

The Role of Military Spending in Canada

by

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A Thesis
presented to the University of Manitoba
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A thesis submitted to the Faculty of Graduate Studies of
the University of Manitoba in partial fulfillment of the requirements
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Chapter I

THE PROBLEM

Military research¹ is seldom non-partisan. It is typically motivated by the implicit attitudes of the researchers: either they believe military expenditure to be a necessary condition in maintaining adequate levels of defence - although definitions of what constitutes an adequate level of defence will vary widely - or they believe in at least partial disarmament, and consequently view current defence expenditures as highly inflated, if not actually unnecessary. The positions of both camps are founded on the assumption that the purpose of military spending is to ensure the defence of the state, although more aggressive motives may be imputed, especially to the military planners of rival states. Thus the dispute is centred around what degree of defence preparation - usually discussed in dollar terms - is desirable or necessary. Additionally, the disarmament camp usually works on the assumption that money presently spent on defence could, and would, be spent for more socially useful purposes.

¹Military research is used in a broad sense, and includes research into all military and military related topics, such as the armaments industry.

Largely ignored by the participants in this debate is the work of Michael Kidron, and to a lesser extent Baran and Sweezy, and Weisskopf. These writers have developed a position on military expenditure which places emphasis not on the role of such spending in securing the physical defence of the state, but on its role in promoting stable economic growth; in "defending" the economy, principally from the dangers of overproduction. Kidron's view is that the most direct consequence of the high levels of military expenditure which characterize the post-War western world has been the unprecedented stability and growth of each state's national economy.

This position is in direct contradiction to the underlying assumption of the disarmament establishment, which insists that military spending represents a drain upon economic resources and is thus detrimental to the economy, especially in terms of opportunity cost. It is also foreign to the pro-defence faction, which usually confines its discussion to military necessities. Moreover, it suggests an "extra-military" role of defence spending, not generally acknowledged.

The purpose of this thesis is to shed some light upon two questions fundamental to military research: is military spending detrimental or beneficial to Canada's economy, and does it play a role beyond securing our physical defence from aggressors?

Chapter II

REVIEW OF LITERATURE

2.1 BACKGROUND

The Arms Economy Theory of Kidron and others is derived from what is basically a Keynesian understanding of how the economy functions. Therefore, a brief summary of relevant Keynesian concepts is presented here. Keynes described the economy as a "circular flow" of money.

Money flows from business to the public in the form of wages, salaries, rents, interests and profits; this money then flows back to businesses when the public buys goods and services from them. As long as businesses sell all they have produced and make satisfactory profits the process continues. (Hunt, 1975:142)

However, within this circular flow there are "leakages"; money that does not remain within the circular income/expenditure flow. Keynes identified three major leakages:

1. savings are withdrawn from the "spending stream",
2. imports are purchased rather than domestic products, thus removing money from the flow,
3. the money collected as taxes is withdrawn. (Hunt, 1975:142)

These three leakages can be offset by three "spending injections":

1. money saved in banks can be invested by the banks,
 2. imports can be offset by exports (they are exactly offset when purchases of imports equal sales of exports),
 3. government can use taxes to finance the purchase of goods and services (if all taxes are used for this purpose then the budget is balanced and government expenditure will exactly offset taxes).
- (Hunt, 1975:142)

In order for the economy to prosper, these three leakages and injections must balance. Unfortunately, this represents an ideal situation and certain inherent problems prevent its being achieved.

Investment (which is necessary to absorb savings) increases the productive capacity, and thus demands an increase in production and income, but Keynes believed that with every increase in income the percentage of income saved also increased. In order to offset saving then, investment must increase at a faster rate than income, both relatively and absolutely. Herein lies the main problem.

In a mature capitalist economy there are a limited number of profitable investment outlets, and expansion may not

continue at an increasing rate indefinitely or a crisis of overproduction is inevitable. Keynes' solution was simple and has proved effective, although not without negative consequences.

Government could step in when saving exceeded investment, borrow the excess saving, then spend the money on "socially useful projects". These projects would be chosen in order not to increase the economy's productive capacity or decrease the investment opportunities of the future. This government spending would increase the injections into the spending stream and create a full-employment equilibrium. In doing so it would not add to the capital stock. (Hunt, 1975:142)

Keynes explained the situation thusly.

Ancient Egypt was doubly fortunate, and doubtless owed to this its fabled wealth, in that it possessed two activities, namely, pyramid-building as well as the search for precious metals, the fruits of which, since they could not serve the needs of many by being consumed, did not stale with abundance. The middle ages built cathedrals and sang dirges. Two pyramids, two masses for the dead, are twice as good as one; but not so two railways from London to York. (Keynes, 1936:131)

The impact of Keynes' work was immense, to the point that the immediate post-War period has frequently been characterized as the Keynesian Revolution by economic analysts. The readiness with which his doctrines were accepted resulted from a number of factors,² but certainly the experience of World War II, where economic recovery was attributable to dramatically increased government spending - the case of the United States from 1939 to the 1941 declaration of war is especially convincing - provided much of the

²For a discussion of this see Stewart, Michael, *Keynes and After*, Penguin, 1975

impetus. Also, "more perhaps than that of any other of the great economists, Keynes' work had direct and important meaning for policy and policy makers." (Rosen, 1968:66) Keynes provided not only a macro analysis of the workings of the twentieth century economy, but an attractive method by which the not inconsiderable problems of the 1930's could be alleviated, and, in Keynes' view, prevented from recurring. However, while the Keynesian solution of stabilizing the economy by government spending was embraced by the capitalist world, his suggestion that such spending take the form of socially useful projects met with less enthusiasm.

2.2 ARMS ECONOMY THEORY

Despite its overwhelming importance in contemporary society, the implications of the high levels of military expenditure which have characterized the post-war Western World, not to mention the Soviet Bloc, China, and even the Third World, have been the subject of few systematic analyses. Rosen made this comment about the case in the United States:

We can conclude this survey with the most important abdication of any by the economists. This is a failure which applies across the board; the theoreticians, Presumably the effect would diminish rapidly below this level, although the institutionalists, and the aggregative economists alike have virtually ignored the most important single force in the American economy of the past twenty-five years, war and preparation for war. Economists have sometimes been willing to discuss the question of the economy's ability to deal with the consequences of important cutbacks in military spending, but the discussion has acquired no struc-

ture or continuity, engendered no schools or positions to be debated. The level of attention has been episodic, and the intensity of involvement tepid at best. (Rosen, 1968:83)

Certainly the most comprehensive analysis of the phenomena is presented in British author Michael Kidron's Western Capitalism Since the War (1970). It is this book which expounds what is usually termed "Arms Economy Theory".

Kidron sets out to discover the cause of the unprecedented stability, growth, and high employment levels of post-war capitalism. He rejects the two most frequently cited explanations of 1) state planning (when examined it emerges as a series of ad hoc responses to specific situations), and 2) trade and innovation (because they lie within the "causal loop" and are thus influenced by growth, high employment, and stability, as well as influencing them).

Kidron maintains that it is necessary to look outside the causal loop for the reason, and identifies the arms economy as the causal factor because:

1. by taxing profits for military expenditure, the capital available for re-investment is reduced, which acts to curb over-production, and creates a net increase in the market for end-goods, in that the end goods produced by arms expenditure are fast wasting;

2. arms expenditure creates high employment and growth, and thus serves to increase production, but only in specific areas; it is an economic luxury and does not significantly alter the relationship between individual capitals, or cause overproduction. (Kidron, 1970:56)

Speaking of the arms economy, E.K. Hunt offers the following summary.

Military spending keeps the capital goods industry operating near full capacity without raising the economy's productive capacity as rapidly as would be case if they provided capital goods for industry. Demand does not tend to drop below supply as persistently as it formerly did; military spending increases demand without increasing productivity. (Hunt, 1975:149)

The parallel between military expenditure, and Keynes's socially useful projects, is striking. Military expenditure serves to siphon off the economic surplus and to expend it in a manner which does not increase normal production, but at the same time increases employment and provides economic growth. Furthermore, the fruits of this spending "do not stale with abundance". Like two pyramids or two masses for the dead, two weapons systems are better than one. And if two, why not two hundred? As Weisskopf notes: "the historical record suggests that for the past forty years the (American) government has had to rely largely on military spending to absorb the surplus." (Weisskopf, 1972:370)

The level of military spending throughout the world is staggering.

In 1962, well before the war in Vietnam jerked up American (and Russian) military outlays, a U.N. study concluded that something like \$120 billion was being spent annually on military account. This was equivalent to between eight and nine percent of the world's output of all goods and services at that time. ...Arms expenditure corresponded to about one-half of gross capital formation throughout the world. ...In the countries of western capitalism military expenditure as a proportion of gross domestic product ranged from nearly ten percent in the U.S. to just under three percent in Denmark...and as a proportion of gross domestic capital formation from nearly sixty percent in the U.S. to twelve percent in Norway. (Kidron, 1970:49-50)

Similarly, Warnock noted that in the period 1963 to 1965, the Defence budgets of NATO members accounted for between 16.4%, in the case of Norway, and 55.4%, in the United States, of their respective government's total budgetary expenditures (the figure for Canada was 26.9%). (Warnock, 1970:319)

There are several reasons for the proliferation of the arms economy. Already mentioned has been its promise of stability, growth, and high employment, but this does not answer the question of why this particular mechanism, rather than another.

To begin with, an arms economy provides a stimulative effect for both the domestic and international economy which socially useful expenditure could not begin to match. Social expenditure could certainly be used to create employment; in the form of transfer payments it would undoubtedly

increase consumer spending, and it is equally likely that higher levels of expenditure would result in the construction of hospitals and other public facilities. While such spending would provide employment, and would offer increased stability, it would contribute much less to the growth of the economy.

The arms economy increases demand for a wide variety of manufactured goods and raw materials and results in technological spin-offs of benefit to industry as a whole. Quoting the results of United Nations and Organizations for Economic Cooperation and Development studies, Kidron notes that an arms economy significantly increases demand for aircraft and aircraft parts, non-ferrous metals, chemical products and electronic goods, communications equipment and scientific instruments, as well as other commodities. (Kidron, 1970:50-52) The demand for qualified researchers in military and military related areas is also considerable.

It is here (the area of research) that military outlays are of overwhelming weight as a proportion of the total, accounting for fifty-two percent of all expenditure on research and development in the U.S. (1962-3), thirty-nine percent in Britain (1961-62), thirty percent in France (1961) and fifteen percent ('partial estimate') in Germany (1964). No less than 300,000 qualified scientists are engaged on research and development for military and space purposes in the OECD area, mainly in six countries (those listed plus Canada and Belgium). (Kidron, 1970:51)

Regehr notes that, "SIPRI lists Canada as the Western World's sixth largest spender in military research and development, averaging \$89 million (U.S. dollars) in the

years 1967 to 1970. But the figure is, to say the least, conservative." (Regehr, 1975:69) He suggests that \$250 million "may well be closer to the amount actually spent". (Regehr, 1975:70)

As for raw materials, a 1962 United Nations study estimated that the average annual military demand for a number of raw materials by industrial countries in 1958-59 was 8.6 percent of the world's total crude oil output, 3 percent of its crude rubber, 15.2 per cent of copper, 10.3 per cent of nickel, 9.6 of tin, 9.4 of lead and zinc, 7.5 of molybdenum, 6.8 of bauxite, 5.1 of iron ore, 2.7 of manganese, and 2.3 per cent of chromite. (United Nations, 1962, quoted in Kidron, 1970:52)

Finally, in regard to technological spin-offs, the OECD concluded that

the results of military and space research have had, and will continue to have, a greater influence on civilian innovation by stimulating the general rate of technological advance. For example, the requirements of military and space research, especially for guidance and control, have led to fundamental and applied research in such fields as semi-conductors, micro-circuitry, micro-modules, energy-conversion and physical metallurgy, which are bound to have an impact on civilian technology... In addition, techniques of planning, such as operational research, Progress Evaluation Review Technique (PERT), systems engineering and value engineering - developed initially for military and space purposes - will lead to a general increase in productive efficiency, and to a more rapid identification of opportunities for innovation. And finally, the high standard of performance and reliability required of military and space systems has led to the development of techniques of measurement, testing and control which will serve to increase the quality and reliability of products and components. In

the field of electronics, this is particularly important. (OECD, 1966, quoted in Kidron, 1970:52)

In criticising Canada's efforts to increase arms production, Regehr had this to say. Critics of the program can hardly deny that jobs are

created directly because of the export of arms, and indirectly, although to a much lesser degree than claimed, as a result of the technological spin-offs from arms production which lead to innovations and new commodities in the civilian consumer market. (Regehr, 1975:29)

A second and much different reason for the adoption of an arms economy is that some form of military threat is always present and hence some level of military expenditure always necessary. The question of to what extent real defence needs have influenced military expenditure has been extensively debated by participants of all political leanings, and from most of these discussions one idea emerges: the amount of money spent on all types of military and military related undertakings in the Western World seems excessive for defence purposes alone.

For the most part, the debate is centred upon the likelihood of a war between the Soviet Union, and America and its allies. In Monopoly Capital (1968), Baran and Sweezy provide the following summary.

The theme of Soviet aggressiveness has been repeated so often and so loudly during the last quarter century that it is now accepted by most Americans as a fact - as little to be questioned as that night follows day. And yet, paradoxical though it may seem, we know of no serious analyst of Soviet society and Soviet policy who really believes it. Even the ideological formulator of

the famous "containment" doctrine, George F. Kennan, then chief of the State Department's policy planning staff, flatly rejected the idea that the USSR is an aggressive power in the sense that Hitler Germany was. And the various columnists, historians, and political scientists who have upheld the thesis that Soviet policy has always been essentially defensive include many of the outstanding leaders of American intellectual life. In truth it would be hard to name any thesis which has been more thoroughly investigated or more solidly supported. In addition, the more thoughtful politicians, men like Chester Bowles and Senator Fullbright, are often at pains to emphasize the theme that the Soviet threat - the existence of which they do not doubt - is not military but economic, political, and ideological. (Baran and Sweezy, 1968:184-5)

In Capitalism and American Leadership (1962) Oliver Cox offers an explanation of this apparent paradox. He argues that the "plateau of strength" theory of attaining and holding optimum military strength, was abandoned in the early fifties in the face of the realization that even extremely high levels of defence expenditure, if held constant, would provide insufficient protection from recession. At the same time, congress was exhibiting some reluctance in approving steadily increasing defence budgets. However, the mild recession of late 1957, and the simultaneous increase in Soviet space technology which resulted in several satellite launchings, offered a solution. The economic necessity of defence spending increase, was portrayed as a matter of "national survival", and it was pronounced that "the Communist military threat (was) greater than ever". (Cox, 1962:107-8)

Clearly, it is impossible to provide a definitive answer to the question. However, it seems likely that a substantial portion of defence expenditure is the result of economic rather than military necessity.

A further aspect of the arms economy which Kidron outlines is that its adoption tends to bring lesser states further into the influence of the dominant state. He argues that once a country begins to use defence expenditure as a means of stabilizing its economy it is faced with the problem of constantly increasing this expenditure, especially in research areas, or submitting to further technological dependency. The superior resources of the dominant state makes it possible for it to escalate lesser states into a position where their choices are limited to bankruptcy or further dependence. Just as Britain was able to dominate the capitalist world through her superior industrial technology during the nineteenth and early twentieth century, America's position has been much enhanced by its technological superiority, particularly in arms production, in the latter part of the twentieth.

Similarly, arms expenditure may be used as a form of economic warfare between enemies - i.e., the U.S. and the Soviet Union - by extreme escalation. Specifically, by forcing one's enemy into channeling a substantial portion of its surplus into defence, one can presumably force the neglect of more vital areas. This of course assumes that

the aggressor is better able to afford the cost. The following quote from Schelling's article, The Strategy of Inflicting Costs (1967) analogizes the process neatly.

