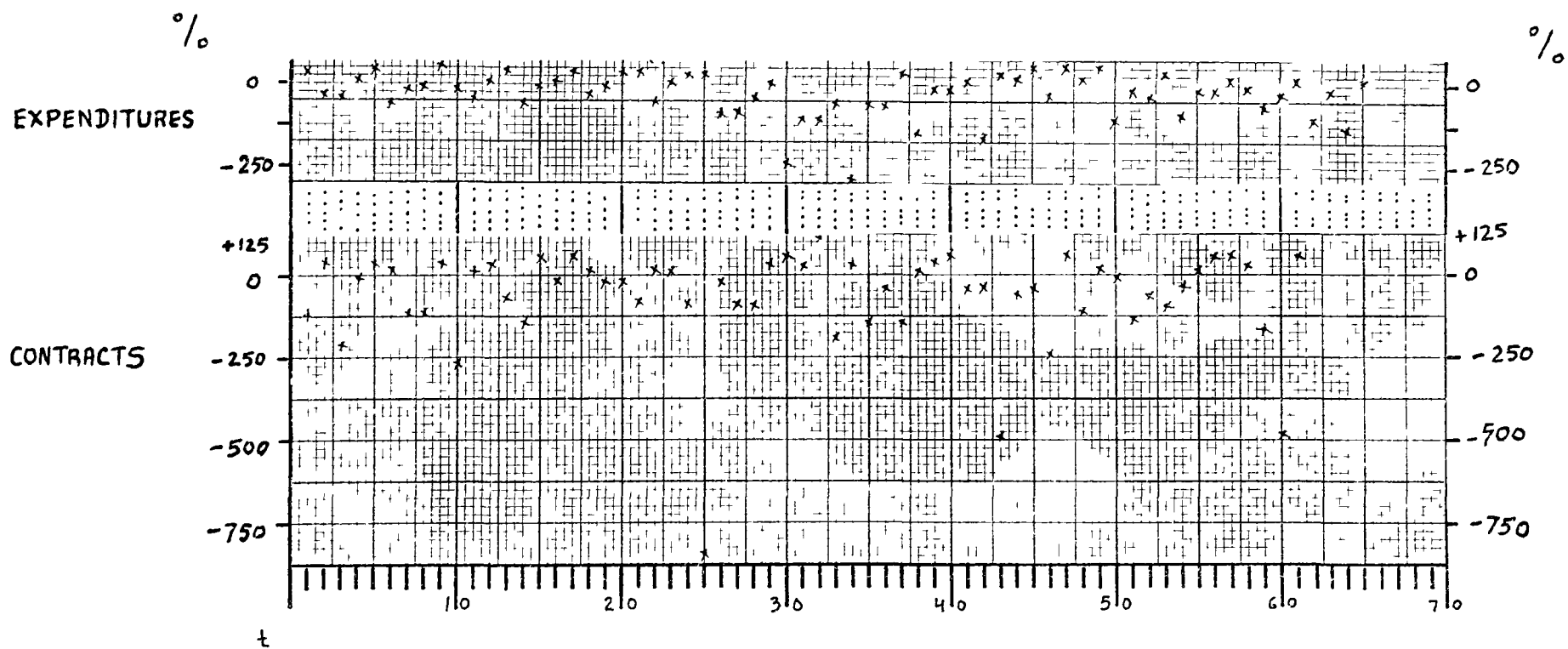


FIG. 28 RESIDUAL ANALYSIS -

1. CONSTRUCTION PROGRAM

2. ELECTRONICS AND COMMUNICATIONS PROGRAM.

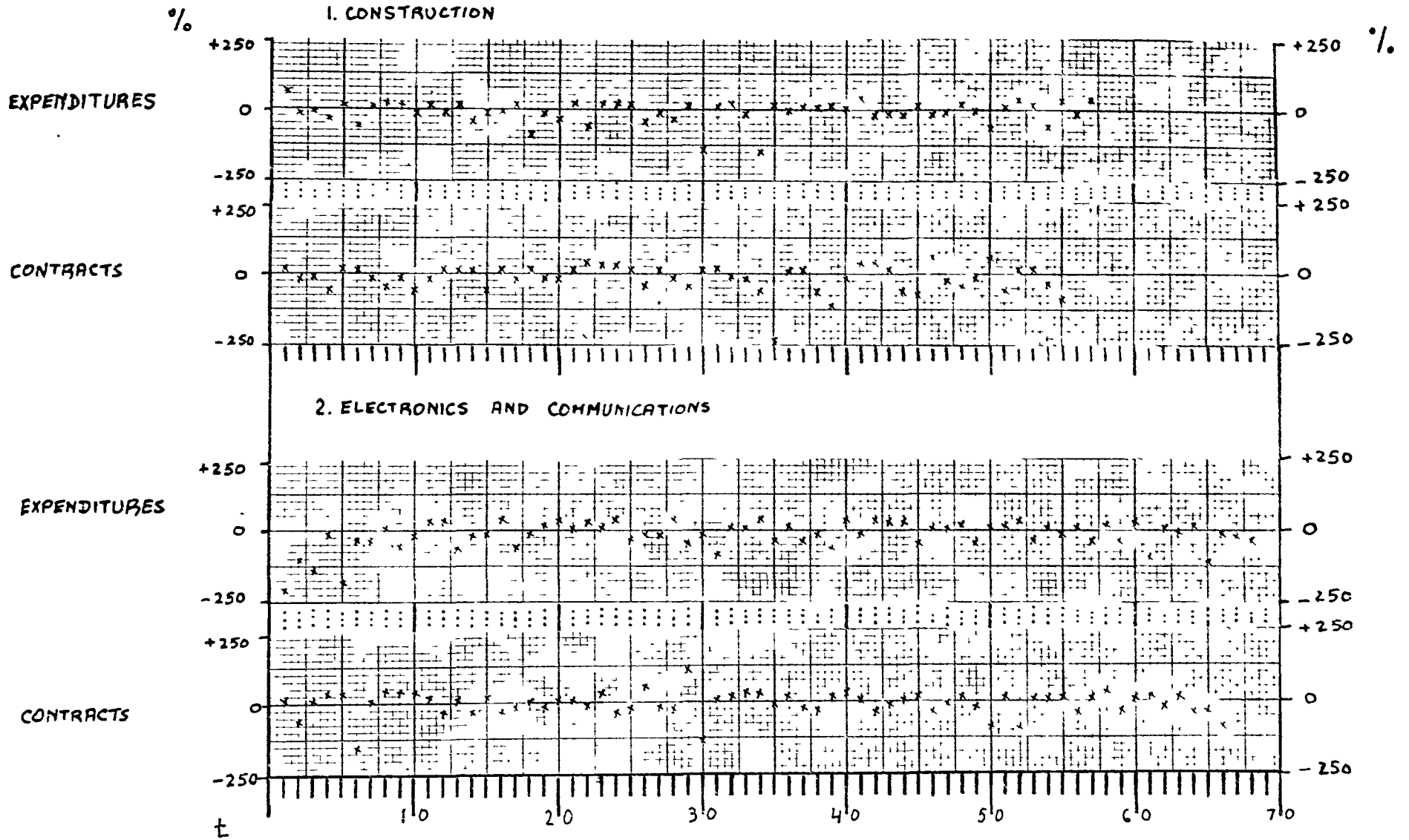


TABLE 40 : LARGE DISTURBANCES IN 5 MAJOR PROGRAMS

MAJOR PROGRAMS	CONTRACTS			EXPENDITURES				
	YEAR/ QUARTER	VALUE		% OF RESIDUAL FROM ACTUAL	YEAR/ QUARTER	VALUE		% OF RESIDUAL FROM ACTUAL
		ACTUAL	PREDICTED			ACTUAL	PREDICTED	
		\$ 000,000	%		\$ 000,000	%		
AIRCRAFT	1964 IV	4.76	68.30	1334.86	1966 II	14.91	43.13	189.24
	1963 III	2.69	29.39	992.41	1967 I	21.41	50.92	137.84
	1961 IV	6.96	54.08	676.95	1965 II	19.71	44.81	127.36
ARMAMENT	1956 IV	0.51	5.94	1064.84	1957 II	3.03	14.39	375.05
	1961 I	0.30	2.81	836.10	1963 III	2.58	8.72	237.99
	1964 III	0.78	9.12	1068.79	1967 I	3.14	12.33	292.74
ELECTRONICS AND COMMUNICATIONS	1953 I	12.45	32.31	159.50	1951 II	7.95	24.26	205.18
	1955 I	10.08	22.80	126.18	1952 I	8.62	24.42	183.26
	1958 IV	-29.29	4.27	114.58	1951 IV	12.79	21.09	143.08
SHIPS	1951 I	0.96	9.11	848.66	1960 I	4.99	21.08	332.46
	1963 III	2.49	14.91	498.89	1959 II	5.04	17.26	242.43
	1967 IV	2.64	15.25	477.50	1962 III	7.19	19.38	169.52
CONSTRUCTION	1960 I	2.98	11.12	273.21	1959 II	8.41	20.76	146.87
	1961 I	7.41	15.51	109.31	1958 III	5.60	13.39	139.12

APPENDIX "C"

BIBLIOGRAPHY AND EXPLANATORY NOTES

(APPENDIX "C")

BIBLIOGRAPHY AND EXPLANATORY NOTES

I. Source of Data:

