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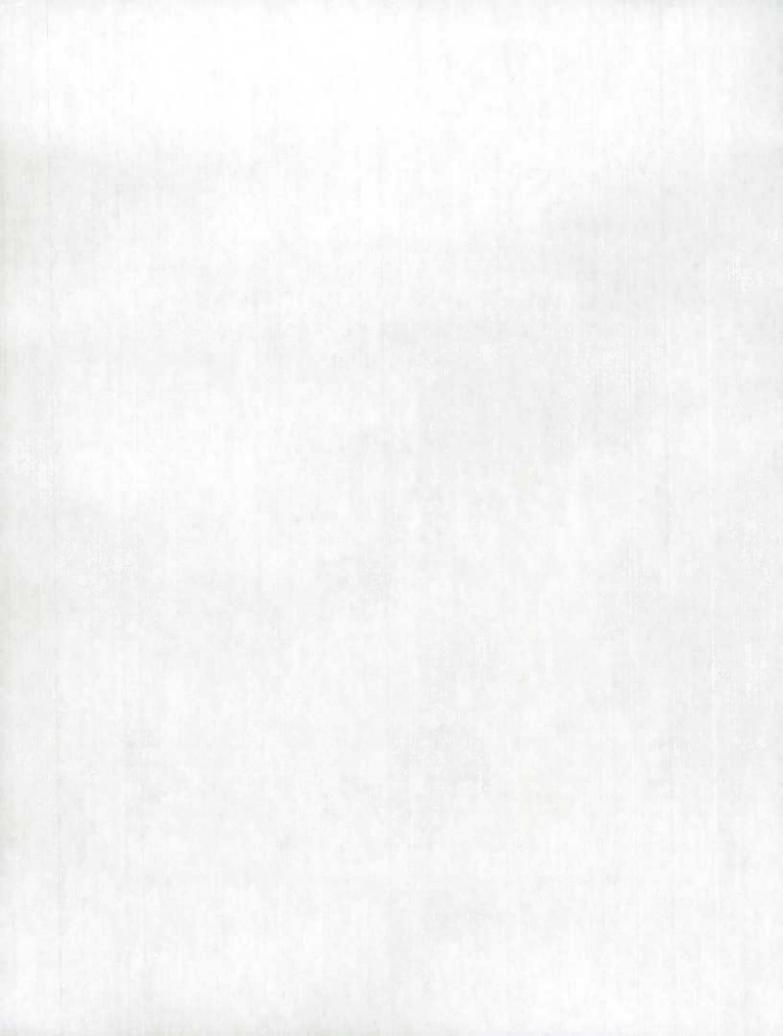(613) 951-3697

GOVERNMENT PRODUCTION TECHNOLOGIES IN CANADA: 1961 to 2000

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By

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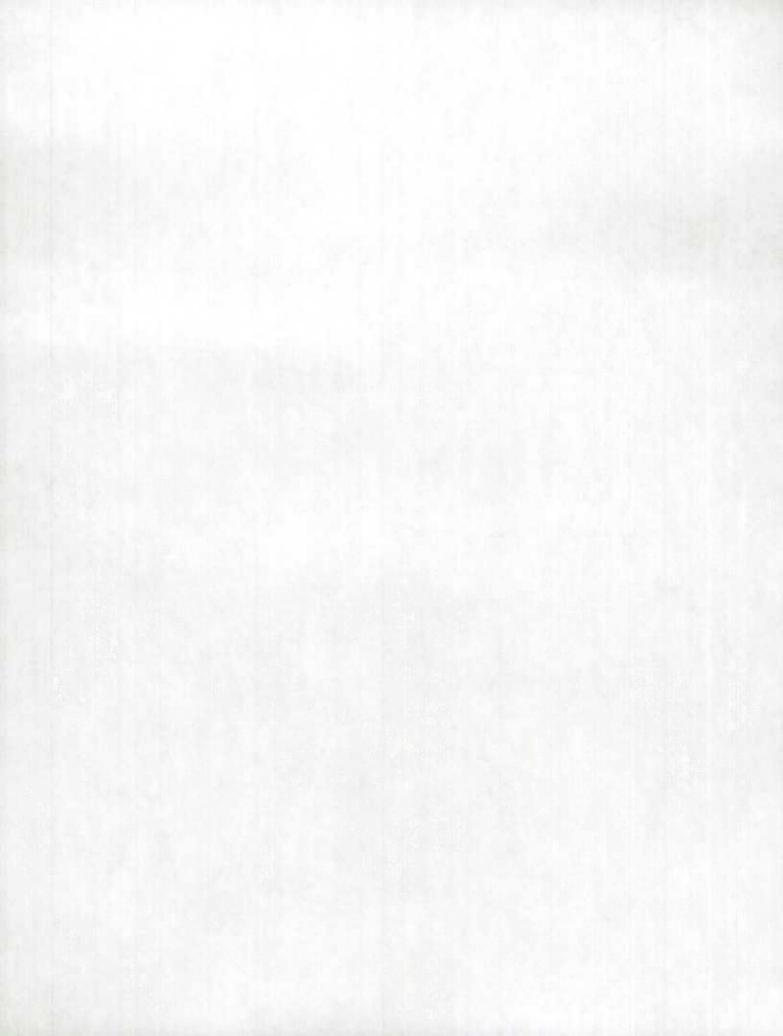System of National Accounts
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Executive Summary

The structure of government production technologies in Canada, as revealed in the input–output tables of the past four decades (from 1961 to 2000), had the following significant patterns:

- decline in defence services
- growth in health care services
- increases in social security programs
- reduction of own-account employment
- expansion in contracting-out for professional and other business services
- decreases in energy-related inputs
- increases in information technology applications.