I have been asked whether I would buy a one-hundred-dollar nylon vest to protect myself from a five-cent bullet, as though the cost criterion says I should not - the factor of 2000-to-1 against me making it a bad investment - yet if I treasure my life I shall obviously buy the vest. In this example the cost criterion is merely backwards; the relevant question is whether my adversary should buy a bullet knowing that I can nullify his investment with a bullet-proof vest. He has wasted his money if the vest is cheap, made a splendid investment if my vest is expensive, and if asked what he accomplished by buying his bullet should have the good sense to say that he imposed a cost on me, not that he hoped to kill me and was frustrated. (Schelling, 1967:111)

Finally, Kidron points out that despite its immense positive influence on post-war capitalist economies, the arms economy is not without its negative aspects. To begin with, there is the rather basic fact that once a state embarks upon arms spending as a method of surplus absorption, any reduction of expenditure, or more accurately any reduction of the rate of growth of expenditure, must have a negative effect upon the economy. Kidron cites two factors which may lead to wind-downs: 1) in that a steady growth of arms expenditure is necessary it may ultimately become too expensive for all but the super-powers so that lesser states may continue only at the risk of their national economies, and 2) anti-militaristic forces within the state may be able to influence arms expenditure in a downward direction. (Kidron, 1970:62)

In addition to these "dangers" the arms economy carries within it certain inherent problems which may ultimately undermine its stabilizing influence. First, as arms production becomes more specialized it may become too withdrawn from other technology, thereby reducing the spin-off effect. Second, as arms production increases it may create unequal development in certain sectors. If one remembers that one of the foundations of Keynes's model was that spending for the purpose of surplus absorption should not disrupt the relationship between individual capitals, the danger of this is apparent. Finally, arms production may tend to become increasingly less labour intensive. (Kidron, 1970:62-63)

The economic limitation is, quite simply, that the new technology of warfare has reduced the power of arms spending to stimulate the economy.

It is a commonplace that warfare is becoming more and more a matter of science and technology, less and less a matter of masses of men and weapons. ...As a consequence of these changes, there has been a sharp shift in the character of goods and services purchased by military outlays. ...This change in the composition of military demand means that a given amount of military spending employs far fewer persons today than it used to. In these circumstances, even very large increases in military spending employs far fewer persons today than it used to. (Baran and Sweezy, 1968:213-14)

2.3 DISARMAMENT LITERATURE

With the exception of research conducted by or for military organizations, some of which was included in the preceding section, most other defence research falls into

the category of disarmament literature. Unlike the arms economy literature, this material does not present a systematic theory of the purpose of military expenditure; rather it is concerned with the documentation of all types of arms spending, and, in some cases, with outlining how the money currently spent on defence could be better utilized.

The main contribution of this material is its meticulous documentation of military budgets and the international arms trade. Much of the material published under the auspices of the Stockholm International Peace Research Institute (SIPRI) and the work of writers such as Benoit (1973) and, in Canada, Regehr (1975) is characterized by a remarkably creative approach to unwrapping the shrouded mysteries of defence budgets.

Virtually all of the disarmament literature is based on the premise that defence expenditure represents a drain on the economy - that the money could, and would, be used for more constructive purposes - and that the armaments it purchases represent a threat to world peace. Those studies which attempt to assess the impact of reduced military spending, do so only in the context of re-employing workers in the arms industries, (Eaton, 1973) (Cumberland, 1973) of stimulating industrial activity to make up for defence industry decline, (Klein & Mori, 1973) (Boulding, 1973) and, less often, of redressing the inevitable balance of payments problem (Benoit, 1973) (Brown, 1964). No attempt is made to

come to grips with the problem of how to achieve the stabilizing effect of arms expenditure as outlined by the arms economy theorists.

One of the most interesting studies published in recent years is Emile Benoit's Defence and Economic Growth in Developing Countries (1973). The book is important because it is one of the only attempts - and this is true of both the disarmament and arms economy literature - to assess the contribution of defence expenditure to the economy by a reasonably sophisticated analysis of data. This is a significant departure from the usual practice in the field of theorizing on the basis of the most basic data - typically the level of arms expenditure as a percentage of total government spending or Gross National Product - without any hypothesis testing or other statistical analysis.

Benoit's book is a study of the relationship between defence expenditure and economic growth in forty-four developing countries in the years from 1950 to 1965. The sample accounts for approximately eighty per cent of all defence expenditure by "less developed countries". Basically, the study examines the correlation between defence spending (which is called "defence burden") and "civilian growth rates" (Gross Domestic Product minus defence expenditure). In accordance with the assumptions of the disarmament school, a negative correlation was expected between the two variables. In fact, although he does not reveal the basis for this belief, Benoit suspected that,

every one percentage point of GDP added to the defence burden might reduce the civilian growth rate by as much as $1/4$ of 1% per annum - offsetting about 70% of the growth produced by an additional 1% of GDP going into investment. (Benoit, 1973:2)

In the author's words, the results of the analysis were "a big surprise".

we did not find the inverse correlation between defence burdens and growth rates that might be anticipated on the basis of these facts. On the contrary, the simple correlation between defence burdens and growth rates were strongly positive: countries with high growth rates tended to have high defence burdens, and vice versa. This seemingly paradoxical pattern has not been hitherto noted or explained. (Benoit, 1973:2)

In fact, an explanation of the pattern has been offered by the arms economy theorists, although they have certainly been remiss in documenting it.

In the course of his data analysis, Benoit investigates three potential artifacts that could have an effect on his results. First, he questions whether the correlation may be false due to a systematic bias in the data, resulting from a supposed tendency of military governments, who were presumed to spend more on military account, to falsify their country's reported growth rate for propaganda purposes. He concludes that the correlation is not false because: 1) in all cases data are compiled by the International Bank for Reconstruction and Development (IBRD) which will revise data "if it has reason to consider them exaggerated", 2) there seems to be no clear pattern of military regimes spending more on arms than other governments, and 3) even when three

suspect countries (Burma, Jordan, and South Vietnam) were removed, the positive correlation remained strong. (Benoit, 1973:74-5)

Second, Benoit asks if the correlation might be spurious. The question ultimately revolves around the multicollinearity of the independent variables, which would have the effect of inflating the correlations. This problem is not really satisfactorily addressed, but he concludes that,

even if the correlation between defence burdens and growth rates may be regarded as technically "spurious" in a narrowly statistical and non-causal sense, we doubt that this truly eliminates the possibility of defence burdens exerting a significant positive cause and effect influence on growth rates in developing countries. (Benoit, 1973:22)

Finally, the question of causation, in terms of whether high defence spending stimulates growth, or a high growth rate allows a high level of defence spending, is asked. No correlation between growth and real changes in defence expenditure were found, nor were defence burdens correlated with rises in per capita income or government revenues. Thus, Benoit concludes that it is military spending that stimulates growth, and not vice versa. (Benoit, 1973:81-2)

While I believe that the main conclusions of the book are valid, there are some problems with the data analysis. First, although the measurement of defence spending corresponds with frequent disarmament practice, and with the method described by SIPRI in *The Meaning and Measurement of Military Expenditure* (1973), the operational definition of

Defence Burden as defence expenditure as a percentage of Gross Domestic Product may be problematic. In calculating a rate there should be some definable relationship between the two variables if this rate is to be used in further calculations. In this case the rate is based on two fluctuating variables, the fluctuations of which may or may not be related; nor can GDP be seen as a ratio variable in relation to defence spending. However, Benoit argues that the measure was devised to improve comparability among the data by filtering out the effects of widely varying values of GDP and defence expenditure. While this may in fact represent an acceptable solution to this problem, I believe that the calculation of such rates is best avoided if comparability among multi-national data is not a factor.³

The data analysis consisted of first calculating average rates of change for civilian GDP and Defence Burden for each country for the fifteen year period, and then using these rates in the calculation of measures of correlation. Obviously the first step results in data of a very general nature, and it is possible that the fifteen year rates mask a good deal of significant yearly fluctuation which might have revealed a clearer picture of the relationship between the two variables. In fact, when Benoit attempted to analyse the yearly data for each country by regression analysis, no clear picture emerged. This was attributed to the

³See the discussion of Defence Expenditure in Chapter III.

variations in yearly GDP as a result of climatic factors upon agricultural production, but I suspect that it may have also been a function of using the defence expenditure/GDP rate rather than dollar figures for the two variables.

In a brief appendix, Benoit gives the results of a preliminary analysis of data for developed countries. The method is identical to that employed for less developed countries, and no year by year data for individual countries is examined. No clear picture emerged from this, but again some of this may be attributed to the Defence Burden concept and to the fifteen year averaging.

For these reasons, considerable caution should be employed in interpreting the results of this study. While the Spearman and Simple Regression values are fairly high (0.49 with a t value of 3.6, and 0.55 with a t of 4.2, respectively) there are questions of both validity and reliability. The first relates to the measurement problems already mentioned. The major reliability problem is the possibility of the correlation coefficients being inflated because of autocorrelation. This would seem to be a possibility given the data, but is not addressed in any systematic manner.

Nevertheless, Benoit concludes that there is a significant positive relationship between military expenditure and economic growth for less developed countries but, on the basis of his brief analysis, suggests that the same would not be true for developed countries.

It should be noted that while Benoit began his study with the typical disarmament premise that defence spending is a drain of economic resources, his conclusions represent a radical departure from the dominant thought of this school. This is particularly significant in light of Benoit's stature within the disarmament community as one of its most prolific researchers, both independently and for the United States Arms Control and Disarmament Agency. Certainly there is a marked contrast between Benoit's conclusions and the views expressed by Melman, in a book published a year later.

The idea that war economy".⁴ economy brings prosperity has become more than an American illusion. ...It is the primary responsibility of thoughtful people who are committed to humane values to confront and respond to the prospect that deterioration of American economy and society, owing to the ravages of war economy, can become irreversible. (Melman, 1974:299-300)

By this I do not wish to imply that Benoit favours the continuation of the arms economy, but that his work is an indication that its existence is a result of more complex factors than the warlike impulses of humanity, or the vested interest of arms manufacturers.

⁴The term "war economy" as used by Melman is synonymous with "arms

2.4 SUMMARY

The preceding review has outlined the two dominant schools of thought on military spending. To the arms economy theorists, defence expenditure is the single most important factor in the post-war economy, directly responsible for the growth, stability, and high employment that has characterized most of the period. As such, its influence is seen as much more than simply providing employment in the arms industry, or serving as a profitable field of investment.

To the disarmament camp, defence expenditure in industrial countries is a drain on valuable resources which could be better employed for more socially desirable purposes. While one may find little to quarrel with in this latter statement, it is less clear whether a reduction in defence expenditure would result in this type of spending. While I do not propose to enter into this highly speculative area, one should remember that Keynes himself suggested that spending for the purpose of surplus absorption should take the form of socially useful projects more than forty years ago, with little apparent effect.

Common to both types of literature is a lack of data analysis by which propositions could be tested. Simply producing a table which shows a high level of military expenditure in relation to GNP or total government expenditure, is proof of nothing more than a high level of defence spending; it does not represent an adequate base from which further

suppositions may be made. Clearly, what is required is an examination of the relationship between defence expenditure and economic growth. If, as the arms economy theorists suggest, the former has the effect of stimulating the economy, one would expect the two variables to be positively correlated; if military spending is a drain on the economy the correlation should be negative. In order to investigate this, two hypotheses will be tested.⁵

1. Federal Government Defence Expenditure is positively related to Civilian Gross National Expenditure.
2. Federal Government Defence Expenditure is positively related to the Labour Force Participation Rate.

Gross National Expenditure is employed as an indicator of economic growth and stability. The Labour Force Participation Rate is employed corroboratively as an alternate (albeit inferential) measure of growth/stability, and as an indicator of employment, in accordance with the arms economy theorists' suggestion that defence spending contributes to high employment levels.

⁵It has already been noted that prior to World War II the level of public sector expenditure was insufficient to exert any significant effect on economic growth, stability, etc. The following hypotheses presuppose the typically higher post-War spending levels, but it should be noted that these levels may not be attained until several years after the end of the War.

One factor not dealt with in any of the research reviewed here, is the possibility that another type of government spending may also have a significant effect on economic growth. During the last fifteen years, Federal expenditure on Health and Welfare has consistently exceeded defence expenditure, both in absolute terms, and as a proportion of all government spending.⁶ In fact, Health and Welfare Expenditure has now replaced Defence Expenditure as the single largest item of Federal Government Budgetary Expenditure. In view of a shift of this magnitude one must consider the possibility that the former has become a major channel for Keynesian spending injections; certainly it comes much closer to Keynes' suggestion that spending should take the form of socially useful projects. Two further hypotheses will be tested in order to evaluate the impact of Health and Welfare spending on economic growth.

3. Federal Government Health and Welfare Expenditure is positively related to Adjusted Gross National Expenditure.

4. Federal Government Health and Welfare Expenditure is positively related to the Labour Force Participation Rate.

⁶See Table #2 in Chapter IV.

Health and Welfare spending should not be seen as a control variable; there is nothing in arms economy theory which denies the possibility of other forms of government spending having an effect on economic growth. In fact, given the magnitude of the economic growth variable, it is unlikely that any one factor could account for all variation. Thus, Health and Welfare Expenditure should be seen as an alternate "co-variable", as it is quite possible that both it and defence spending may be found to be related to GNE or the participation rate. Any positive relationship between these two growth variables and Health and Welfare expenditure would certainly fit the Keynesian framework.

Chapter III

METHODOLOGY

3.1 UNIT OF ANALYSIS

The unit of analysis for all hypotheses is Canada. The Yukon and Northwest Territories are excluded from the participation rate, as is Newfoundland prior to 1949. The Gross National Expenditure figures reflect the value of all goods and services produced in Canada, but of course exclude Newfoundland prior to 1949.

3.2 TIME FRAMEWORK

All data are for the years 1947 to 1979. The decision to begin with the immediate post-War period was made on the basis of the arms economy theorists' assertion that the relationship which they describe only holds for the post-War period. Certainly Keynes' influence was not felt until war-time, but because of the difficulty of comparing the War and peace-time periods data for the years 1939 to 1946 is excluded.

Data begins from 1947, rather than 1946, for two reasons. First, although the War ended in 1945, War Expenditure, as defined by the Comptroller of the Treasury, did not cease until the end of the 1946 fiscal year. Second, there

is a break in continuity from 1946 to 1947 in the Gross National Expenditure figures, as a result of revisions carried out by Statistics Canada on the post 1946 data. Similar revisions were not made for earlier years, so that the individual items that make up GNE are slightly different for the two periods. (Statistics Canada, 1975:56-7) In statistical terms, the result of this discontinuity is that while the average annual percent change for GNE is 4.3 for the years 1926 to 1946, and 8.3 for the years 1947 to 1968, the average annual percentage change for 1946 to 1947 is 13.4.

Initially it was hoped that data for the post-war period might be contrasted with data for some period prior to 1939. However, the earliest date from which comparable data for all variables can be obtained is 1931, and the period 1931 to 1938 is too short for proper analysis.

3.3 DATA SOURCES AND OPERATIONAL DEFINITIONS

All data is taken from official publications of the Government of Canada, and therefore the measurement and definitions of all variables are necessarily those of the data gathering agencies. However, in some cases further adjustments have been made to the data. Following is a list of all variables, their operational definitions and measurement, and a discussion of measurement problems.

3.3.1 Defence Expenditure

This variable is employed in hypothesis #1. The measurement of Defence Expenditure is determined solely by the data gathering agency, and represents "expenditures by the Department of National Defence and Defence Production". (Statistics Canada, 1976:328) It should be noted that Veteran's Benefits - which are paid out by the Department of Veterans' Affairs - are excluded from Defence Expenditure. Data for the years 1947 to 1979 is from the National Income and Expenditure Accounts published by Statistics Canada.