1. Value of Requisitions Quarterly by Procurement Program.

These data are not published. I obtained permission from my office to use them in this study.

2. Value of Contracts and Expenditures.

These data had been published since 1951 in Canada Year Book and the Department of Defence Production Annual Report, either on Fiscal-Year basis or Calendar-Year basis with a breakdown by procurement program.

Here again, I obtained permission from my office to use unpublished breakdown of these annual data by quarters and procurement program.

A. Primary Source

a. DOMINION BUREAU OF STATISTICS (DBS)

3. "Canada Year Book" (1950 to 1967)  
Queen's Printer, Ottawa.

The relevant section of these books provided data about purchasing activity of the Department of Defence Production on behalf of the Department of National Defence.

4. "National Accounts: Income and Expenditures."  
Queen's Printer, Catalogue No. 13-001, 13-201, 13-502, 13-519 and others, various issues.

These publications give data about GNE with its various components, thus to find the portion of this type of expenditure out of GNE and out of other public expenditures.

5. "Seasonally adjusted Economic Indicators (1947 to 1955)."  
Ref. Paper No. 77, prepared by the Research and  
Development Division - National Income Section,  
Queen's Printer, Ottawa.

This paper provided a manual way of calculating series  
of economic indicators that were consulted in develop-  
ing the thesis.

b. Department of Defence Production (DDP)

6. "Annual Report of the Department of Defence Production."  
(1950 to 1968).  
Queen's Printer, Ottawa.

These reports provided more details about procurement  
than Canada Year Book. Numerical data were provided  
on Calendar-Year basis.

7. "Special Studies Prepared for the Special Committee of  
House of Commons on Matters Relating to Defence.  
1964-65"  
Queen's Printer, Ottawa, 1965.

8. Urquhart, M.D. and Buckley, K.A.H. - "Historical  
Statistics of Canada."

This book provided data about GNP, GNE and other  
statistics used in the analysis of this paper.

B. Secondary Source

The following publications were consulted to explain various  
phenomena and policy with relation to defence expenditure  
and its impact on the economy in general.

a. Department of National Defence (DND)

9. "A Brief History of the Canada-United States Permanent  
Joint Board of Defence 1940-1960"  
1960, Catalogue No. DA 3-4160, pp. 30.

This article gives a description of the joint problem of  
Defence of North America and the possibility of coopera-  
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10. Claxton, Hon. Brooke (Minister of Defence) - "Defence Progress"  
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