These general patterns indicate that the government sector tended toward reduced defence spending and emphasis on active involvement in peace-keeping operations rather than escalation of armaments; tried to promote good quality of life for Canadians through increased health care services; and strengthened social security programs such as the Canada and Quebec pension plans. This last trend shows a distinct preference for income security, particularly for seniors. The government sector also reduced 'own-account' employment, preferring to acquire professional and other business services from producers in the economy rather than hire its own employees for such services. The energy-related input trend changed: the input shares stopped rising and dropped. Finally, the government reinforced computer applications to better serve the public (Table 1).

Table 1: Significant patterns in government production technologies, by decade

	1960s	1970s	1980s	1990s
Functions:	%			
Defence function	13.9	6.9	7.0	5.4
Health function	16.9	19.9	23.7	25.6
Input categories:				
Social security as reflected in supplementary labour income contributions	4.3	6.0	6.6	8.2
Own-account employment as reflected in wages and salaries	54.6	52.3	48.8	45.3
Contracting-out of professional and other services (health services excluded)	14.0	15.0	16.3	17.0
Energy-related inputs	1.9	2.0	2.1	1.7
Information technology services	0.6	0.8	1.2	1.6

Source: Statistics Canada, Input–Output Division

The patterns reveal that during the 1960s, for every dollar's worth of resource inputs for production activities, 42 cents went for public administration, 27 cents for education, 17 cents for health, and 14 cents for defence. In contrast, the pattern during the 1990s revealed 43 cents spent on public administration, 26 cents on education, 26 cents on health and 5 cents on defence (Table 2). In the 1960s, a total of 44 cents was spent on education and health, compared with 52 cents in the 1990s.

These patterns indicate that the combined total shares of the education and health functions were larger than those used for public administration by 2 percentage points in the 1960s and by 9 percentage points in the 1990s. The share of public administration stayed in the same range (42% to 43%) for the entire period of 40 years. showing no significant growth. More resources were, therefore, needed for both education and health.

Table 2: Government production technologies, by function and decade		
	1960s	**1990s**
	%	
Public administration	42	43
Education	27	26
Health	17	26
Subtotal of education and health functions	44	52
Defence	14	5
Total	**100**	**100**

Source: Statistics Canada, Input–Output Division

An analysis of the input categories reveals the following significant features:

- Contributions to social security programs, which are reflected in the employees' supplementary labour income component, accounted for about 4.3% of the total inputs during the 1960s and doubled to 8.2% in the 1990s.

- The inputs on health care, such as physicians' services, laboratory fees and pharmaceuticals, accounted for about 2.6% in the 1960s and rose to 10.3% in the 1990s.

- Professional and other business services accounted for only 1.3% during the 1960s and grew to about 3.5% by the 1990s.

- Wages and salaries to own-account employees consisted of 54.6% during the 1960s and fell to 45.3% by the 1990s.

- Energy-related inputs increased from 1.9% in the 1960s to 2.1% in the 1980s. However, they dropped to 1.7% in the 1990s.

- Information technology applications, which were approximately 0.6% during the 1960s, rose to 1.6% by the 1990s.

- All other inputs accounted for 34.7% in the 1960s and declined to 29.4% by the 1990s.

Table 3: Significant patterns in input categories, by decade		
	1960s	**1990s**
	%	
Social security contributions	4.3	8.2
Health services and pharmaceuticals	2.6	10.3
Professional and other business services	1.3	3.5
Wages and salaries	54.6	45.3
Energy-related inputs	1.9	1.7
Computer inputs	0.6	1.6
All other inputs	34.7	29.4
Total	**100.0**	**100.0**

Source: Statistics Canada, Input–Output Division

These findings raise some significant questions and concerns, such as the following:

- If the declining trend in the share of wages and salaries and the increasing trend in the purchased services through contracting-out of activities were to continue in future decades, what would be the impact on the quality of government services?

- If the increasing trend of the inputs related to health care were to continue in future decades, what would be its impact on other functions?

As this is only an exploratory fact-finding study, these and other concerns will have to be addressed in a later work. However, it should be noted that the health care system is mostly focused on curing rather than preventing diseases. It might be useful to consider disease prevention as a possible way of controlling health share increases in the future.

Background

It is well known to economists that the input–output tables, which are an integral part of the System of National Accounts, offer extensive detailed information on the production and disposition of goods and services for each industry. This information proves useful to a variety of analytical studies. In addition, the Canadian input–output tables have a new dimension that relates to two institutional categories: government sector institutions and non-profit institutions serving households.

These institutions have been brought into the industry structure of the Canadian System of National Accounts (CSNA) as a result of the recent modernization project involving a major historical revision.[1] Since they consume most of their output themselves and do not operate for profit, they are essentially non-commercial in nature. As such, they were formerly treated as final consumers and shown only in the *final demand* matrix.[2] Since these institutions are now part of the CSNA industry structure,[3] the shift in their treatment from final consumers to producers of goods and services gave rise to the new dimension. This change implicitly recognizes that these institutions have a production function in the economy: they too produce goods and services, despite the fact that they do not sell a large portion of their output. The final outcome of the change in the treatment is the inclusion of all producers of goods and services in the industry structure of the input–output tables. These producers of goods and services include corporations, unincorporated businesses, governments, and non-profit institutions serving households.

In the new dimension, government-sector institutions are classified into six industries based on their major activities:

- hospitals (including residential care facilities)
- education services (including universities, colleges and schools)
- defence services (national defence)
- federal government (excluding defence)
- provincial and territorial governments
- municipal (local) governments.

The inputs used by these industries in their production activities are shown in the *use* matrix,[4] while their outputs are shown in the *make* matrix.[5] Besides creating the new

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1. This modernization project was completed during 1998. For more details on the historical revision, see Murty, P.S.K., "Input–Output Accounts of the Canadian Economy: Concepts, Definitions and National Economic Accounting Structure, Volume 3, Historical Revision, 1961–92," Technical Paper No. 95, Input–Output Division, Statistics Canada, Ottawa, August 2001.