While there is no problem with operationally defining Defence Expenditure as the total of expenditures by the Department of National Defence and the Department of Defence Production, the question of whether to employ constant or current dollar figures is less simple. Usually, when one is interested in measuring real change in yearly spending figures a suitable price index is employed to control for the effects of inflation, but in dealing with defence expenditure, no appropriate price index is available. Because no "defence price index" is obtainable, a choice must be made whether to employ an index calculated for another type of spending. The two nearest indexes would seem to be the Consumer Price Index and the Government Expenditure

Price Index, but I believe that neither is appropriate for the following reasons.

The largest components of defence spending are personnel, and operations and maintenance. Unlike all other Federal Government departments and most of private industry, military personnel are not organized into a union, or any quasi-union such as an employee association, nor does the Department enter into any form of collective bargaining with military personnel. Also, DND has no direct competitors

for military personnel, in that there are no private military organizations which might lure "employees" away by offering higher wages. This is not to say that military personnel may not be attracted by other unrelated employment in government or industry, although this would presumably be more a factor in recruiting, or with recent recruits, than with "career soldiers". Related to this, DND offers what is probably Canada's most attractive pension plan, as well as a variety of benefits including inexpensive housing, comprehensive medical and dental care, and the non-profit sale of consumer goods which may tend to discourage personnel from seeking other employment. Thus, military personnel are cushioned from many of the effects of inflation by the Department, which may tend to minimize inflationary wage increase.

Unlike the case in private industry, military manpower requirements are unaffected by economic or other external considerations. The size or "strength" of the armed forces is determined by long range planning (except in cases of

war) so that the need to suddenly increase manpower, which usually entails offering higher wages, does not arise.

Finally, there is a conceptual problem with applying a price index to military wages. The inflationary component of wage increases in industry is determined by the extent that wages have increased over increases in productivity. In manufacturing the procedure is simple, and in trade only slightly less so, but the military produces no tangible output. On what basis could increases in military productivity be measured; increased national security? Thus the inevitable result of attempting to apply any existing price index to military wages will be to treat all increase as the effect of inflation.

The end result of these factors is that military wage rates are very much at the discretion of the Department of National Defence. This does not mean that military wages will not rise, nor that their increase will be to some extent affected by inflation, but it is clear that they will be much less affected than the wages of unionized or other workers in government or industry.

Operations and maintenance expenditures are quite intertwined with personnel costs, in that the personnel performing these operations are almost exclusively military. Beyond this there are a number of factors which set DND apart from industry and other government. These range from major areas such as the Department's tax free status to les-

ser areas such as its exemption from carrying insurance (all settlements are made out of operational funds). Also, the extremely large bulk purchasing practice of the Department for non-military items tends to counter inflationary effects.

The other major item which makes up the Defence Budget is capital outlay for equipment. Here again there are a number of factors which are unique to the military context.

To begin with, armaments are not sold on an open market in the sense that consumer goods are; the number of purchasers is small, especially if you consider NATO joint purchases of major items. In addition to this, few major items are produced without being destined for a particular purchaser, the defence contract being the invariable mode of sale for aircraft, motorized vehicles, and other sophisticated weaponry.

It is also very difficult to gauge the effect of inflation on armaments because of the constant technological innovation in the industry, and the rate at which weapons become obsolete is unparalleled except perhaps by the electronics industry (which, of course, forms a major part of modern weaponry). In speaking of this problem, SIPRI made the following observations.

The construction of a price index for goods subject to continual technical change is a difficult procedure. If the technical characteristics of a good change significantly, qualitatively speaking, it is a "new" good. The essential function of a price index, on the other hand, is to measure the average change in the price of a collection of

identical goods at two points in time. If a good appears in period 1 which is technically distinct from any good appearing in period 0 then, theoretically, it is necessary to compute a hypothetical period 0 price for the new good...

Whatever civilian price index is used as a deflator, the fundamental point is that inadequate account will be taken of the higher rate of quality improvement in military equipment than in civil equipment. Since military output cannot be measured, the rate of quality improvement in military equipment cannot be measured either. The use of a price index for civilian equipment to deflate expenditures on military equipment therefore implicitly assumes that the rate of quality change is the same for both. (SIPRI, 1973:14-15)

Related to the rapid rate of technological advance in armaments is another factor which indicates the uniqueness of military production. In the mid sixties Research and Design accounted for approximately five percent of the value of total output in general manufacturing; in arms production in the United States, France, and the United Kingdom, R&D accounted for at least fifty percent of the value of total output. (SIPRI, 1973:14) It should also be remembered that much of this R&D expenditure is paid for by government grants to arms manufacturers.

Finally, because of the nature of the armaments market it is extremely difficult to estimate what portion of the final cost of a particular weapon or weapons system is attributable to inflation. Many defence contracts are awarded on a Cost-Plus-Fixed-Fee basis, which means that the contractor will be paid for all costs associated with producing the item, plus a fixed profit. In practice it becomes almost impossible to assess cost-effectiveness, so

that the distinction between cost and profit becomes blurred. The overwhelming trend in the defence industry is to utilize the cost-reimbursement plan as a method of expanding the contractor's production capability. As Williamson notes:

the contractor has the incentive to expand those expenditures that improve his future capability, particularly investment in plant and personnel. ...the very existence of substantial cost uncertainties at the inception of the task may be invoked as the reason for the overrun. As long as cost overruns, for whatever reason, can be made "defensible", penalties for previous cost excesses will be difficult to assign. (Williamson, 1967:225)

Thus, the utilization of production costs as a means of expanding a contractor's business - expansion being usually financed out of profits in other industry - and the concurrent uncertainty as to what actually makes up the cost of a weapons purchase, results in a situation where it is virtually impossible to assess what portion of any increase in defence purchases are inflationary.

All of the foregoing should be seen as an illustration of the divergence of arms production from other types of manufacturing. While it is obvious that inflation must play some part in the price of weapons, the nature of arms sales makes it impossible to assess inflationary factors by the application of a price index designed for consumer goods.

Because of the obvious inapplicability of any existing price index to the defence budget, defence expenditure will be measured in current dollars. This decision is supported

by the observations of SIPRI and Benoit, who both argue that in the absence of a military price index, deflation of defence expenditure is best avoided unless the need for international comparison is seen as an over-riding factor. Similarly, in speaking of the American case, Melman noted that,

neither it (the U.S. Department of Defence) nor anyone else has produced the required price index of military goods and services which is the indispensable tool for such analyses. In its absence it is prudent to give more attention to the mounting billions of military funding... (Melman, 1974:138)

One method sometimes used in measuring defence expenditure for international comparison, is to define it as a percentage of GNP or total government spending. However, such a process introduces potential artifacts which are in all likelihood, much more serious than those encountered in employing current dollar figures. The present analysis is concerned with the effect of changing levels of defence spending on GNE and the participation rate, and while measuring defence expenditure as a percentage of GNE or total government spending may be a useful descriptive tool, there is no reason to assume that it meaningfully reflects change. First, if employed as a "change variable" it seems based on an implicit assumption that some fixed or predictable relationship is expressed by the percentage of GNE or government spending that defence expenditure comprises; presumably that budgetary decisions are, at least in part, made on a percentage basis.

Second, if military spending is measured as a percentage of GNE or all government spending, the result is a rather misleading type of ratio variable. Specifically, when data for several years are compared it must be noted that the base against which defence spending is calculated changes each year as a result of increases or declines in other items of the Federal budget or in those items which comprise GNE. An increase in the dollar value of military spending may, because of a greater increase in the total budget or in GNE, show as a decline, or vice versa. Similarly, because the rate of inflation for all government spending and GNE differs from that for military expenditure, variations between these variables are difficult to measure meaningfully over time. Thus, although the percentage basis of this measurement implies the confidence associated with a ratio variable, the fluctuations in the percentage denominator may result in a good deal of point to point variation in the original data scale being masked by the fixed distance points of the percentage.

Third, if Defence spending is measured as a percentage of GNE then it should not in turn be correlated with GNE, for in doing so GNE would be the denominator of the first variable, and the second variable.

Thus, while measuring military spending as a percentage of GNE or total government spending affords a useful tool for assessing the relative magnitude of the former, the

result of this procedure is inappropriate for further time series analysis in the present context.

Finally, in that this thesis deals only with Canadian data, current dollar figures, while they may tend to slightly overestimate the rate of change of defence spending, provide a much more accurate picture than would figures obtained by the application of a price index which is known to be inappropriate, or by percentaging.

3.3.2 Civilian Gross National Expenditure

This variable is employed in hypothesis #1. Gross National Expenditure is defined by Statistics Canada as, "a measure of the value of the nation's total production of goods and services". (Statistics Canada, 1975:81) Gross National Expenditure (GNE) and Gross National Product (GNP) are conceptually identical measurements; GNE uses the "sum of expenditures" approach and GNP uses the "sum of incomes" approach to arrive at identical figures. (Statistics Canada, 1975:80-81) GNE was chosen because of the availability of constant dollar figures for the entire period under investigation. The data source for 1947 to 1979 is the National Income and Expenditure Accounts.

Civilian Gross National Expenditure is simply GNE with Defence Expenditure removed. This is done so that when the two variables are compared, the latter does not make up a component of the former. Civilian Gross National Expendi-

ture is computed by subtracting current dollar Defence Expenditure from GNE for each year, and then dividing the remaining GNE by the implicit price index for GNE. Thus Civilian Gross National Expenditure is measured in constant dollars.

The analysis would be enhanced by the isolation and removal of direct and spin-off production resulting from defence spending which forms part of GNE. Unfortunately, a complete accounting of the value of this production is not possible at this time, owing to the complexity of identifying what would run to thousands of individual components of Gross National Expenditure. As there seems little point in removing only the immediately identifiable cases without any knowledge of the total, the value of all directly consequent and spin-off production makes up a portion of GNE. Given the preliminary nature of the present analysis this does not so much detract from the results as indicate a desirable refinement in case of further research.

In comparing Defence Expenditure with Civilian GNE the concern is with the relation of a change in one variable to change in the other; the actual amounts of each variable in dollars is not important. Thus no difficulty is inherent in comparing constant dollar Civilian GNE with current dollar Defence Expenditure. In each case the measurement of the variable is determined by what most accurately portrays yearly change, and while constant dollar conversion is

appropriate for GNE, the same cannot be said for Defence Expenditure.

3.3.3 Labour Force Participation Rate

This variable is employed in hypotheses #2 and #4; its measurement and definition are that of the data gathering agency, the Labour Force Survey Division of Statistics Canada, from whence the data are taken for the years 1947 to 1979. For the years 1947 to 1971, the participation rate is defined as the labour force as a percentage of the population fourteen years of age and over - ⁷for 1972 to 1979 it is the labour force as a percentage of the population fifteen years of age and over. It is not possible to obtain figures for the entire period for either fourteen and over or fifteen and over, as the former are not available to 1979, nor the latter from 1947. This does not represent a serious discontinuity in the data, as an examination of the two rates for the years they are both available reveals little difference between the fourteen and over and fifteen and over figures.

In addition to measuring employment, the participation rate may be seen as a corroborative measure in relation to GNE, as employment is generally accepted as tied to economic growth, being high in times of expansion and low in periods of decline.

⁷Members of the armed forces are not counted as part of the labour force.

3.3.4 Health and Welfare Expenditure

This variable is used in hypothesis #3. Data for the years 1947 to 1960 is taken from Buckley and Urruhart's Historical Statistics of Canada (1965); data for 1961 to 1979 is from the yearly Public Accounts of Canada. For all years Health and Welfare Expenditure includes Federal expenditures for health, family allowances, unemployment assistance and relief projects, old age assistance and blind and disabled persons' allowances, the old age security fund deficit, and miscellaneous welfare and social security expenditures.

Health and Welfare Expenditure is measured in constant dollars. In that the bulk of this spending represents transfer payments which will be used by the recipients to purchase consumer goods and services no conceptual problems are inherent in this conversion.

3.3.5 Adjusted Gross National Expenditure

This variable is employed in hypothesis #3. The definition and measurement of GNE is identical to that described for the variable Civilian Gross National Expenditure, as is the data source. However, in Adjusted Gross National Expenditure, Health and Welfare Expenditure has been subtracted from GNE. Thus, Adjusted GNE is defined as $GNE - \text{Health and Welfare Expenditure}$ divided by the GNE Implicit Price Index.

3.4 PLAN FOR THE ANALYSIS OF DATA

As the hypotheses indicate, the data analysis will examine the relationship between two types of government spending and the performance of the economy. Although the main concern is with the impact of defence expenditure, health and welfare spending has been included in order to see if the relationship described by the authors discussed in the Review of Literature may not also hold true for another type of government spending. Health and Welfare spending was an obvious choice, in that it has recently become the single largest item of Federal government expenditure.

The data analysis section will begin with the presentation of some general figures illustrating the importance of the two types of spending in the federal budget; this will include pre-World War II data so that the dramatic increase in defence spending in the post-War period may be appreciated.

The method of testing each hypothesis will be identical. First, data for both variables of each hypothesis will be presented in line graphs and subjected to visual inspection. Next, Spearman, Pearson product-moment, and Kendall tau-b correlation coefficients will be computed for each set of variable pairs. The Pearson product-moment correlation would likely be considered the most appropriate measure - certainly it is the most frequently used in similar analyses - but by the comparison of the three measures one can ensure



that the strength and direction of any correlation is not due to an artifactual interaction of the data distribution and the statistical method. It should perhaps be noted at this point, that in the initial phases of the analysis scattergrams were produced for all variable pairs, and in each case the relationship between variables was judged to be linear. This of course facilitated the decision as to which statistical measures were appropriate.

The third step will be to compute Ordinary Least Squares Regression Coefficients for all variable pairs, as well as Durbin-Watson statistics and autocorrelation coefficients for residuals. In that the concern is with direction and strength of the relationships, attention will be focused upon the R-squares and levels of significance.

Finally, an autoregressive model will be employed to control for first order serially correlated errors. A method "similar to the method of Cochrane-Orcutt" (SAS Institute Inc., 1979:131), will be employed, with the result that R-squares and significance levels "corrected for autocorrelation" will be produced.

Chapter IV

ANALYSIS OF DATA

Table #1 shows Gross National Expenditure, Total Federal Government Expenditure, and Defence Expenditure in dollars, as a percentage of GNE, and as a percentage of total Government Expenditure, from 1926 to 1979. What is most striking in examining the figures is the contrast between pre- and post-War government spending. Until World War II, Public Sector spending is quite low and exhibits a relatively stable pattern of slow growth; in all cases Defence Expenditure accounts for less than 1% of Gross National Expenditure. This pattern changes dramatically with the onset of the War, but what is most interesting is that even after 1946 Public Sector spending never returns to anywhere near pre-War levels; even at its lowest point in 1947, Defence Expenditure is still over six times greater than at the highest pre-War level in 1938. Until 1953 Defence spending exhibits a pattern of rapid growth, but it declines sharply in 1954, and, until 1965 is characterized by yearly fluctuation between the range of \$1,559,000,000 and \$1,802,000,000. An almost unbroken pattern of increase begins in 1966 (broken only by the slight drop from 1968 to 1969), so that by 1979 Defence Expenditure has reached a level roughly comparable to Wartime.