2. In the *final demand* matrix of the Canadian input–output tables, government institutions were included in the data of the government sector while non-profit institutions serving households were included in the personal sector.

3. Ibid., Volume 1, pp. 49–50.

4. The *use* matrix is also called the *input* matrix.

dimension, these matrices have provided a detailed insight into government sector production activities and significantly enhanced the usefulness of the input–output tables.

Furthermore, the Canadian input–output tables have been published annually since 1961 and are fully integrated with other parts of the CSNA, National Economic and Financial Accounts, and Balance of International Payments.

This study has been facilitated by the availability of industry *input* and *output* matrices, including integrated time-series for the government sector, covering four decades.

Goal of this Research Study

The objective of this study is to identify long-term trends of government production technologies over the past four decades by examining the input structure of the government-sector industries. It will also explore the underlying significant factors that might have contributed to structural changes in those technologies.

This is a fact-finding and exploratory study. It is not meant to measure either the productivity or the efficiency of the government sector.

A literature review has revealed no published precedents on the subject. Therefore, this study on government production technologies in Canada is probably the first of its kind. Since the inclusion of the government sector in the industry framework of the Canadian input–output tables is recent, it appears that there is a basic need to fill in the emerging literature gap. This study attempts to satisfy this information need.

Moreover, because topics such as technology, innovation and the knowledge-based economy are currently receiving much attention, this paper will attempt to shed some light on the issue of technology and set the stage for future extensions involving goods-producing industries and other service-producing industries. Such extended future studies on the subject could be followed up by a series of research papers highlighting the conclusions concerning the production technologies of the Canadian economy.

Concepts and Definitions

Government Sector

The government sector consists of three levels of government: federal, provincial and municipal. This sector includes all government departments, health service institutions

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5. The *make* matrix is also called the *output* matrix. In the previous treatment, the government sector was treated as a final consumer, not as a producer of goods and services. Therefore, it had neither inputs nor outputs in the Canadian input–output tables.

(such as hospitals and residential care facilities) and educational institutions (universities, colleges and schools). These institutions are mostly government-funded. The government sector also includes all special funds and other government organizations and agencies classified as government institutions in the Public Sector Universe Project[6] of the CSNA.

The activities of the government sector are essentially non-commercial in nature and are financed for the most part by taxation and government borrowing. A small proportion of government production, approximately 10% to 15%, is sold in the market place, either at nominal prices or at cost. The majority of services, however, are provided free of charge to the public. In practice, the government does not make a profit from sales of goods and services. The government sector's activities are, therefore, considered essentially non-commercial.[7]

Government Inputs for Production Activities

In general, the government sector produces goods and services for the benefit of the public. It uses several intermediate inputs in its production activities, including raw materials, manufactured goods and services from other producers.

In addition, the government sector employs the services of its own employees, uses its own capital assets such as machinery and equipment, and pays indirect taxes to itself. In the input–output tables, these own-account transactions appear as four different categories of primary inputs:

- wages and salaries (W&S)
- supplementary labour income (SLI), which mostly contains fringe benefits to its own employees
- capital consumption allowances (CCA), representing the portion of its own capital assets consumed in the production activities
- indirect taxes, which are mostly property-related.

The total inputs (both intermediate and primary) that the government-sector industries use for production activities are also called gross current expenditures on goods and services. The term *gross* implies that the data are gross of sales of goods and services that other sectors of the economy have purchased from the government sector. This means that these sales are not netted out of the expenditures. The total inputs in the *use* matrix

6. The Public Sector Universe includes all institutions that are conceptually classified as part of the government sector. It is maintained in Statistics Canada by the Public Institutions Division and utilized by all divisions of the Agency in the production and analysis of statistics relating to the government sector. It facilitates uniformity and consistency in the government-sector database across all divisions of Statistics Canada.

7. Government business enterprises are not included in the government sector because their motivations and methods of operation are profit-oriented, similar to those of private business enterprises. They are, therefore, included in the relevant business-sector industries.

are also on the gross basis, whereas government sales generated in the course of production activities are represented by the output in the *make* matrix.[8]

Therefore, the term *input*, which is normally used in government-sector input–output tables, is equivalent to the term *gross current expenditures on goods and services* used in the Income and Expenditure Accounts of the CSNA. They represent the same total resource-using expenditures of the government production activities; however, they do not include capital expenditures such as those relating to machinery and equipment (M&E) and construction put-in-place. The capital consumption allowances, which are included in the *use* matrix, represent the value of capital assets consumed in the production processes.

Industry Technology and Government Production Technologies

According to the industry technology definition of the input–output analysis, each industry chooses its human and material resource requirements and uses them as inputs in its production processes. The proportions (shares) of inputs to the total spending closely reflect the technologies employed by the corresponding industries. The long-term shifts in the shares of inputs to the total spending on production activities reveal the patterns of industry technologies over a given period. This study relies on that definition to measure government production technologies.

Supplementary Labour Income

Supplementary labour income (SLI) represents fringe benefits to employees in the form of employer contributions. In the present case, these are the government-sector contributions to specific accounts of employee benefits, such as pensions, unemployment insurance, Canada and Quebec pension plans, workers' compensation and other welfare plans (hospital and other insurance, such as dental and travel). It also includes retiring allowances, such as the severance pay employees receive at the time of their retirement from active service. In addition to the normal contributions at the rates determined by the various plans, the government also periodically pays any actuarial deficits into the funds, which are also included in the SLI.

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8. Formerly, while gross government current expenditures on goods and services were shown as a positive category, government sales of goods and services were shown as a negative category in the *final demand* matrix of the input–output tables in order to avoid double counting of government sales in the gross domestic product. Since government sales of goods and services were reflected in the purchasing sectors' expenditures as positive numbers, they were shown as negative numbers in the government-sector data.

Research Strategy and Methodology

Database

This study focuses on the content of government spending in the production process for the past 40 years, from 1961 to 2000. At present, published annual data are available only for 1961 to 1998. The data for 1999 and 2000 are taken from the synthetic unpublished projected series.

The data used in this study represent purchasers' prices—the market cost of the inputs—in current dollars. They reflect the purchasers' actual transaction payments (cost plus margins, such as wholesale margin, retail margin, transportation margin and commodity-tax margin) to acquire the resource inputs needed for their production activities.

Methodology

1. The required basic input data, containing 476 commodities at the Link (L) level of aggregation, have been extracted from the *input* matrix of the input–output tables for six industries: health, education, defence, federal government, provincial and territorial governments, and municipal (also called local) governments.

2. These data are converted into a more manageable level of detail at the Small (S) level of aggregation, which contains 57 commodities. This conversion is necessary because the 40-year historical annual data at the L level are voluminous and rather unwieldy.

3. The 57 S-level commodities are reorganized into two categories: goods and services. If a particular S-level commodity comprises both goods and services (e.g., other utilities) or cannot be meaningfully analysed, necessary details are extracted from the L level or in some cases, from the Worksheet (W) level. This enables such S-level commodities to be split into the required inputs. The S-level commodities that have been subjected to this exercise are listed in the appendix.

4. The data of the six industries have been grouped into four functional categories:

    - *health services* (including hospitals and residential care facilities)
    - *education services* (including universities, and other educational institutions, such as colleges and schools)
    - *defence services* (including the federal Department of National Defence)
    - *public administration* (including federal, provincial and territorial, and municipal governments. This function covers all government activities other than health, education and defence. It includes areas such as internal security, economy, environment, natural resources, tax collection, labour and immigration, agriculture, consumer and corporate affairs, industrial development, and sports and recreation.)

In organizing this functional grouping, health and education services have been adjusted in the following way:

- The inputs on health services—such as commodities representing private hospitals, health and social services, and pharmaceuticals—have been deducted from education, defence and public administration groups and added to the health function to reflect the total resource inputs used for health.

- Similarly, the inputs on education services of health, defence and public administration groups have been deducted from those groups and added to the education function to reflect the total resource inputs used for education.

5. The input data derived for the four functions covering the 40-year period have been converted into annual averages in dollar values for each of the four decades—the 1960s (1961 to 1970), the 1970s (1971 to 1980), the 1980s (1981 to 1990) and the 1990s (1991 to 2000).

6. The dollar values of the inputs for the four decades' annual averages are converted into percentages of the total inputs. These are called *input shares* in this paper.

7. The input shares of the total government sector have been cross-classified by the four functions—health, education services, defence and public administration—through the use of basic data's detailed information. This exercise has transformed the input shares of the total government sector into a three-dimensional paradigm showing not only the total share of each input for the government sector, but also its functional distribution by decade.

8. The data of this three-dimensional paradigm are regrouped into four components for analysis:
    - *employee compensation* (wages and salaries and supplementary labour income)
    - *capital consumption* (M&E and construction)
    - *purchased service* (professional and other business services, computer services, and health services, etc.)
    - *all other inputs* (such as raw materials, manufactured goods and indirect taxes).

9. Finally, in the next section, the assembled data are analysed to explore the government production technologies of the past four decades.

Data Analysis of Production Technologies

Functional shares

The government sector has been divided into four main functional groups for this study: health services, education services, defence services and public administration.

Of these four major functions, public administration had the largest share of resource inputs: about 42% in the 1960s, 44% in both the 1970s and 1980s, and 43% in the 1990s (Table 4). The fluctuations from decade to decade are negligible.

The education function had the second largest share: about 27% in the 1960s, 29% in the 1970s, and 26% in both the 1980s and 1990s. Here again, the fluctuations from decade to decade are rather insignificant.

Health followed with a share of about 17% in the 1960s; it grew rapidly thereafter to 20% in the 1970s, 23% in the 1980s, and 26% in the 1990s—a steady increase of 3 percentage points from decade to decade. The resulting growth from the 1960s to the 1990s was 9 percentage points, or about 53%. This growth was due to the following factors:

- The number of patient-days in health care institutions has been significantly increasing since 1961: hospitals across the country recorded about 40.0 million patient-days in 1961, about 50.0 million in 1971, 54.0 million in 1981 and 54.2 million in 1991. Also, full-time hospital staff rose from about 209,000 in 1961 to 306,000 in 1971, further increasing to 321,000 in 1981 and 343,000 in 1991. These data indicate a rise in morbidity among the population over the decades, resulting in increases in patient-days and full-time hospital staff.[9]

- Universal health care was introduced through the national medicare plan across Canada in 1968; since then, the provincial and territorial governments have been bearing the cost under that plan. The share of this component grew rapidly from 2% in the 1960s to 8% in the 1990s (Table 5).

- During the 1970s and 1980s, all provinces introduced 'pharmacare' plans for their senior populations (aged 65+) and have been bearing the cost of prescription drugs under those plans (Table 5).

- There has been a steady increase in the population of seniors over the past few decades. In 1961, seniors made up about 8% of the total population; their share had risen to about 13% by 2000. This group normally requires more health care, a demographic factor that might also have contributed to the increases in the shares of all the components in the health function (Table 5).[10]

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9. The data were taken from *Annual Return of Hospitals—Part 1* and *Annual Return of Health Care Facilities—Part 1*, Health Statistics Division, Statistics Canada.
10. The data were taken from CANSIM II, *Table 051-0026* (1960 to 1970) and *Table 051-0001* (1971 to 2000).