Table #1

Gross National Expenditure, Total Federal Government Expenditure, Defence Expenditure, Defence Expenditure as a Percentage of Gross National Expenditure, and Defence Expenditure as a Percentage of Total Federal Government Expenditure, Canada, 1926 to 1979

Year	Gross National Expenditure	Total Federal Government Expenditure	Defence Expenditure*	Defence Expenditure as a % of Gross National Expenditure	Defence Expenditure as a % of Total Federal Government Expenditure
(millions of dollars)					
1926	5146	288	15	.29	5.2
1927	5561	292	19	.34	6.5
1928	6050	295	20	.33	6.8
1929	6139	306	22	.36	7.2
1930	5720	313	24	.42	7.7
1931	4693	352	18	.38	5.1
1932	3814	353	4	.1	1.1
1933	3492	355	20	.57	5.6
1934	3969	381	22	.55	5.8
1935	4301	420	27	.63	6.4
1936	4634	434	25	.54	5.8
1937	5241	448	33	.63	7.4
1938	5272	485	36	.68	7.4
1939	5621	448	70	1.2	15.6
1940	6713	998	543	8.1	54.4
1941	8282	1535	1046	12.6	68.1
1942	10265	3737	3100	30.2	83.0
1943	11053	4352	3565	32.3	81.9
1944	11848	5285	4299	36.3	81.3

Table #1
(continued)

Year	Gross National Expenditure	Total Federal Government Expenditure	Defence Expenditure*	Defence Expenditure as a % of Gross National Expenditure	Defence Expenditure as a % of Total Federal Government Expenditure
(millions of dollars)					
1945	11863	4284	2891	24.4	67.5
1946	11885	2980	847	7.1	28.4
1947	13473	2125	227	1.7	10.7
1948	15509	1905	236	1.5	12.4
1949	16800	2077	361	2.1	17.4
1950	18491	2291	483	2.6	21.1
1951	21640	3104	1157	5.3	37.3
1952	24588	4299	1800	7.3	41.9
1953	25833	4532	1907	7.4	42.1
1954	25918	4501	1727	6.7	38.4
1955	28528	4644	1760	6.2	37.9
1956	32058	4915	1802	5.6	36.7
1957	33513	5205	1765	5.3	33.9
1958	34777	5859	1661	4.8	28.3
1959	36846	6115	1559	4.2	25.5
1960	38359	6518	1546	4.0	23.7
1961	39646	6883	1618	4.1	23.4
1962	42927	7216	1680	3.9	23.3
1963	45978	7363	1572	3.4	21.3
1964	50280	7801	1584	3.1	20.3
1965	55364	8200	1559	2.8	19.0

Table #1
(continued)

Year	Gross National Expenditure	Total Federal Government Expenditure	Defence Expenditure*	Defence Expenditure as a % of Gross National Expenditure	Defence Expenditure as a % of Total Federal Government Expenditure
(millions of dollars)					
1966	61828	9323	1709	2.8	18.3
1967	66409	10526	1805	2.7	17.1
1968	72586	11729	1812	2.5	15.4
1969	79815	12976	1799	2.3	13.9
1970	85685	14772	1868	2.2	12.6
1971	93462	16804	1926	2.1	11.5
1972	103952	19495	1963	1.9	10.1
1973	120438	21694	2174	1.8	10.0
1974	140880	27826	2548	1.8	9.2
1975	165428	29245	2780	1.7	9.5
1976	191492	33978	3220	1.7	9.5
1977	210132	38930	3693	1.7	9.5
1978	230407	42902	4080	1.8	9.5
1979	260533	46922	4245	1.6	9.0

* Data for the years 1939 to 1946 inclusive, are based on the definition of "War Expenditures" followed by the Comptroller of the Treasury in the Public Accounts, and include expenditures of the departments of National Defence, munitions and supply and many other departments for war or related purposes.

Sources: Gross National Expenditure -

1926 to 1974 - Department of Industry, Trade,
and Commerce, National Income
and Expenditure Accounts, Volume
I, Annual Estimates 1926-1974,
Table 2

Table #1
(concluded)

1975 to 1979 - Department of Industry, Trade, and Commerce,
National Income and Expenditure Accounts,
Fourth Quarter 1979, Table 2

Federal Government Expenditure -

1926 to 1971 - Department of Industry, Trade, and
Commerce, Canadian Statistical Review,
Historical Summary, 1970, Table 1.7

1972 to 1979 - Department of Industry, Trade, and Com-
merce, National Income and Expenditure
Accounts, Fourth Quarter 1979, Table 6

Defence Expenditure -

1926 to 1974 - Department of Industry, Trade, and Commerce,
National Income and Expenditure Accounts, Volume
I, Annual Estimates 1926-1974: 328

1961 to 1979 - Department of Industry, Trade, and Commerce,
National Income and Expenditure Accounts, Fourth
Quarter 1979, Table 6

The pattern of Health and Welfare Expenditure, as shown by Table #2, is similar, although the depression of the 1930's did result in a substantial pre-War increase in spending. This, however, is dwarfed by the post-War spending levels, where even the lowest post-War year (1947) is over four times greater than the height of the depression. The rest of the period under consideration is characterized by a distinct upward trend in Health and Welfare spending as expressed by current dollar figures.

Table #3 allows an easy comparison to be made of the relative levels of Defence and Health and Welfare spending over the 1926 to 1979 period. The most salient aspects of the data are the shifts in the percentage of Federal government spending accounted for by the two types of expenditure. In the earliest years Defence Expenditure makes up a much larger share of the Federal budget, although both it and Health and Welfare Expenditure account for only a small portion of GNE. With 1930 we see the first of a series of jumps in Health and Welfare spending, in this case as a response to the depression. Until 1939 it continues to be much greater than Defence Expenditure and, unlike the latter, to account for a portion of GNE that approaches that of the present. In fact, in 1935 Health and Welfare Expenditure accounted for almost a quarter of Federal budgetary expenditure, and for 2.4% of GNE.

Table #2

Gross National Expenditure, Total Federal Government Expenditure, Health and Welfare Expenditure, Health and Welfare Expenditure as a Percentage of Gross National Expenditure, and Health and Welfare Expenditure as a Percentage of Total Federal Government Expenditure, Canada, 1926 to 1979

Year	Gross National Expenditure	Total Federal Government Expenditure	Health and Welfare Expenditure*	Health and Welfare Expenditure as a % of Gross National Expenditure	Health and Welfare Expenditure as a % of Total Federal Government Expenditure
(millions of dollars)					
1926	5146	288	5	.1	1.8
1927	5561	292	9	.15	2.9
1928	6050	295	7	.12	2.4
1929	6139	306	9	.14	2.8
1930	5720	313	18	.32	5.8
1931	4693	352	55	1.2	15.6
1932	3814	353	54	1.4	15.3
1933	3492	355	54	1.5	15.2
1934	3969	381	82	2.1	21.4
1935	4301	420	103	2.4	24.5
1936	4634	434	106	2.3	24.4
1937	5241	448	103	2.0	23.1
1938	5272	485	79	1.5	16.3
1939	5621	448	78	1.4	17.4
1940	6713	998	60	.9	6.1
1941	8282	1535	52	.63	3.4
1942	10265	3737	68	.66	1.8
1943	11053	4352	76	.68	1.7

Table #2
(continued)

Year	Gross National Expenditure	Total Federal Government Expenditure	Health and Welfare Expenditure*	Health and Welfare Expenditure as a % of Gross National Expenditure	Health and Welfare Expenditure as a % of Total Federal Government Expenditure
(millions of dollars)					
1944	11848	5285	91	.76	1.7
1945	11863	4284	285	2.4	6.7
1946	11885	2980	386	3.2	12.9
1947	13473	2125	420	3.1	19.7
1948	15509	1905	424	2.7	22.3
1949	16800	2077	490	2.9	23.6
1950	18491	2291	535	2.9	23.3
1951	21640	3104	573	2.6	18.5
1952	24588	4299	486	2.0	11.3
1953	25833	4532	506	2.0	11.2
1954	25918	4501	574	2.2	12.7
1955	28528	4644	618	2.2	13.3
1956	32058	4915	650	2.0	13.2
1957	33513	5205	762	2.3	14.6
1958	34777	5859	987	2.8	16.8
1959	36846	6115	947	2.6	15.5
1960	38359	6518	1045	2.7	16.0
1961	39646	6883	1224	3.1	17.8
1962	42927	7216	1317	3.1	18.3
1963	45978	7373	1411	3.1	19.1
1964	50280	7801	1559	3.1	20.0

Table #2
(continued)

Year	Gross National Expenditure	Total Federal Government Expenditure	Health and Welfare Expenditure*	Health and Welfare Expenditure as a % of Gross National Expenditure	Health and Welfare Expenditure as a % of Total Federal Government Expenditure
(millions of dollars)					
1965	55364	8200	1458	2.6	17.8
1966	61828	9323	1636	2.6	17.5
1967	66409	10526	2148	3.2	20.4
1968	72586	11729	2378	3.3	20.3
1969	79815	12976	2734	3.4	21.1
1970	85685	14772	3191	3.7	21.6
1971	93462	16804	3633	3.9	21.6
1972	103952	19495	3789	3.6	19.4
1973	120438	21694	5674	4.7	26.2
1974	140880	27826	7361	5.2	26.5
1975	165428	29245	11445	6.9	39.1
1976	191492	33978	13798	7.2	40.6
1977	210132	38930	13768	6.6	35.4
1978	230407	42902	14133	6.1	32.9
1979	260533	46922	16344	6.3	34.8

* Represents total Health and Welfare spending, calculated by adding columns G28-33 in Buckley and Urquhart, and Health and Welfare subtotals in the Public Accounts.

Sources: Gross National Expenditure -

1926 to 1974 - Department of Industry, Trade,
and Commerce, National Income
and Expenditure Accounts, Vol-
ume I, Annual Estimates 1926-
1974, Table 2

Table #2
(concluded)

1975 to 1979 - Department of Industry, Trade,
and Commerce, National Income
and Expenditure Accounts, Fourth
Quarter 1979, Table 2

Federal Government Expenditure -

1926 to 1971 - Department of Industry,
Trade, and Commerce, Can-
adian Statistical Review,
Historical Summary, 1970,
Table 1.7

1972 to 1979 - Department of Industry,
Trade, and Commerce, National
Income and Expenditure
Accounts, Fourth Quarter 1979,
Table 6

Health and Welfare

Expenditure -

1926 to 1960 - Buckley and Urquhart, Historical Statis-
tics of Canada, G28 to G33

1961 to 1979 - Department of Finance, Public Accounts of
Canada, Volume I

Table #3

Defence Expenditure, Health and Welfare Expenditure, Defence Expenditure as a Percentage of Gross National Expenditure, Health and Welfare Expenditure as a Percentage of Gross National Expenditure, Defence Expenditure as a Percentage of Total Government Expenditure, and Health and Welfare Expenditure as a Percentage of Total Government Expenditure, Canada, 1926 to 1979

Year	Defence Expenditure*	Health and Welfare Expenditure**	Defence Expenditure as a % of Gross National Expenditure	Health and Welfare Expenditure as a % of Gross National Expenditure	Defence Expenditure as a % of Total Federal Government Expenditure	Health and Welfare Expenditure as a % of Total Federal Government Expenditure
(millions of dollars)						
1926	15	5	.29	.1	5.2	1.8
1927	19	9	.34	.15	6.5	2.9
1928	20	7	.33	.12	6.8	2.4
1929	22	9	.36	.14	7.2	2.8
1930	24	18	.42	.32	7.7	5.8
1931	18	55	.38	1.2	5.1	15.6
1932	4	54	.1	1.4	1.1	15.3
1933	20	54	.57	1.5	5.6	15.2
1934	22	82	.55	2.1	5.8	21.4

Table #3
(continued)

Year	Defence Expenditure*	Health and Welfare Expenditure**	Defence Expenditure as a % of Gross National Expenditure	Health and Welfare Expenditure as a % of Gross National Expenditure	Defence Expenditure as a % of Total Federal Government Expenditure	Health and Welfare Expenditure as a % of Total Federal Government Expenditure
	(millions of dollars)					
1935	27	103	.63	2.4	6.4	24.5
1936	25	106	.54	2.3	5.8	24.4
1937	33	103	.63	2.0	7.4	23.1
1938	36	79	.68	1.5	7.4	16.3
1939	70	78	1.2	1.4	15.6	17.4
1940	543	60	8.1	.9	54.4	6.1
1941	1046	52	12.6	.63	68.1	3.4
1942	3100	68	30.2	.66	83.0	1.8
1943	3565	76	32.3	.68	81.9	1.7
1944	4299	91	36.3	.76	81.3	1.7
1945	2891	285	24.4	2.4	67.5	6.7
1946	847	386	7.1	3.2	28.4	12.9

Table #3
(continued)

Year	Defence Expenditure*	Health and Welfare Expenditure**	Defence Expenditure as a % of Gross National Expenditure	Health and Welfare Expenditure as a % of Gross National Expenditure	Defence Expenditure as a % of Total Federal Government Expenditure	Health and Welfare Expenditure as a % of Total Federal Government Expenditure
	(millions of dollars)					
1947	227	420	1.7	3.1	10.7	19.7
1948	236	424	1.5	2.7	12.4	22.3
1949	361	490	2.1	2.9	17.4	23.6
1950	483	535	2.6	2.9	21.1	23.3
1951	1157	573	5.3	2.6	37.3	18.5
1952	1800	486	7.3	2.0	41.9	11.3
1953	1907	506	7.4	2.0	42.1	11.2
1954	1727	574	6.7	2.2	38.4	12.7
1955	1760	618	6.2	2.2	37.9	13.3
1956	1802	650	5.6	2.0	36.7	13.2
1957	1765	762	5.3	2.3	33.9	14.6
1958	1661	987	4.8	2.8	28.3	16.8

Table #3
(continued)

Year	Defence Expenditure*	Health and Welfare Expenditure**	Defence Expenditure as a % of Gross National Expenditure	Health and Welfare Expenditure as a % of Gross National Expenditure	Defence Expenditure as a % of Total Federal Government Expenditure	Health and Welfare Expenditure as a % of Total Federal Government Expenditure
	(millions of dollars)					
1959	1559	947	4.2	2.6	25.5	15.5
1960	1546	1045	4.0	2.7	23.7	16.0
1961	1613	1224	4.1	3.1	23.4	17.8
1962	1680	1317	3.9	3.1	23.3	18.3
1963	1572	1411	3.4	3.1	21.3	19.1
1964	1584	1559	3.2	3.1	20.3	20.0
1965	1559	1458	2.8	2.6	19.0	17.8
1966	1709	1636	2.8	2.6	18.3	17.5
1967	1805	2148	2.7	3.2	17.1	20.4
1968	1812	2378	2.5	3.3	15.4	20.3
1969	1799	2734	2.3	3.4	13.9	21.1
1970	1868	3191	2.2	3.7	12.6	21.6

Table #3
(continued)

Year	Defence Expenditure*	Health and Welfare Expenditure**	Defence Expenditure as a % of Gross National Expenditure	Health and Welfare Expenditure as a % of Gross National Expenditure	Defence Expenditure as a % of Total Federal Government Expenditure	Health and Welfare Expenditure as a % of Total Federal Government Expenditure
	(millions of dollars)					
1971	1926	3633	2.1	3.9	11.5	21.6
1972	1963	3789	1.9	3.6	10.1	19.4
1973	2174	5674	1.8	4.7	10.0	26.2
1974	2548	7361	1.8	5.2	9.2	26.5
1975	2780	11445	1.7	6.9	9.5	39.1
1976	3220	13798	1.7	7.2	9.5	40.6
1977	3693	13768	1.8	6.6	9.5	35.4
1978	4080	14133	1.8	6.1	9.5	32.9
1979	4245	16344	1.6	6.3	9.0	34.8

* Data for the years 1939 to 1946 inclusive, are based on the definition of "War Expenditures" followed by the Comptroller of the Treasury in the Public Accounts, and include expenditures of the departments of National Defence, munitions and supply and many other departments for war or related purposes.

** Represents total Health and Welfare spending, calculated by adding columns G28-33 in Buckley and Urquhart, and Health and Welfare subtotals in the Public Accounts.