The defence function had the smallest share of resource inputs: about 14% in the 1960s, its share declined significantly to 7% in the 1970s, stayed at the same level in the 1980s, and declined to 5% in the 1990s. The steep drop of 50% in the 1970s and the further reduction of about 29% in the 1990s were caused by drastic cuts in the Department of National Defence during those decades. For example, the regular forces declined from about 123,000 in 1963 to 94,000 in 1970, with further reductions to 80,000 in 1980 and 79,000 in 1992. Similarly, the civilian staff, which numbered 52,000 in 1963, declined to 40,000 in 1970, with further reductions to 37,000 in 1980 and 35,500 in 1992.[11]

In summary, the functional data reveal that the shares of public administration and education have had no appreciable changes over the past four decades. The health and defence functions, however, have shown significant trends. While the share of the health function had an upward trend, with an increase of 9 percentage points or about 53% from the 1960s to the 1990s, the share of the defence function had a downward trend, losing 9 percentage points or about 64% during the same period.

The health and education functions are generally considered to be most important for the well-being of the population. Taken together, their combined share was 44% in the 1960s, 49% in both the 1970s and 1980s, and 52% in the 1990s. These combined shares of health and education functions exceeded the shares of public administration in all four decades.

In other words; during the 1990s, of every dollar's worth of resource inputs into the government production process, 43 cents was the amount spent on public administration, 26 cents on health, 26 cents on education (a total of 52 cents for health and education combined), and 5 cents on national defence. In contrast, the shares in the 1960s were as follows: 42 cents for public administration, 27 cents for education, 17 cents for health (44 cents for health and education together), and 14 cents for defence.

Input Shares

This section is presented in two parts: trends of technologies and significant underlying reasons for those trends.

Trends:

During the 1960s, the structure of government production technology comprised approximately 59% employee compensation (55% wages and salaries and 4% SLI), 10% capital consumption, 16% purchased services and 15% other inputs (Table 6).

In the 1970s, the structure of technology changed to approximately 59% employee compensation (53% wages and salaries and 6% SLI), 9% capital consumption, 20% purchased services and 12% other inputs.

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11. Julien, J.R.P., *The Influence of the Defence Budget on the Canadian Economy*, Concordia University, Montréal, 1994, pp. 23 and 38.

In other words, from the 1960s to the 1970s, purchased services and SLI had increasing trends while wages and salaries, capital consumption and other inputs had declining trends.

In the 1980s, there were further changes. The technology mix was 55% employee compensation (49% wages and salaries and 6% SLI), 9% capital consumption, 23% purchased services and 13% other inputs. The purchased services component also grew in that decade. Capital consumption stayed stable at the same level as in the 1970s. Employee compensation had a declining trend while other inputs remained almost the same as in the 1970s.

During the 1990s, the declining trend of employee compensation continued. The technology mix consisted of 53% employee compensation (45% wages and salaries and 8% SLI), 9% capital consumption, 25% purchased services and 13% other inputs. Here again, as in the 1970s and 1980s, the increasing trend of the purchased services and the declining trend of wages and salaries continued. Capital consumption and other inputs remained at the same levels as in the previous decade.

Significant Underlying Reasons:

Increasing trend in the share of health services

Important legislative measures were introduced in the 1960s, 1970s and 1980s.

- *The Hospital Insurance and Diagnostic Act* came into force in 1961. As a result, the hospitals that came under the financial and operational control of the provinces and territories began to provide free services to the public. In other words, the Act led to provincial and territorial governments indirectly providing free hospital services to the public.

- In 1962, Saskatchewan introduced its own medicare plan and started to bear the cost of health services to the public.

- In 1968, the national medicare plan came into effect in all the other provinces and the governments started to bear the cost of health services covered under that plan.

- During the 1970s and 1980s, provincial and territorial governments introduced pharmacare drug plans for seniors (aged 65+) and started to bear the cost of prescribed drugs.[12]

Health services thus came under the financial responsibility of the government sector, beginning in the 1960s and growing rapidly in the subsequent decades.

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12. Anderson, Lori J., *Provincial and Territorial Drug Reimbursement Programs—Descriptive Summary*, Bureau of Pharmaceutical Surveillance, October 1990

Decreasing trend in the share of wages and salaries

Although the share of employee compensation was the same in the 1970s as in the 1960s, its composition was different. Whereas the 55% share of wages and salaries in the 1960s declined to 53% in the 1970s, the 4% share of SLI rose to 6% in the same period. The decline of 2 percentage points in the share of wages and salaries was offset by a corresponding gain in the SLI. The overall total share of employee compensation, therefore, remained at 59% in the 1960s and 1970s. The decline in the share of wages and salaries was mostly due to the defence function, which suffered a sharp drop in the 1970s. Budget cuts and reorganization in the Department of National Defence led to a large-scale reduction in defence personnel (tables 7, 7A, and 7B).

The education and public administration functions also revealed some declining trends in their shares of wages and salaries in the 1980s and 1990s. Eight factors contributed to this trend:

- The school-age group (4 to 24 years) was about 39% of the population in the 1970s. It declined to 33% in the 1980s and 29% in the 1990s.[13]

- From 1974 to the end of 1978, the federal government imposed price and wage controls under the *Anti-Inflation Act* to restrain increases in wages and salaries of both business and government sectors.

- In June 1982, Parliament passed *The Public Sector Compensation Restraint Act* (Bill C-124) to control inflation in the economy and encourage the private sector and provinces to fight inflation. Under the Act, collective bargaining in the public sector was suspended for a period of two years. The ceilings imposed by the Act limited increases in wages and salaries.

- Following the federal government's *Public Sector Compensation Restraint Act*, provincial governments also passed similar legislation between 1982 and 1984. All these acts temporarily (i.e., for periods not exceeding three years) froze wages and salaries in order to reduce government spending on that budget component, which is usually the largest.

- The Federal Task Force on Program Review was established to recommend measures to eliminate unnecessary duplication, repetition and waste in federal government operations. In 1985, the task force submitted several recommendations to cut costs. The federal government implemented some of the measures.

- To reduce the size of the public sector, the federal budget of May 23, 1985 announced that 15,000 person-years would be cut from federal government

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13. The data were taken from CANSIM II, *Table 051-0001*.

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departments over a period five years. It also announced that the government would consider privatizing certain government activities and contracting out others "to achieve a leaner, more efficient public service, as well as to reduce government expenditures on salary budgets."[14]

- Government budget deficits grew to a record level of $310.5 billion during the 1980s from $54.4 billion in the 1970s.[15] In view of this, all levels of government were concerned with the amount of expenditures on wages and salaries, the largest budget component. They devised ways and means to reduce spending on that input for the production function. These included privatizing certain activities and contracting out others, thus reducing the need for own-account employees in the payrolls. Examples of privatization are the Post Office, which became the Canada Post Corporation, a Crown corporation, in 1981, and the Queen's Printer, which became St-Joseph Corporation when it was privatized in 1996.

- In 1993, Ontario[16] passed the *Social Contract Act* "in order to achieve significant savings in public sector expenditures"[17] through adjustments in employee compensation arrangements. One of the measures under the Act to meet the expenditure reduction targets was to require employees to take unpaid leave of absence to a maximum of 12 days or the equivalent in each of the following periods:

<div style="text-align:center">

June 14, 1993 to March 31, 1994
April 1, 1994 to March 31, 1995
April 1, 1995 to March 31, 1996

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These factors contributed to the downward trend in the share of wages and salaries for education and public administration during the 1980s and 1990s.

Increasing trend in the share of supplementary labour income

Several factors contributed to the increased share of SLI:

- In 1966, the Canada and Quebec pension plans came into effect. While these plans covered only 5 years in the 1960s (1966 to 1970), they covered all 10 years

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14. Budget Papers, *Securing Economic Renewal*, Department of Finance, Canada, May 23, 1985, p. 31.
15. The data were taken from CANSIM II, *Table 380-0022*.
16. Ontario has the greatest government employee complement (about 31% of total complement) of all provincial and federal governments. See Carter, D.D. and Pradeep Kumar, *Recent Public Sector Restraint Programs: Two Views*, Industrial Relations Centre, Reprint Series No. 53, Queen's University, Kingston, Ontario.
17. *Social Contract Act*, S.O., 1993, C.5, p.15
(http://192.75.156.68/DBLaws/Statutes/English/93s05_e.htm) Under the Act, the public sector comprises the following sectors: public service; health; community services; schools sector; colleges; universities; agencies, boards and commissions; and municipalities.

of the following decade (1970s). This contributed partly to the significant increase in the share of SLI during the 1970s.

- On April 1, 1970, under the authority of *The Supplementary Retirement Benefit Act*, the federal government introduced the indexation program for pensions of federal civil servants. Consequently, from that time, there were additional contributions to the pension funds.

- The new *Unemployment Insurance Act of 1971* raised the level of employer contributions to 1.4 times the employee contributions. In addition, there were increases in the contribution rates in 1983 and 1991.

- Because of staff reductions and early retirements associated with budget cuts during the 1990s, large allowances consisting of severance pay and bonuses were paid to retiring public servants. These allowances are a component of SLI.

- The governments periodically also paid actuarial deficits into the pension funds in addition to their normal contributions, which are treated as SLI.

- The federal government introduced an employee dental care plan on March 1, 1987. It has, since then, paid the related contributions falling under the plan.

Relatively stable capital consumption

The share of capital consumption, which was about 10% in the 1960s, declined to 9% in the 1970s and remained stable at that level in the 1980s and 1990s as well. The content analysis of this component has revealed that the capital consumption of machinery and equipment (M&E), which was about 2% in the 1960s, remained the same in the 1970s and 1980s but rose to 3% in the 1990s. There was no reduction in this component over the four decades.

Further content analysis of M&E capital consumption has revealed that about one-third of its share (about 1%) was for computers in the 1990s, with smaller shares in the 1960s, 1970s and 1980s.

In contrast to the increasing trend of M&E, the share of construction declined from 8% in the 1960s to 7% in the 1970s and 1980s, with a further decline to 6% in the 1990s. The marginal reduction is noticed in all functions, particularly in public administration where the lower capital consumption was associated with lower net new investment levels in federal and provincial government construction projects.[18]

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18. The net new investment levels were calculated by using the following equation: investment in assets minus capital consumption equals net new investment.

Increasing trend in the share of purchased services

The increase in the share of purchased services was due to health and social services and professional and other business services including computer services (Table 8). The increase in the share of health and social services from 2% in the 1960s to 5% in the 1970s was due to the introduction of the national medicare in 1968. Coupled with an increased morbidity among the population, medicare gave rise to further increases in the 1980s and 1990s.

Professional and other business services had a share of 1% in the 1960s, 3% in the 1970s and 1980s, and 4% in the 1990s. These services include engineering, scientific, accounting and legal services, as well as other business services, such as courier services, and software and other computer services. Most of this input was used in the public administration function.

Declining share of other inputs

The share of other inputs, which was approximately 15% in the 1960s, dropped to 13% in the 1990s (Table 6). This decline is mostly due to the drop in the share of defence's manufactured goods (Table 9). These manufactured goods represent motor vehicles and other transport equipment and parts, and electrical and communication products. Large cuts in defence personnel and equipment are associated with the decline in other defence inputs.

Information technology inputs

Information technology inputs from manufactured goods, purchased services and capital consumption have been combined to assess the total magnitude of the resource inputs in the computerization of government production activities (Table 10). The combined share of those inputs had a steady growth, from 0.6% in the 1960s to 0.8% in the 1970s, 1.2% in the 1980s, and 1.6% in the 1990s. This growth is attributable to the capital consumption of computer assets, and not to purchased services and the manufactured goods. The share of capital consumption rose from a modest 0.2% in the 1960s and 1970s to 0.5% in the 1980s, and 0.9% in the 1990s, a substantial increase of almost five times the share of the 1960s. This indicates that the government sector's investment in information technology increased significantly and rapidly, particularly in the 1980s and 1990s.