Table #3
(concluded)

Sources: Defence Expenditure - 1926 to 1974 - Department of Industry, Trade, and Commerce,
National Income and Expenditure Accounts,
Volume I, Annual Estimates 1926-1974: 328

1975 to 1979 - Department of Industry, Trade, and Commerce,
National Income and Expenditure Accounts,
Fourth Quarter 1979, Table 6

Health and Welfare Expenditure - 1926 to 1960 - Buckley and Urquhart, Historical
Statistics of Canada, G28 to G33

1961 to 1979 - Department of Finance, Public
Accounts of Canada, Volume I

At the height of the war, Defence spending accounted for over eighty percent of all Federal government spending and over thirty percent of GNE. Obviously this reflects the severe distortion of the economy forced by the hostilities, but it also provides the first indication of a fundamental change in public sector spending. Prior to World War II the size of the public sector was small, and it is uncertain whether the relatively low levels of government spending could have exercised any significant effect on the growth or decline of the economy. This basically conservative approach to government spending died with the war, so that even after the conflict ceased to demand high levels of government expenditure, the public sector did not return to its previous size.

The increase in the Defence Budget in the immediate post-War years was dramatic, rising from \$227 million in 1947 to \$1907 million in 1953 - an over eightfold increase. In fact, the 1953 Defence Budget was greater than the combined total spent in the first three years of World War II. Over this same period it rose from 10.7 percent of all Federal government spending, and 1.7 percent of GNE in 1947, to 42.1 percent of Federal spending and 7.4 percent of GNE in 1953. When one considers that Health and Welfare expenditure, which was the second largest single budgetary item, accounted for only 11.2 percent of all Federal spending in 1953, the extent to which defence dominated government

spending is apparent. Furthermore, the military expenditure figures represent the operating budget, in that, as was noted in Chapter 3, Veterans' Benefits are excluded from these figures.

In 1945 Health and Welfare Expenditure trebled, primarily as a result of the institution of family allowance payments. From this point onward this spending was to show a steady increase in current dollar figures. Until 1950 it represented a larger share of Federal expenditure than did Defence Expenditure, but as the latter rose in the early fifties, bringing the Federal Budgetary Expenditure up with it, the portion of Federal expenditure accounted for by Health and Welfare dropped. During the same period (1947 to 1953) Health and Welfare Expenditure as a percentage of GNE dropped from 3.1 to 2.0, as a result of the relatively modest increases of the former failing to keep pace with the rapid growth of the latter (see Table #1).

During the years 1953 to 1965 Defence Expenditure exhibited a pattern of slight decline, although in five cases the figure rose from one year to the next. Throughout this period Defence Expenditure steadily declined, both as a percentage of all Federal spending and GNE, falling from 42.1 to 19.0, and from 7.4 to 2.8, respectively. However, despite the steady increase of current dollar Health and Welfare Expenditure, and its concurrent increase as a percentage of all Federal spending and GNE, Defence Expenditure

continued to account for a larger share of both. As regards GNE, this is to some extent due to a slower rate of yearly GNE increase in the late fifties than in the immediate post-war years.

The slight downward trend of Defence Expenditure over the 1953 to 1965 period reverses in the years from 1966 to 1979. With only one exception - the slight drop from 1968 to 1969 - a pattern of steady growth characterizes this final period. Over the years 1966 to 1972, Defence spending as a percentage of GNE continues its pattern of decline, but from 1973 onward the share of Gross National Expenditure accounted for by military expenditure remains relatively stable. The same is true of Defence Expenditure as a Percentage of Total Government Spending, although the downward trend does not begin to stabilize until 1974. The steady trend of increase in Health and Welfare Expenditure continues throughout the 1966 to 1979 period, and in 1967 Health and Welfare surpasses Defence, becoming the single largest item of Federal Budgetary Expenditure. As a percentage of GNE, Health and Welfare spending continues to increase until 1976, when it drops slightly, and appears to remain relatively stable for the final three years; this pattern is duplicated in the data showing Health and Welfare Expenditure as a Percentage of Total Government Spending.

The data presented thus far has illustrated two important developments. First, the remarkable increase in

government spending which began after World War II, and, second, the shift in the relative size of the Defence and Health and Welfare Budgets. From 1947 until the early sixties Defence dominated the Federal budget; since that time Health and Welfare has done so. Throughout the post-War period the two have consistently accounted for between one-third and one-half of all Federal spending.

Hypothesis #1: Federal Government Defence Expenditure is positively related to Civilian Gross National Expenditure.

Table #4 and Graph #1 show Defence Expenditure and Civilian Gross National Expenditure for the years 1947 to 1979. Although there is more year to year fluctuation in the Defence series, the two variables exhibit a definite positive correlation in trend; when the direction of yearly change is examined the relationship is positive in twenty-five of the thirty-two cases. Also, it should be noted that the only year to year decrease in Civilian GNE (1953 - 1954) corresponds with the largest single year to year decline in Defence Expenditure of the entire period, and that the gradient of increase in Civilian GNE flattens in the four years of consistent decline in Defence spending from 1956 to 1960. Nevertheless the relationship may be characterized as one of trend, and it is unclear to what extent the year to year fluctuations are correlated.

Table #4

Civilian Gross National Expenditure, Defence Expenditure, and Labour Force Participation Rate, Canada, 1947 to 1979

Year	Civilian Gross National Expenditure* (millions of constant dollars)	Defence Expenditure** (millions of dollars)	Labour Force Participation Rate**
1947	28985	227	54.9
1948	29772	236	54.6
1949	30727	361	54.5
1950	32861	483	53.7
1951	33579	1157	53.7
1952	35774	1800	53.5
1953	37619	1907	53.1
1954	37447	1727	52.9
1955	41182	1760	52.9
1956	44890	1802	53.5
1957	46145	1765	54.0
1958	47444	1661	53.9
1959	49560	1559	53.8
1960	51058	1546	54.2
1961	52532	1613	54.1
1962	56195	1680	53.9
1963	59366	1572	53.8
1964	63572	1584	54.1
1965	68021	1559	54.4

Table #4
(concluded)

Year	Civilian Gross National Expenditure* (millions of constant dollars)	Defence Expenditure (millions of dollars)	Labour Force Participation Rate**
1966	72783	1709	55.1
1967	75208	1805	55.5
1968	79790	1812	55.5
1969	84251	1799	55.8
1970	86498	1868	55.8
1971	91536	1926	56.1
1972	97225	1963	56.5
1973	104014	2174	57.5
1974	106903	2548	58.3
1975	111250	2780	58.8
1976	114800	3220	60.6
1977	120373	3693	61.0
1978	123879	4080	62.6
1979	127697	4245	63.3

* GNE - Defence Expenditure + GNE Implicit Price Index for each year

**1947-75 are for persons 14 years and over; 1976-79 are for 15 and over

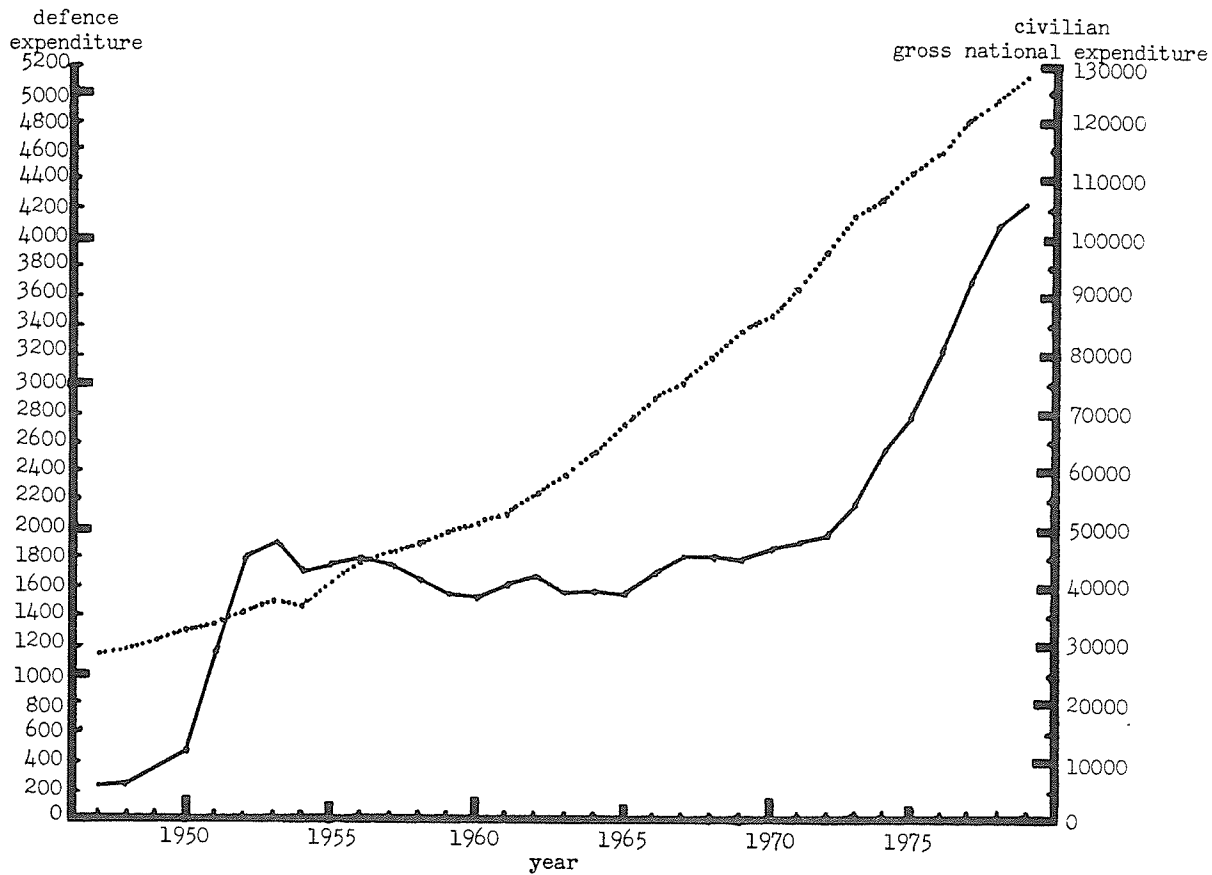
Sources: GNE and Defence Expenditure - see Table #1

Participation Rate - 1947 to 1971 - Department of Industry,
Trade, and Commerce,
Canadian Statistical Review,
Historical Summary, 1970,
Table 3

1972 to 1979 - Statistics Canada, Labour
Force Survey, 71-201

Graph #1

Defence Expenditure and Civilian Gross National Expenditure, Canada, 1947 to 1979 *



* see table #4 for sources and definitions

— defence expenditure

..... civilian gross national expenditure

Before proceeding further, some preliminary comments should be made regarding the nature of the data distribution. The data used in testing Hypothesis #1 is characterized by a strong unidirectional covariance of trend. In the case of one of the variables - GNE - the upward trend is broken in only one instance, while in the other there is some variation around the upward trend. This makes data analysis problematic for two reasons. First, because the direction of change in GNE is, in all but one case, of the same direction, confidence in the correlation of GNE and Defence Expenditure is undermined, even though the direction of the relationship is as predicted by the hypothesis. Second, it is difficult to assess the effect of the strong trend relationship of the two variables on measures of association or correlation coefficients. However, in that this problem, to a greater or lesser extent, arises in the analysis of data for all four hypotheses, it will be dealt with in detail at the end of this chapter.

Table #5 lists the results of the Pearson product-moment, Spearman rank-order, and Kendall tau-b correlations, as well as the Ordinary Least Squares Regression R-square, Durbin-Watson statistic, and autocorrelation coefficient for residuals, and R-square corrected for autocorrelation. Significance probabilities are given for all correlations.

The Spearman and Kendall correlations are included with the Pearson product-moment correlation primarily as a check

Table #5

Summary of Computer Data Analysis for Hypothesis #1 - Civilian Gross National Product with Federal Government Defence Expenditure

		Significance
Pearson product-moment	.84977	.0001
Spearman rank-order	.81357	.0001
Kendall tau-b	.68057	.0000*
Ordinary Least Squares Regression, R-square	.7221	.0001
Durbin-Watson statistic	.1298	
Autocorrelation coefficient for residuals	.9277	
Autoregression procedure R-square	.4405	.0001

* .0001 probability is due to ranking process of measure, and the absence of ties in the data set

for peculiarities of the data distribution which might lead to inflated (or depressed) Pearson values, or directional errors. In that all three are positive, and the absolute values do not differ dramatically - although the Kendall tau-b value is lower as expected⁸ - it is safe to conclude that a strong positive correlation exists between the two variables. Certainly the significance is sufficient at .0001 to support this.

The Ordinary Least Squares R-square value remains high and positive, and significance is unchanged. However, the low Durbin-Watson statistic indicates the presence of positive serial correlation,⁹ and this is corroborated by the high autocorrelation coefficient for residuals. Clearly the absolute values of the Pearson product-moment, Spearman rank-order, and Kendall tau-b correlations, and the O.L.S. Regression R-square are inflated because of this.

Basically, the autoregressive procedure estimates the autoregressive parameters, transforms the data for each variable by the autoregressive model, and then performs an Ordinary Least Squares Regression on the transformed data. Thus

⁸The absolute value of Kendall's tau-b tends to be smaller than that of Pearson's R in most instances. (Nie, N., Statistical Package for the Social Sciences, McGraw-Hill, 1975: 289)

⁹For a two variable model with a data set of thirty-three cases the Durbin-Watson statistic should be at least 1.48 to indicate the absence of positive serial correlation. (Durbin, J. and Watson, D.S., Testing for Serial Correlation in Least Squares Regression, Biometrika, volume 38, 1951:159-77)

in crude terms, the autoregression procedure R-square and significance level are corrected for autocorrelation.

As one would expect, the absolute value of the R-square drops as a result of this process; significance still remains very high in spite of it.

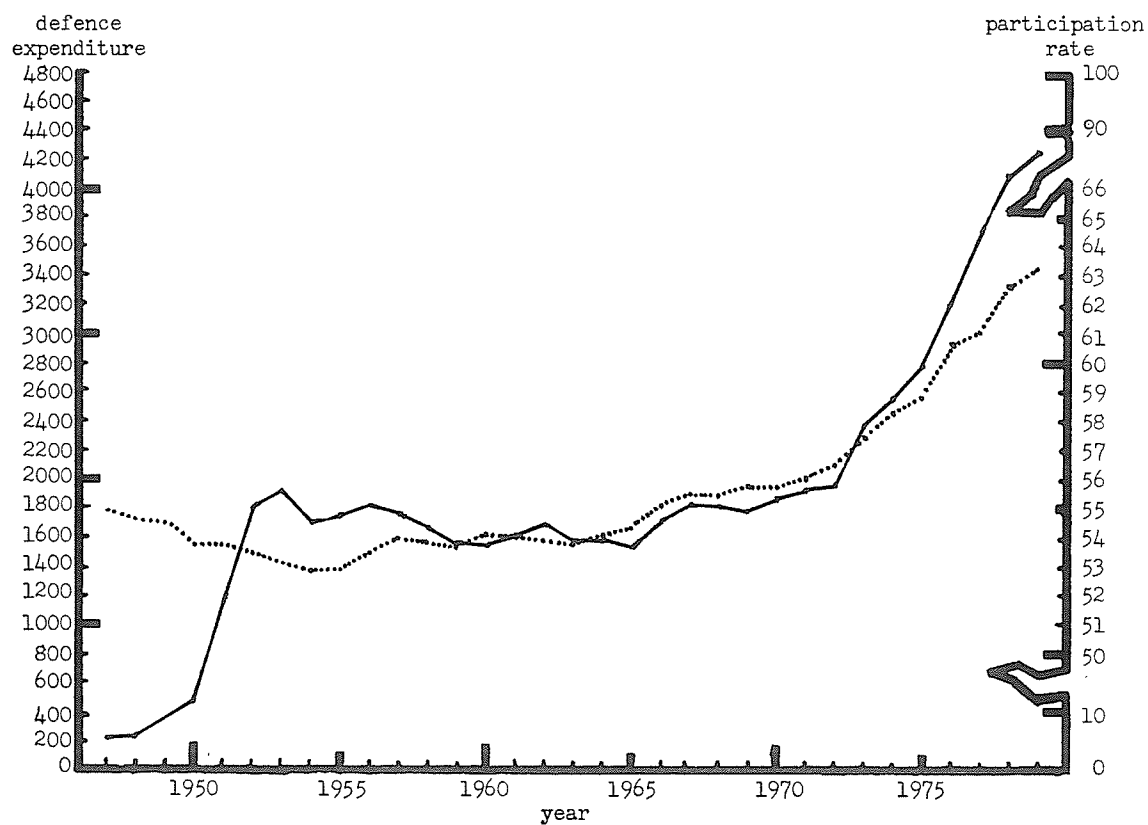
On the basis of the preceding data analysis, one must conclude that there is a significant positive relationship between the two variables; all measures reveal a strong relationship, consistent in direction and significance. However, because of the nature of the data, most accurately revealed by Graph #1, I would suggest that year to year fluctuations in Defence Expenditure of relatively small magnitude are of lesser importance than the general trend of spending, and that only major changes in the expenditure pattern, as in 1953 to 1954, will show immediate and direct correlation of yearly figures.