Energy-related inputs

When energy-related inputs containing electricity and petroleum products are separated from manufactured goods (Table 11), their combined share was 1.91% in the 1960s, 2.01% in the 1970s, 2.10% in the 1980s and 1.72% in the 1990s. The public administration function consumed the most energy inputs, whereas defence consumed the least, because of its large-scale budget cuts. The increasing trend in energy inputs reversed itself in the 1990s, suggesting that the government's energy-saving measures in

the health, education, and public administration functions have finally begun to achieve the desired results, however small they might be.

Conclusions

Using functional and main input categories, this study has highlighted the long-term trends of government production technologies for the past four decades. It has also identified the significant underlying factors that contributed to those trends.

The government sector is a labour-intensive industry. In the past four decades, over 50% of its resource inputs have gone to employee compensation.

The government production technologies show general patterns. Employee compensation and capital consumption, which are own-account resources, steadily declined: their combined share was 69% in the 1960s, 68% in the 1970s, 64% in the 1980s, and 62% in the 1990s (Table 6). In contrast, purchased services and other inputs, which are dependent resources acquired from outside sources, gradually rose: their combined share was 31% in the 1960s, and it rose to 32% in the 1970s, 36% in the 1980s, and 38% in the 1990s. Therefore, in the past four decades, the dependency rate on outside producers in government-sector production activities has had a steady growth.

Because of the rapid increase in the health services function, which used 26 cents of every dollar spent for government production activities in the 1990s compared with 17 cents in the 1960s, further detailed studies would perhaps be useful in identifying the types of diseases that have required the majority of government resources in the past four decades.

According to a Chinese proverb, "Whatsoever was the father of a disease, an ill diet was the mother."[19] Current health care services are mostly directed toward curing rather than preventing diseases. Although all diseases are not due to lack of nutrition, preventive programs, such as education and training in nutrition and food, would perhaps prove useful in controlling the growing trend of the health function share.

Appendix – Split of Selected S-Level Commodities

S34 – other utilities

This S-level commodity contains four L- and W-level commodities. They have been separated through the use of details in the concerned L- and W-level aggregations, and allocated to two categories:

Goods

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19. Carper, Jean., *Food: Your Miracle Medicine*, Harper Paperback, New York, 1993, p. xxix.

- L409 – electric power
- W5491 – water

Services
- L410 – gas distribution (the gas margin normally added to the gas price by the gas distribution industry)
- W5491 – other utilities (containing waste removal services)

S27 – chemicals, pharmaceuticals and chemical products

This S-level commodity contains L315 – pharmaceuticals, as well as other chemicals (with several L codes). It has been split into two categories (pharmaceuticals and other chemicals) using the relevant details of L-level aggregation.

S45 – operating, office, cafeteria and laboratory supplies

This contains four L-level commodities. They have been separated using details of the L-level aggregation:

- L441 – spare parts and maintenance supplies
- L442 – office supplies
- L443 – cafeteria supplies
- L445 – laboratory equipment and supplies

S39 – business and computer services

This has four service commodities that have been separated using the L-level aggregation:

- L428 – engineering, scientific, accounting and legal services
- L429 – advertising services
- L436 – software development, computer services and rentals
- L437 – other services to business and persons

S41 – health and social services

This has two L-level commodities, which are also separated for analysis:

- L424 – private hospital services
- L425 – other health and social services, including health practitioners, laboratory services, private residential care facilities, childcare outside homes, and other health and social services

S22 – machinery and equipment

This commodity has been split into computers and similar office equipment (W3290: 1961 to1985 and W3291: 1986 to 2000), and other M&E (total S22 minus computers). This was achieved through the use of W-level aggregation details.

S57 – capital consumption allowances

In the CSNA, capital consumption allowances (CCA) of the government sector are measured in terms of replacement cost, which reflects the cost of replacing the portion of capital assets used up in production. The Income and Expenditure Division makes the necessary adjustments to the basic data supplied by the Capital Stock and Investment Division, taking into consideration replacement cost valuation and historical consistency of the time-series. These adjusted data are then used in the Income and Expenditure Accounts as well as in the input–output tables.

Although the basic data supplied by the Capital Stock and Investment Division contain details of CCA by type of asset, such as M&E and construction, only the total CCA data for the industries are used in the CSNA. In other words, the final totals of CCA used in the Income and Expenditure Accounts and the input–output tables are not broken down into M&E and construction. Since this split is required for this study, the detailed data of the Investment and Capital Stock Division have been used as proxies to split the total CCA into M&E and construction. Furthermore, for the purpose of analysis, the data for CCA of M&E have been broken down into computers and similar office equipment and other M&E (using the details of the same source as proxies). For example, if the data of the Investment and Capital Stock Division showed that 5% of the total M&E was used for computers in a given year, that ratio has been applied to the total CCA data of M&E to derive the required estimate for CCA of computers. The balance, after deducting the estimated portion of CCA for computers from the total M&E, has been taken for the other M&E.

Tables

Table 4: Government resource inputs, by function and decade

	1960s	1970s	1980s	1990s
		%		
Public administration				
Federal	14	14	13	12
Provincial	14	16	18	17
Municipal	14	14	13	14
Total of public administration	42	44	44	43
Education	27	29	26	26
Health	17	20	23	26
Subtotal of education and health functions	44	49	49	52
Defence	14	7	7	5
Total government sector	**100**	**100**	**100**	**100**

Source: Statistics Canada, Input–Output Division

Table 5: Inputs of health function, by main category and decade

	1960s	1970s	1980s	1990s
		% of total shares		
Hospitals and residential care facilities	14	14	15	16
Health services covering mostly physicians and laboratory services under the national medicare plan	2	5	7	8
Cost of pharmaceuticals under provincial drug plans	1	1	1	2
Subtotal of health services and pharmaceuticals	3	6	8	10
Total health function inputs	**17**	**20**	**23**	**26**