Hypothesis #2: Federal Government Defence Expenditure is positively related to the Labour Force Participation Rate.

Table #4 and Graph #2 show the Labour Force Participation Rate and Defence Expenditure for the years 1947 to 1979. Again, there is a strong correlation of trend between the two variables for most of the period. However, this positive relationship is not apparent until 1953. Prior to 1953 the relationship is overwhelmingly negative.

Graph #2

Defence Expenditure and Labour Force Participation Rate, Canada, 1947 to 1979*



* see Table #4 for sources and definitions

——— defence expenditure

..... participation rate

It is difficult to assess why the relationship between the two variables, so emphatically positive from 1953 onward, should be the reverse for the first six years of the period under investigation. There are, however, several factors which may have some explanatory value. First, there may be some discontinuity in the participation rate data. From 1945 to 1952 data were collected quarterly, and averaged to produce yearly figures. From 1953 onward data were collected monthly, and the monthly figures averaged for annual rates. While it seems safe to say that the post 1952 data is more accurate, this does not mean that the 1945 to 1952 data are inaccurate, and it is impossible to judge to what extent the less frequent sampling affected the rate.

What is much more likely is that the level of Defence Expenditure in the immediate post-War period was insufficient to exert any effect.¹⁰ As mentioned in Chapter II, Keynesian theory requires a substantial level of spending. Pre-War expenditure was insufficient to exert any effect on economic growth, and as Table #1 shows, it was not until 1952 that levels of spending roughly comparable to typical post-War amounts were achieved. In view of this, it is unlikely that any marked relationship would exist between the two variables prior to this time.

¹⁰See footnote #5 on page 25.

Overall, the hypothesized relationship accurately describes the data, although because of the atypical spending pattern of 1947 to 1952, one must stipulate that the predicted relationship will only exist once a typical post-War expenditure level is attained. Furthermore, there seems to be a closer covariance of year to year variations of the two variables than was present between those of Hypothesis #1, and this covariance follows both upward and downward movement.

Table #6 lists the Pearson, Spearman, and Kendall correlation coefficients and the regression R-squares for the two variables of Hypothesis #2. Again there are no directional differences between the first three measures, and the changes in magnitude are relatively slight. Significance is excellent for all three, and the difference between the .0001 level for the Pearson product-moment correlation and the .0002 level for the Spearman rank-order and Kendall tau-b is unimportant.

The Ordinary Least Squares Regression R-square is strong at .6867 with more than adequate significance. The Durbin-Watson statistic is very slightly higher than for hypothesis #1, although it is still low enough to indicate positive serial correlation. Similarly, the autocorrelation coefficient is moderately less than was the case in the first hypothesis, but still denotes the presence of autocorrelation.

Table #6

Summary of Computer Data Analysis for Hypothesis #2 - Labour Force
Participation Rate with Federal Government Defence Expenditure

		Significance
Pearson product-moment	.82687	.0001
Spearman rank-order	.60833	.0002
Kendall tau-b	.46037	.0002
Ordinary Least Squares Regression, R-square	.6867	.0001
Durbin-Watson statistic	.1480	
Autocorrelation coefficient for residuals	.8342	
Autoregression procedure R-square	.4980	.0001

Because the O.L.S. Regression R-square is less inflated by autocorrelation, the Autoregression R-square is closer to it in magnitude at .4980 than was the case for Hypothesis #1. Significance remains at .0001.

Despite the atypical negative relationship for all but one of the first six years of the chosen time period, all measures indicate a stable positive relationship between the two variables which, considering their broad nature, is quite strong. Obviously, had the first six years of atypical spending been omitted from the analysis the relationship would have been considerably stronger. Ultimately one must accept the hypothesis as proven on the basis of the data analysis with the reservation that the relationship was not apparent when spending was low.

Hypothesis #3: Federal Government Health and Welfare Expenditure is positively related to Adjusted Gross National Expenditure.

Table #7 and Graph #3 list Adjusted Gross National Expenditure and Federal Health and Welfare Expenditure for the years 1947 to 1979. Once more, the strong trend relationship is apparent as both variables increase throughout most of the period. In the case of Health and Welfare spending the upward trend is much more uneven, and is impeded at several points by year to year decline in level. However,

Table #7

Adjusted Gross National Expenditure, Health and Welfare Expenditure,
and Labour Force Participation Rate, Canada, 1947 to 1979

Year	Adjusted Gross National Expenditure*	Health and Welfare Expenditure	Labour Force Participation Rate**
	(millions of constant dollars)		
1947	28563	1483	54.9
1948	29405	1314	54.6
1949	30485	1417	54.5
1950	32767	1489	53.7
1951	34536	1425	53.7
1952	37837	1157	53.5
1953	39823	1176	53.1
1954	39233	1283	52.9
1955	42938	1338	52.9
1956	46600	1316	53.5
1957	47603	1469	54.0
1958	48410	1845	53.9
1959	50420	1713	53.8
1960	51753	1823	54.2
1961	53069	2071	54.1
1962	56689	2173	53.9
1963	59582	2236	53.8
1964	63605	2391	54.1
1965	68149	2138	54.4
1966	72872	2247	55.1
1967	74809	2761	55.5
1968	79152	2893	55.5

Table #7
(concluded)

Year	Adjusted Gross National Expenditure*	Health and Welfare Expenditure	Labour Force Participation Rate**
	(millions of constant dollars)		
1969	83241	3072	55.8
1970	85133	3387	55.8
1971	89829	3633	56.1
1972	95484	3538	56.5
1973	100936	4925	57.5
1974	103183	5715	58.3
1975	105324	7346	58.8
1976	108350	7747	60.6
1977	114498	7061	61.0
1978	118377	6648	62.6
1979	121699	7081	63.3

* GNE - Health and Welfare Expenditure ÷ GNE Implicit Price Index for each year

** 1947-1975 are for persons 14 years and over; 1976-1979 are for 15 and over

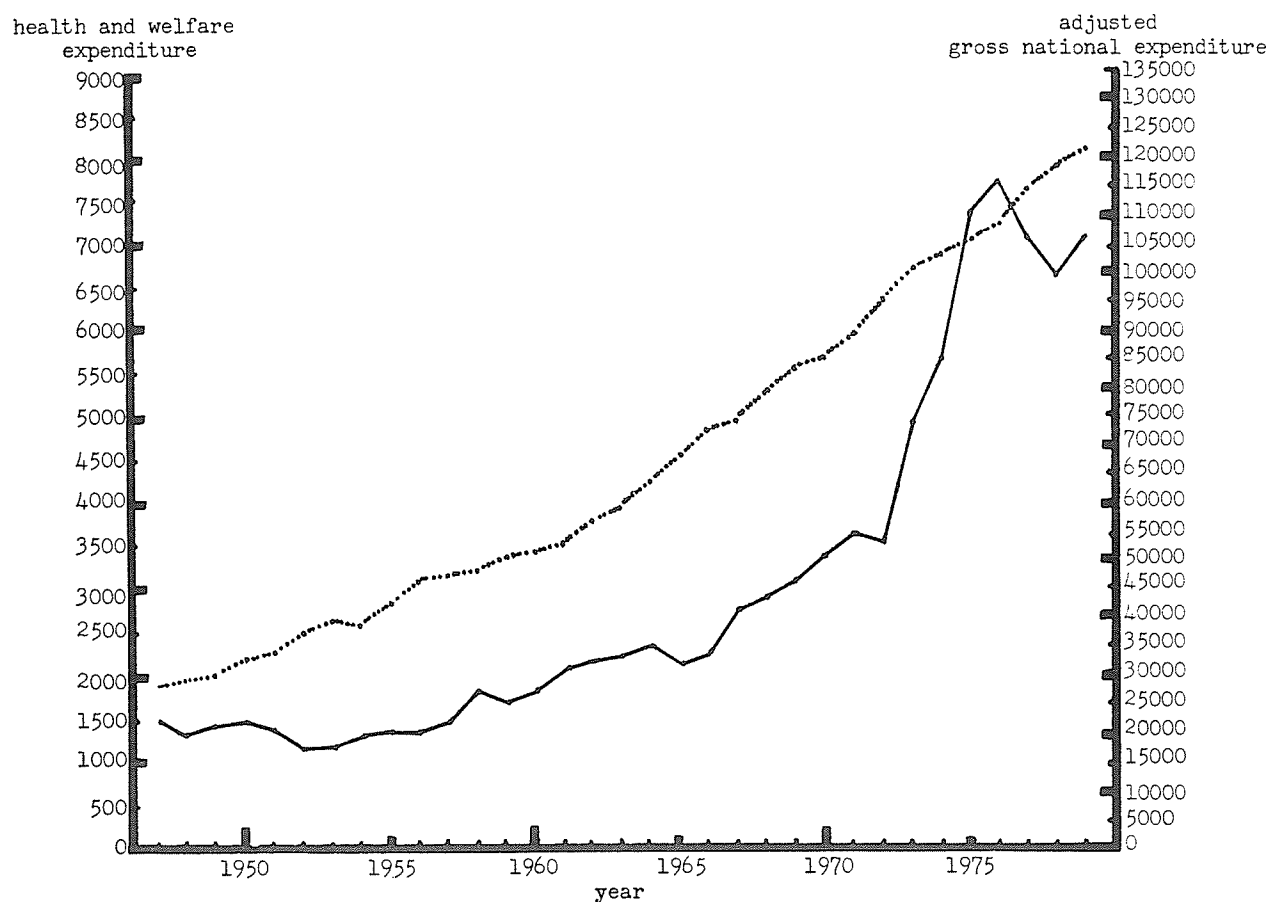
Sources: GNE and Health and Welfare Expenditure - see Table #2

Participation Rate - 1947 to 1971 - Department of Industry, Trade, and Commerce, Canadian Statistical Review, Historical Summary, 1970, Table 3

1972 to 1979 - Statistics Canada, Labour Force Survey, 71-201

Graph #3

Health and Welfare Expenditure and Adjusted Gross National Product, Canada, 1947 to 1979*



* see Table #7 for sources and definitions

— health and welfare expenditure

..... adjusted gross national expenditure

these drops are of short duration, and in all cases expenditures soon exceeds the previous level, typically in two to three years.

One point worth noting is that the single year to year decline in Adjusted Gross National Expenditure is not paralleled by a drop in Health and Welfare Expenditure; in fact, the latter increases slightly. This would suggest that the relationship between the two variables was not strong at this point, and I would suggest that, in view of the relatively low level of Health and Welfare Expenditure at this point, this may indeed be the case.

As to the sharp decline in Health and Welfare spending near the end of the period (1976 to 1978), which is not answered by a similar directional change in Adjusted GNE, two factors are important. First, the drop follows a period of rapid increase, so that even in 1978 spending is higher than at any point prior to 1975, and, given the seeming importance of trend over year to year fluctuations noted in the discussion of Hypothesis #1, these short term drops may be of minimal importance.

The second factor concerns the interaction of Health and Welfare Expenditure with Defence Expenditure. This will be dealt with in detail at the end of this chapter, but at this point it should be noted that while the former declines sharply from 1976 to 1978, the latter increases steeply over the same period. Thus the effect of a reduction in Health

and Welfare spending may have been counterbalanced by an increase in Defence Expenditure.

Table #8 lists the Pearson, Spearman, and Kendall correlation coefficients, and the Ordinary Least Squares Regression and Autoregression R-squares for the two variables of Hypothesis #3. Pearson, Spearman, and Kendall correlation coefficients are all of the same direction and similar magnitudes - more so than for the previous two hypotheses - and the significance level for all three is identical at .0001.

The O.L.S. Regression R-square is very strong at .8531, but the Durbin-Watson statistic indicates the presence of positive serial correlation. The autocorrelation coefficient is also quite high at .8041.

The Autoregression procedure R-square is somewhat higher than for either of the first two hypotheses reflecting that the O.L.S. Regression R-square was less inflated by autocorrelation for the two variables of Hypothesis #3, as the Pearson product-moment correlation values for the three hypotheses do not differ dramatically. Significance for the Autoregression R-square is more than adequate at .0001.

On the basis of the data analysis Hypothesis #3 can be accepted, although as was the case with the first hypothesis, the relationship is one of trend, and it is uncertain to what extent year to year fluctuations in Health and Welfare spending are related to the Adjusted Gross National Expenditure. Also, the moderately higher Autoregression

Table #8

Summary of Computer Data Analysis for Hypothesis #3 - Adjusted Gross
National Product with Federal Government Health and Welfare Expenditure

		Significance
Pearson product-moment	.92366	.0001
Spearman rank-order	.94485	.0001
Kendall tau-b	.82955	.0001
Ordinary Least Squares Regression R-square	.8531	.0001
Durbin-Watson statistic	.3023	
Autocorrelation coefficient for residuals	.8041	
Autoregression procedure R-square	.5374	.0001

R-square for this hypothesis is not really sufficient to state categorically that the relationship between the two variables of Hypothesis #3 is stronger than the relationship investigated in Hypothesis #1.

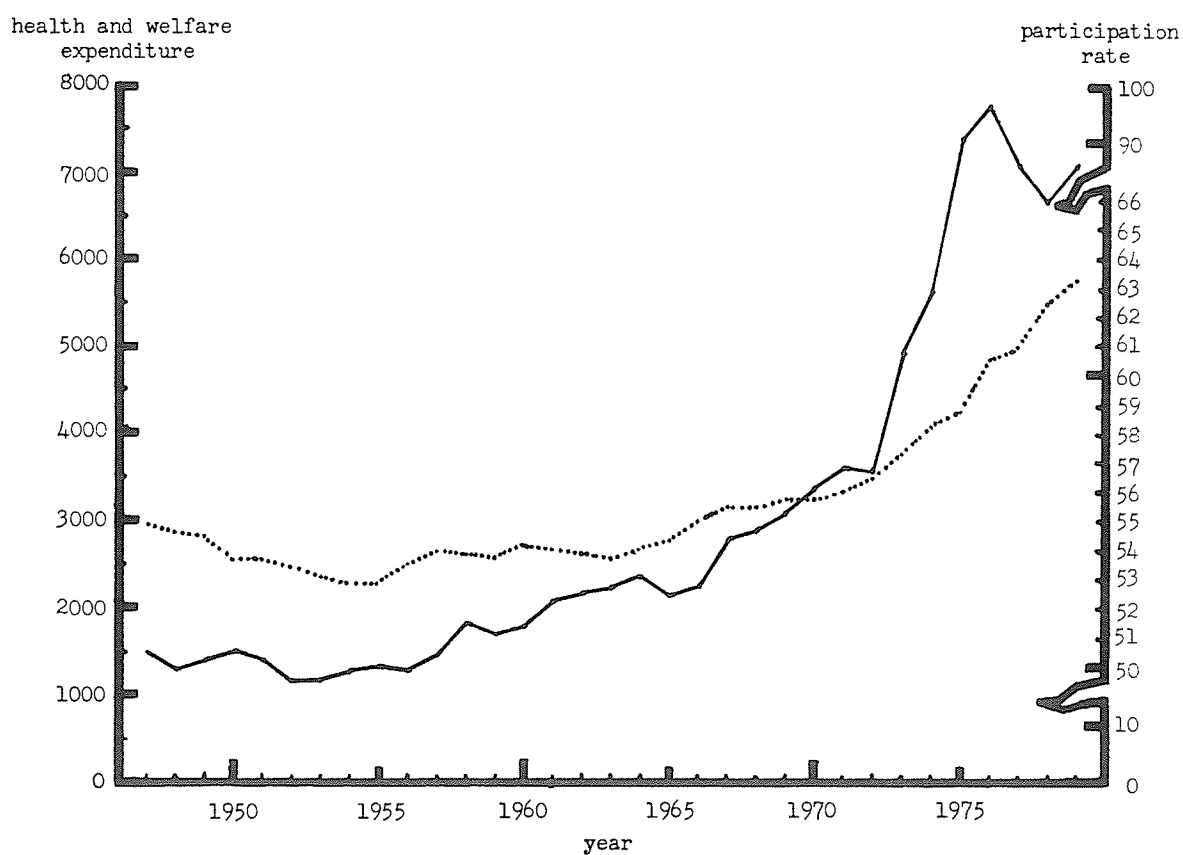
Hypothesis #4: Federal Government Health and Welfare Expenditure is positively related to the Labour Force Participation Rate.

As Graph #4 illustrates, the relationship between Federal Government Health and Welfare Expenditure and the Labour Force Participation Rate is positive in trend, and seems to display a reasonably high degree of covariance in short term fluctuations. Specifically, although there does not seem to be a direct relationship in the year to year variations, the direction of change throughout the period is quite similar. Again it should be remembered that unlike the case in hypotheses #1 and #3, both variables in Hypothesis #4 exhibit change in two directions.

The only problematic period in the relationship between the two variables is the same as was noted in dealing with Hypothesis #3; the decline in Health and Welfare spending from 1976 to 1978. Both of the mitigating factors mentioned in the previous discussion would apply here as well, and it should further be noted that sharp drop in Health and Welfare Expenditure of 1976 to 1977 is echoed by a flattening

Graph #4

Health and Welfare Expenditure and Labour Force Participation Rate, Canada, 1947 to 1979*



* see table #7 for sources and definitions

— health and welfare expenditure

..... participation rate

of the upward trend of the Participation Rate for the same years. However, as was the case in the investigation of the three previous hypotheses, the relationship between the two variables of Hypothesis #4 must be considered primarily one of trend, in that the effect of year to year fluctuations in Federal Government Health and Welfare Expenditure upon the Labour Force Participation Rate be accurately determined.

The Pearson product-moment correlation shown in Table #9 is extremely strong, as are the Spearman rank-order and Kendall tau-b correlations. All are positive, and the significance level is .0001 in each case. This strength continues in the Ordinary Least Squares Regression R-square, which is high at .8945. The Durbin-Watson statistic is higher than for any other hypothesis at .5553, although still low enough to indicate positive serial correlation. The Autocorrelation coefficient, however, indicates much less autocorrelation than in the previous hypotheses, and approaches an acceptable level.

The drop from the O.L.S. Regression R-square to the Autoregression R-square (.7746) is much smaller than in the case of any other hypothesis, because the former is only minimally inflated by autocorrelation. Significance is the same for all measures at .0001.

Thus, Hypothesis #4 can be accepted, although despite the strong positive correlation, caution should be employed in interpreting this in the presence of the strong trend relationship.

Table #9

Summary of Computer Data Analysis for Hypothesis #4 - Labour Force
Participation Rate with Federal Government Health and Welfare
Expenditure

		Significance
Pearson product-moment	.94579	.0001
Spearman rank-order	.88528	.0001
Kendall tau-b	.74048	.0001
Ordinary Least Squares Regression, R-square	.8945	.0001
Durbin-Watson statistic	.5553	
Autocorrelation coefficient for residuals	.5737	
Autoregression procedure R-square	.7746	.0001

4.1 DISCUSSION OF ANALYTICAL PROBLEMS

Before this chapter may be concluded several points pertaining to the data analysis must be dealt with. All are concerned with the reasons for making analytical decisions or adopting corrective measures, but would not have been fully comprehensible if included in the methodology chapter, as they are related to the data distribution.

First is the question of trend. This thesis is an attempt to evaluate theoretical perspectives which describe broad economic trends. (In the context of this, many of the conclusions discussed in the next chapter deal as much with the methodological problems of the analysis as with the particular perspectives.) The variables that reflect these trends are notoriously difficult to operationalize satisfactorily, and are in some ways ill suited to methods of statistical analysis which assume precise bi-directional relationships. Thus the solid trend relationship which characterizes the data for all hypotheses is not problematic from a theoretical viewpoint - in fact, arms economy theory predicts just such a relationship - but from a methodological one. Specifically, it dictates caution in the interpretation of correlation coefficients or R-squares.

There is no question that the variable relationships revealed by the analysis are primarily that of trend. When variables are lagged in either direction R-squares do change (in most cases at a rate of approximately .05 per year lag-

ged) but the amount of variation only indicates what was obvious from the graphs - that yearly fluctuations are much less important than the overall pattern.

There are, of course, statistical procedures which "decompose" the trend and concentrate on the correlation of the year to year fluctuations, but in an analysis which, because of its theoretical basis, is only properly concerned with broad trend relationships, their application seems inappropriate. Ultimately, in that the theoretical position under investigation concerns itself only with broad patterns of growth, stability, and employment, there is no justification to go beyond its level of specificity and seek correlations based on minor or short term variation.

A further complication is the unidirectional nature of the GNE data. One method which is sometimes used to solve this problem is first differencing, which involves measuring the difference from one year's expenditure to the next, and then using these differences as a measure of change. Unfortunately there are two problems with employing this strategy.

First, when first differences are calculated for both variables in the two hypotheses which employ GNE, the magnitude of the differences becomes so great that when correlation coefficients are computed, the directional relationship between the variables is obscured by the extreme variations. Given that the data contains only thirty-three cases, (thir-

ty-two when first differences are calculated) which is quite a lengthy span of years but a small data set by computational standards, this result is not surprising, but unfortunately neither is it susceptible to solution.

The second problem with the first difference strategy again hinges on the level of specificity of the problem under investigation. What is measured by first differences is year to year variation, and as mentioned previously, there is little justification for seeking a relationship of this precision on the basis of the theoretical assumptions in question. Similarly, the logic of the first difference approach is problematic in the present context, for if first difference values are used to measure a variable then it is possible - in fact probable - that in many cases a substantial yearly increase in expenditure becomes a decline if it is smaller than the previous yearly increase. Thus an implicit assumption is made that whatever the total amount of expenditure, a variation which may account for only a small percentage of this total is significant.

The final problematic area of the data analysis which will be considered in this chapter is the possibility of interaction between the variables Defence Expenditure and Health and Welfare Expenditure as they relate to the Participation Rate and GNE. In order to discuss this question it is necessary to anticipate some of the content of the next chapter.

Defence and Health and Welfare Expenditure are employed almost as alternate variables. The inclusion of the latter reflects a judgement that the kind of benefits in terms of growth, stability, and high employment that the Arms Economy Theorists ascribe to military spending could also be attributed to Health and Welfare expenditure. This in itself implies an interaction or cumulative effect of the two variables, and indeed seems to be indicated by the data.

In terms of data analysis this would indicate the employment of multiple regression analysis, so that the cumulative effect, and relative contribution of the two variables, might be assessed. Unfortunately Defence and Health and Welfare spending are extremely highly correlated, and thus any multiple regression analysis must deal with the problem of multicollinearity; that is, that the results of the analysis may be in large part due to the correlation between the two independent variables, rather than to their relationship to the dependent.

The best remedy for multicollinearity (Orr, 1977:54-63) is to increase the sample size, impossible in this case. There is little point in stretching the time framework beyond the period covered by the theory in question and including pre 1947 data. Nor is there much logic in terms of the broad trends in question, in obtaining quarterly data for the thirty-three years, assuming that it was available.

The only other seemingly applicable remedy is the first difference approach. However, it must be found inappropriate for the reasons already mentioned.

Thus, conclusions as to the interaction of Health and Welfare and Defence expenditure must, for better or worse, be made on the basis of the existing analysis, primarily on the evidence of the graphs. One possibility to be discussed in the conclusion which should be mentioned here is that the relative importance of Defence and Health and Welfare spending in promoting growth, stability, and employment, has shifted over the time period in question. Specifically, that initially the latter is of secondary importance to Defence, but that this situation is reversed by the end of the period. Without going into further detail, this possible relationship is discussed with reference to the relative expenditure levels and the nature of the two types of spending. The matter is raised here because some type of split period analysis for each hypothesis, using Pearson Correlations and Regression would seem to be indicated. Unfortunately, such a procedure is inadvisable in that the results of any analysis performed on one-half or less of a thirty-three case data set would be unreliable in the extreme.

Chapter V

SUMMARY AND CONCLUSIONS

The fundamental question addressed in this thesis is whether defence spending exerts a beneficial effect on the Canadian economy which transcends its stated functional utility; that is, does defence expenditure purchase something more than arms and men. This discussion has been carried out in the context of two diametrically opposed viewpoints: that of what was termed the disarmament camp, which holds that military spending represents a drain on the economy, and arms economy theory which suggests that defence expenditure contributes to stability, growth, and high employment.

Arms economy theory is based upon an essentially Keynesian understanding of political economy,¹¹ and represents a refinement of the premise that particular forms of government spending may exert a stimulative and stabilizing effect upon the economy. The beneficial effect is not simply a one-to-one ratio, where for every dollar spent a dollar's

¹¹This is not meant to imply that the theory is drawn solely from Keynesian thought, nor that Keynes' understanding of political economy was without precedent. Direct antecedents of the principles outlined by Keynes can be found in the work of several nineteenth and twentieth century analysts, perhaps most interestingly in the work of Luxemburg.

worth of production ensues, but is seen as exerting a much broader influence.

Up to this point Arms economy and Keynesian theory are in accord, but the arms economy theorists' identification of military spending as the principal channel of stimulative spending represents a significant departure. At bottom, this position does not differ functionally from Keynes'; rather it stipulates that the "spending injections" take a different form than Keynes's "socially useful projects".

Arms Economy theory suggests that the growth, stability, and high employment levels of the post-War Western World have been in large part due to the unprecedented rate of defence expenditure. They argue that this spending serves as an outlet for investment capital which would otherwise be underemployed, or if reinvested in existing industrial enterprises - would increase production beyond realistic levels of consumption. In that arms production is separate from other industry, expansion in this area does not directly effect the existing relations of industrial production. Furthermore, armaments are an economic luxury; beyond some basic level they fulfill no real need of the populace. Nevertheless, their continued production presents no problem of over abundance, in that this consumption by governments can, within broad limits, always be increased, and this increased consumption provides investment opportunities and employment, both directly, and as a spin-off.

Beyond this, there are several facets of the arms economy which may offer advantages to particular states. First, because armaments technology is complex, and develops rapidly, smaller countries may experience difficulty in keeping pace with the rate of development fostered by the largest and wealthiest states. As a result they may tend to fall increasingly into a dependant relationship with dominant powers, both by the purchase of arms and the importation of technology.

Second, the production of arms themselves, and not their actual use, may represent a form of economic warfare among rival states. Specifically, the development of a particular weapons system may force an "enemy" to undertake expenditure to provide equality of defence, and presumably neglect more advantageous spending plans.

Finally, Kidron suggests that the arms economy has certain inherent problems which may become more acute over time. First, the adoption of an arms economy strategy represents a long term commitment to high levels of military expenditure. Once under way, to abandon this course could be disastrous. Furthermore, certain factors may tend to diminish the beneficial effect of arms expenditure in the long run. Specifically: 1) arms technology may through specialization become divorced from other industry and thus have little spin-off effect, 2) arms production may, by the demand it creates in certain related industries, foster

unequal development among sectors of the economy, and 3) because of its high technological development arms production may tend to become increasingly less labour intensive.

Contrary to the arms economy theorists, the disarmament writers believe that military spending represents a drain on the economy. While they are aware that spending cutbacks would have immediate consequences, specifically for workers employed in the arms industry, they see only a limited one-to-one benefit of defence expenditure (i.e., profit for arms manufacturers and arms industry jobs). Like the arms economy theorists, their position is usually held in the absence of solid data analysis.

Emile Benoit makes an interesting attempt at more sophisticated data analysis in Defence and Economic Growth in Developing Countries (1973). On the basis of this research he is forced to conclude that defence spending does contribute to economic growth in developing countries.

While the book represents a considerable advance in defence spending analysis, there are methodological problems. Specifically, his measurement of defence expenditure as military spending as a percentage of G.D.P. and his use of fifteen year averages for all countries raise questions as to the magnitude of the correlations he obtained. However, it does seem safe to conclude that there is a significant directional relationship between military spending and G.D.P. growth.

In order to evaluate some of the questions raised by the material discussed in the Review of Literature, two hypotheses were formulated. Through different variables both posited that defence spending was positively related to economic growth. It was also suggested that Health and Welfare expenditure might have a similar relationship with the growth of the economy, because of its recent predominance in the Federal budget and place in Keynes' original theoretical formulation. Therefore two further hypotheses, predicting a positive relationship between Health and Welfare spending and gross National Expenditure were formulated.

Data was collected for Canada for the years 1947 to 1979. Dollar figures were selected as the most reliable form of variable measurement given the focus on change. Figures were deflated where it was judged appropriate using the government spending price index; in view of the strong reservations expressed by most analysts, and the absence of a military price index, Defence Expenditure was measured in current dollars.

The analysis of data began with the presentation of general data showing defence and health and welfare spending in dollars, and as a percentage of all government spending and Gross National Expenditure. The dramatic increase in government spending after World War II, and the shift in the relative size of the Defence and Health and Welfare Budgets - Defence being predominant from 1947 to the early sixties and Health and Welfare afterwards - were noted.

The data analysis for each hypothesis was identical in form, beginning with the visual inspection of graphically represented data, to Pearson correlations supported by Spearman rank-order and Kendall tau-b's, Ordinary Least Squares Regression with Durbin-Watson statistics and autocorrelation coefficients for residuals, and finally an autoregressive O.L.S. regression model.

In regard to Hypothesis #1, it was concluded that a significant positive relationship existed between the two variables. This relationship was described as a broad correlation of trend, and relatively small yearly fluctuations were considered of indeterminate importance, although it was noted that the largest single year drop in Defence Expenditure did coincide with the only decline in Gross National Expenditure of the period.

The data for Hypothesis #2 was characterized by a significant positive relationship overall, and a somewhat closer covariance of year to year variations.

In contrast to the rest of the period, data for the years from 1947 to 1952 were characterized by negative relationship. It was suggested that this may be due to the level of Defence Expenditure being inadequate to exert any influence on employment prior to 1951-2. Thus the hypothesis was accepted with the reservation that the relationship may not hold where spending levels are significantly lower than the post-War average.

Hypothesis #3 was accepted, and again it was noted that the relationship was primarily one of trend; yearly fluctuations in Health and Welfare spending of small magnitude seemed to have little effect on G.N.P. It was suggested that the relationship between the two variables may be weaker in the earlier part of the period than in later years, and that the 1976 to 1978 decline in Health and Welfare spending, which was not reflected in Adjusted Gross National Expenditure, may have been offset by the concurrent increase in Defence Expenditure.