Source: Statistics Canada, Input–Output Division

Table 6: Total government sector – production technologies, by decade

	1960s	1970s	1980s	1990s
	%			
Employee compensation				
Wages and salaries	55	53	49	45
Supplementary labour income	4	6	6	8
Total employee compensation	59	59	55	53
Capital consumption				
Machinery and equipment	2	2	2	3
Construction	8	7	7	6
Total capital consumption	10	9	9	9
Purchased services				
Health services	2	5	7	8
Professional and other business	1	3	3	4
Other	13	12	13	13
Total purchase services	16	20	23	25
Other inputs				
Pharmaceuticals	1	1	1	2
Other	14	11	12	11
Total other inputs	15	12	13	13
Total inputs	**100**	**100**	**100**	**100**

Source: Statistics Canada, Input–Output Division

Table 7: Total government sector – employee compensation, by function and decade

	1960s	1970s	1980s	1990s
	% of total shares			
Health	10	11	11	11
Education	20	21	19	18
Public administration				
Federal	8	8	8	7
Provincial	7	8	8	8
Municipal	6	7	6	6
Total public administration	21	23	22	21
Defence	8	4	3	3
Total employee compensation	**59**	**59**	**55**	**53**

Source: Statistics Canada, Input–Output Division

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Table 7A: Total government sector – wages and salaries, by function and decade

	1960s	1970s	1980s	1990s
	% of total shares			
Health	10	10	10	10
Education	18	19	16	16
Public administration				
Federal	8	7	7	5
Provincial	6	8	7	6
Municipal	6	6	6	6
Total public administration	20	21	20	17
Defence	7	3	3	2
Total wages and salaries	**55**	**53**	**49**	**45**

Source: Statistics Canada, Input–Output Division
Note: Figures in this table are rounded.

Table 7B: Supplementary labour income, by function and decade

	1960s	1970s	1980s	1990s
	% of total shares			
Health	0.5	1.0	1.0	2.0
Education	1.0	2.0	2.0	2.0
Public administration				
Federal	0.8	0.9	0.9	1.3
Provincial	0.2	0.6	0.9	1.2
Municipal	0.5	0.8	0.9	1.0
Total public administration	1.5	2.3	2.7	3.5
Defence	1.0	0.7	0.5	0.5
Total supplementary labour income	**4.0**	**6.0**	**6.2**	**8.0**

Source: Statistics Canada, Input–Output Division
Note: Figures in this table are rounded.

Table 8: Total government sector – purchased services, by decade

	1960s	1970s	1980s	1990s
	% of total shares			
Health and social services	2	5	7	8
Professional and other business services (including computer services)	1	3	3	4
Other services	13	12	13	13
Total services	**16**	**20**	**23**	**25**

Source: Statistics Canada, Input–Output Division

Table 9: Total government sector – manufactured goods, by function and decade

	1960s	1970s	1980s	1990s
	% of total shares			
Health	3	2	2	2
Education	2	3	2	2
Public administration	5	4	4	5
Defence	4	2	3	2
Total manufactured goods	**14**	**11**	**11**	**11**

Source: Statistics Canada, Input–Output Division

Table 10: Total government sector – information technology-related inputs, by decade

	1960s	1970s	1980s	1990s
	% of total shares			
Information technology supplies	0.1	0.0	0.1	0.1
Software and other services	0.3	0.6	0.6	0.6
Capital consumption	0.2	0.2	0.5	0.9
Total information technology-related inputs	**0.6**	**0.8**	**1.2**	**1.6**

Source: Statistics Canada, Input–Output Division

Table 11: Total government sector – energy-related inputs, by decade

	1960s	1970s	1980s	1990s
	% of total shares			
Petroleum and coal products	0.94	1.05	1.00	0.67
Electric power	0.97	0.96	1.10	1.05
Total energy-related inputs	**1.91**	**2.01**	**2.10**	**1.72**

Source: Statistics Canada, Input–Output Division

Table 11A: Distribution of energy-related inputs, by function and decade

	1960s	1970s	1980s	1990s
	% of total shares			
Health	0.19	0.18	0.18	0.16
Education	0.44	0.56	0.54	0.52
Defence	0.43	0.24	0.25	0.14
Public administration	0.85	1.03	1.13	0.91
Total energy-related inputs	**1.91**	**2.01**	**2.10**	**1.72**

Source: Statistics Canada, Input–Output Division

Table 12: Summary of total government production technologies, 1961 to 2000

	1960s	1970s	1980s	1990s
	% of total inputs			
Employee compensation				
Wages and salaries (54)	54.55	52.82	48.80	45.33
Supplementary labour income (55)	4.29	5.99	6.58	8.18
Total employee compensation	58.84	58.81	55.38	53.51
Capital consumption (57)				
Computers (57A)	0.23	0.15	0.49	0.90
Other machinery and equipment (57B)	1.74	1.54	1.39	1.41
Subtotal of machinery and equipment	1.97	1.69	1.88	2.31
Construction (57C)	7.81	7.16	6.60	6.22
Total capital consumption	9.77	8.85	8.48	8.53
Services				
Health and social services (41A) + (41B)	1.95	5.14	6.64	8.16
Computer services (39C)	0.27	0.57	0.62	0.62
Professional and other business (39A)+(39B)+(39D)	1.31	2.14	2.71	3.54
All other services	13.03	12.25	12.93	12.87
Total Services	16.56	20.10	22.89	25.20
Other inputs				
Raw materials	0.46	0.56	0.76	0.61
Manufactured goods	13.91	10.85	11.34	10.75
Pharmaceuticals (27A)	0.66	0.83	1.49	2.16
Other (total minus pharmaceuticals)	13.25	10.02	9.86	8.59
Indirect taxes (52)	0.45	0.83	1.15	1.41
Total other inputs	14.82	12.25	13.25	12.76
Total	**99.99**	**100.00**	**100.00**	**100.00**

Source: Statistics Canada, Input–Output Division

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