The data analysis for Hypothesis #4 revealed stronger correlation than for any of the previous hypotheses, and although there was again no precise year to year covariance, the broad direction of change - whether up or down - was similar for both variables throughout the period. Thus, on the evidence of the significant positive relationship exhibited by the data, Hypothesis #4 was accepted.

The results of the analysis of data for each hypothesis were quite similar. In each case a fairly strong relationship in the predicted direction and of acceptable significance was found to characterize the data. Trend was of importance in all cases - albeit to a lesser extent for hypotheses #2 and #4 - and year to year fluctuations around the trend were of indeterminate importance. On the basis of this analysis all four hypotheses were accepted. However, before proceeding further, several analytical points which

bear upon any conclusions drawn from the analysis must be discussed.

The problem of trend, particularly as it relates to the unidirectional nature of the Gross National Expenditure data, is of considerable importance. In the Discussion of Analytical Problems at the end of Chapter 4, it was noted that the trend relationship is problematic for statistical reasons rather than theoretical ones; that in fact, it is just such a relationship that the arms economy theorists suggest. Thus, an attempt to decompose the trend and search for a precise year to year correlation would go beyond the level of specificity of the theories involved. The problems which arise from the unidirectional trend of the G.N.E. data are in the main related to this, although more acute.

No appropriate solution was found regarding the GNE data.¹² The first difference approach - the most obvious solution - was rejected for both theoretical and statistical reasons. The latter resulted from the relative magnitude of calculated first differences in a thirty-three case data set, while the former concerned both the level of specificity of the theory in question, and the underlying assumption

¹²The Rate of Capacity Utilization was considered as an alternative measure but was rejected for several reasons. First, it is only available from 1961 onward. Also, arms economy theory suggests that arms expenditure will lead to stable economic growth, and the relationship between economic growth and capacity utilization is quite complex. In fact, if military spending acts to curb both violent upswing and decline as has been suggested, the relationship between it and the rate of capacity utilization would tend to be difficult to quantify.

of the first difference approach. In the present context, applying the first difference approach would implicitly assume that what may amount to only a minor variation in yearly expenditure is significant; that the difference in expenditure from one year to the next is of greater importance than the overall expenditure level. Given the nature of the data, and the problem under investigation, I believe that such an assumption is untenable.

The singular direction of the G.N.E. data is problematic in that it tends to reduce confidence in the correlation, for despite the definite upward trend of both Defence and Health and Welfare spending overall, each exhibit occasional downward movements that find no echo in G.N.E. It should, however, be remembered that the only year to year drop in G.N.E. does coincide with the single largest yearly decline in Defence Expenditure, and, although caution must be observed in drawing conclusions on the basis of one occurrence, this suggests that large changes in the latter will be reflected in the former. Also, the 1953 to 1954 drop in Defence Expenditure is unparalleled, being nearly twice as great at \$180 million as any other yearly decline, the next largest being \$108 million in 1962-63.

Obviously, if magnitude is important in this context, it must also be a factor throughout the period, and of particular importance in the early years of the period. In current dollars, Defence Expenditure does not pass the \$1 billion

mark until 1951; Health and Welfare does not do so until 1960. Given the observations of the arms economy theorists, it seems safe to assume that below some minimum level, the effect of government spending will be negligible. By the same token, one would assume that above this minimum level, yearly variations in expenditure must be of a certain size to have any effect. Unfortunately, there is no precise way to determine either "minimum effective level" or the magnitude of variation around this level that will be significant, but by examining the normal expenditure levels for the period a very rough estimate may be formed. From 1952 onward Defence Expenditure never falls below \$1500 million. Throughout these years, especially the fifties and early sixties, the relationship between Defence and GNE and the participation rate is strong. This would imply that a yearly expenditure of approximately \$1500 million is necessary to exert any real effect on economic growth or employment; below this level the effect will be negligible.¹³ Taking it one step further, if one assumes that above this minimum level, yearly variation must be at least 10% - which seems a conservative figure - to exert any measureable effect, the only fluctuation that meets this criteria is the 1953 to 1954 drop.

¹³presumably the effect would diminish rapidly below this level, although of course not instantly.

The foregoing must, of course, be considered speculation, although the idea of a minimum effective level is, I believe, sound. Certainly the comparatively small expenditures of the early post-War years cannot be expected to exert anywhere near the effect of later yearly expenditure as much as twenty times as great.

The question of minimum effective magnitude also requires some assessment of the interaction of the two expenditure variables, Health and Welfare and Defence. Clearly, if both forms of spending produce a similar effect, then there should be a cumulative effect of the two types of expenditure.¹⁴ A quick examination of the data suggests that Defence Expenditure was of almost singular importance until the late fifties, that the two forms of expenditure were of roughly equal importance, until the mid sixties, and that for the rest of the period Health and Welfare expenditure would be of major importance, although augmented by Defence. Thus, the slight rise in Health and Welfare spending that occurred in 1953 to 1954 would not have been of sufficient magnitude to offset the concurrent decline in Defence, but the general upward trend of the former in the sixties should have provided some stimulative effect in conjunction with

¹⁴While this effect would likely be additive, it would of course depend upon the types of spending contained within each category as regards function. Also, it should be noted that once high levels of expenditure are reached, the magnitude of any increase - whether 'independent' or 'combined' - must be accordingly large for its effect to be apparent.

the stable military spending. Similarly, the sharp drop in Health and Welfare spending from 1974 to 1976 would have been partially counterbalanced by the rise in Defence.

The preceding would suggest that the correlation between Defence Expenditure and Civilian Gross National Expenditure and the Labour Force Participation Rate would be stronger in the earlier part of the period under investigation than in the later years, and the reverse would be expected for Health and Welfare Expenditure and Adjusted Gross National Product and the Labour Force Participation Rate. While I believe this would be the case, given the size of the data set, no reliable correlation coefficients could be obtained if the period were split, in that the resulting two data sets - if the period were arbitrarily split at the mid point - could contain only sixteen or seventeen cases. At this point it is only possible to state that, on the basis of the relative levels of Defence and Health and Welfare Expenditure, it seems likely that the relative importance of the two spending types reverses over the period, and that there seems to be some indication of a return to greater reliance on Defence in the late seventies. Later in this chapter the relative advantages of the two spending types will be discussed in an attempt to provide a rationale for this shift.

Like the advantages that could have been obtained by a split period analysis, having an alternate period for comparison would be of considerable benefit. The results of a

second analysis would, if substantially the same, have increased confidence greatly. However, there is little point in analyzing pre-World War II data, which lies beyond the period with which arms economy theory is concerned, and in which, according to Keynesians, government spending was at an insufficient level to influence economic growth.

Finally, the absence of a military price index has contributed to the generality of the findings, and has helped to confine the analysis to one of broad directional trends. While no other reasonable measurement choice was available, in the face of this, questions as to the magnitude of change, and the relative strength of the correlations, must be addressed with caution.

Typically, such problems plague any attempt to assess the accuracy of broad social theory, and in fact may account for the scarcity of solid data analyses in the theoretical area which informs this thesis, and other analogous spheres. Theory building often relies more heavily on logic and rational argument than on data analysis, and broad historical trends often seem inappropriate subjects for statistical research. The difficulties encountered herein were thus to some extent anticipated, and do not render valid conclusions impossible, but only indicate the need for reasonable caution in interpretation.

On the basis of the analysis presented here, the disarmament position that military spending exerts a negative

effect on economic growth is insupportable. The results of the analyses for Hypotheses #1 and #2 indicate a significant positive relationship between Defence Expenditure and economic growth and employment and, while the strength of this relationship may not be stated with precision, there is no doubt as to its direction.

The analysis supports the arms economy theorists' perception of the relationship between military spending and economic growth, stability, and high employment for post-War Canada. In addition, it suggests that overall, Health and Welfare Expenditure performs a similar function. Thus we may conclude that Defence Expenditure and Health and Welfare Expenditure contribute to economic growth, stability, and high employment in Canada.

The analysis does not allow the strength of this contribution to be determined with precision. Economic growth and employment are complex phenomena, the result of a multitude of factors. Their measurement is of necessity broad, and variation is most likely due to a combination of input factors in most cases, both in a purely cumulative sense, and in terms of an interaction, the combined effect of which may be greater than the discrete input of the individual factors involved. Certainly Defence Expenditure makes a significant contribution to economic growth, stability, and high employment, as does Health and Welfare Expenditure, and a substantial decrease in either type of spending would have serious

detrimental effects. Whether or not this could be offset by the deliberate manipulation of other variables which stand in a similar relationship to the economy, and whether their input would be equal, must remain a matter for speculation.

It was noted before that, on the basis of the relative levels of expenditure, it would appear that military expenditure was the major channel for stimulative spending from Wartime until the early sixties, but that after that time Health and Welfare expenditure increasingly assumed primacy. The reasons for this probably lie in the specific benefits which accrue from each type of spending.

Arms economy theory deals almost exclusively with highly industrialized mature capitalist economies; existing analyses concentrate on the United States and Britain. Of these, America probably represents arms economy theory in its purest form, as the dominant state in the Western World and the leader in arms technology. When the U.S. government purchases arms it does so overwhelmingly from domestic suppliers; when it stimulates the arms industry by procurement and other expenditure the immediate value, spin-off, and employment effects are for the most part confined within its borders. In addition to this, the competitiveness of American arms in the world market is increased, and the value of resulting sales ultimately benefits the domestic economy. Finally, when arms are supplied through trade, or other transactions on an other than "cash" basis, there is again

an immediate benefit to the U.S. economy in increased production.

The situation in Canada is quite different. Although we do have a considerable arms industry, much of what we produce are components of larger systems or high technology, less labour intensive items. For the most part major purchases - aircraft, ships, and other sophisticated weaponry - are made from foreign producers. The resulting benefit in increased production and employment, as well as the spin-off effect, is markedly less than if these items were produced within our borders. Thus while the stabilizing effect of arms expenditure is unaffected, the effect is reduced.¹⁵

Health and Welfare spending, on the other hand, while not serving precisely the same purpose, does remain within the domestic economy. Welfare transfer payments do allow for increased consumption on the part of the recipients, and thus foster increased production in industry, although not in a restricted sector like military expenditure. It is possible, however, that stimulating production across the board is less hazardous in Canada than in the U.S., with our lower level of industrialization and our reliance on imports. Clearly there is more room for expansion in the areas which would be most affected by transfer payment spending, much of which presumably goes for economic neces-

¹⁵A full analysis of this would of course require an examination of the inter-relation between Western countries, particularly NATO members.

sities such as food and shelter.

It is also possible that the health component of this expenditure - although it accounts for much less of the total than Welfare - may operate in a more classically Keynesian manner. Certainly two hospitals are twice as good as one, and the wide variety of manufactured goods utilized in contemporary health care which are directly purchased by health spending, as well as the R&D expenditure of government grants, should result in both increased production and employment.

Interestingly, there is some indication that the trend towards increasing Health and Welfare spending at a much faster rate than defence may be reversing. Defence expenditure has increased significantly throughout the latter part of the seventies, and it is certain that the expenditure resulting from the new fighter plane and destroyer purchase agreements will bring spending up even more rapidly. Probably the most important facet of these contracts is their insistence that a large portion of the production entailed is to take place in Canada. It would be premature to conclude on the basis of this that the trend is definitely reversing, but military spending will increase significantly in the coming decade, and thus assume a more important role in Canada's economic health.

This thesis has been an attempt to examine social phenomena; if it has focussed more on economic matters than is

usual in contemporary sociological research, it is in the belief that this was the best way of analyzing the problem. Beyond the dollars and cents of Defence and Health and Welfare budgets lie a multitude of social concerns, but without full cognizance of fundamental relations of modern capitalism complete analysis is impossible.

Until recently, defence was a neglected area in Canadian social science, and even now interest is tepid compared to that in most other countries. As a result we tend to rely upon a conventional wisdom which may not be entirely up to date. This analysis has suggested that military spending may serve a function which goes beyond the defence of our soil. If this is the case then analysis of the defence budget - of defence policy itself - must take into account not only the defensive purpose of expenditure, but the broader economic function as well. To what extent policy decisions are influenced by each consideration, and which assumes primacy in a given case is a matter of immediate concern.

I believe that the analysis has revealed that Canada relies on defence spending for more than just the maintenance of an armed force and a variety of weapons systems. Those who advocate disarmament must be aware of the full range of issues involved, and that substantial cut-backs would involve much more than simply finding employment for defence industry workers and armed service personnel.

Health and Welfare spending stands in a parallel relation to the economy, and surely this has implications for Health and Welfare policy. Clearly the decision to opt for one program or another, to spend money in one way or another, has a broad and immediate effect on the economy - ultimately on all Canadians - and it would be naive to conclude that such concerns do not influence policy makers.

It is a rare election when the amount of government budgetary expenditure does not come under attack. Inevitably, current spending levels are portrayed as ruinous to the economy and as taking money out of the pockets of Canadians. While the question is obviously a complex one, far too much so for adequate consideration here, this analysis, in agreement with arms economy theory suggests that in a very real sense certain types of government spending are important factors in our post-war economic growth and relatively high employment. It is thus difficult to consider significant cutbacks with equanimity. In fact there are strong indications that the result would be disastrous. This raises an interesting question regarding federal party policy. Specifically, is a policy of major cutbacks seriously considered by any party, or is each government faced with the inevitability of spending increase in order to avoid widespread economic disruption?

In the years following World War II Canadians, like the citizens of virtually all Western countries became accus-

tomed to a pattern of stable expansion. In Kidron's words, to "unparalleled growth, stability, and high employment". This pattern has, if not completely changed, at least been disrupted in the nineteen seventies. Some analysts believe that what we are experiencing are the finite limits of an expansion that has been mainly confined to waste production; that is the production of items that serve no real human necessity, and are only valuable in a broad economic sense. A great deal of arms production falls into this category, but it is by no means alone; a multitude of products and services are bought and sold which, while their manufacture or rendering provides employment, generates profit, etc., serve no rational purpose.

If the seventies indicated a seriously diminishing return on military spending, the eighties may see an attempt, in the absence of any new solutions, to buck the trend by even greater expenditure. Already there is evidence that both the United States and Canada are prepared to substantially increase their defence expenditure. Ultimately these decisions affect all of us, not simply in terms of tax dollars, but in the way our society develops in the coming years.

Chapter VI

SUGGESTIONS FOR FURTHER RESEARCH

This thesis was initially conceived as an analysis of the Canadian defence establishment, but early on in the initial research it became apparent that in order to conduct such an examination certain fundamental questions would have to be answered. The present work represents this necessary first step. As such it provides a base upon which further analysis in the area may proceed. By this I do not mean to imply that this examination is exhaustive. Several refinements would be desirable, although for the most part their execution would be quite complex.

Of greater utility would be the construction of a military price index, although as regards military wages it is difficult to envision a satisfactory outcome. The problem hinges upon the output of military personnel, which may defy quantification, but without such measurement it is difficult to imagine a realistic measure being produced. On the other hand, it should be possible to produce some approximate index of equipment purchases, although it is doubtful whether this could be accomplished by anyone other than the Department of National Defence.

The isolation of Defence expenditure spin-off would be advantageous to further research, as it would afford a useful measurement of the ultimate contribution of military spending, and could serve as a further control in measuring GNE. Again, the work would be extensive, requiring the totalling of all military related production in the economy.

A much simpler addition to the present analysis would be the inclusion of expenditure figures on what might prove to be a third significant type of spending injection; expenditure on energy producing and related installations such as hydro projects. Figures would, of course, have to include both Federal and Provincial spending.

I believe the results of this thesis have significant implications for a variety of government policy analysis in the Defence, Health and Welfare, and possibly other fields. The relationship between these two types of spending and the economy cannot be ignored in major spending decisions.

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