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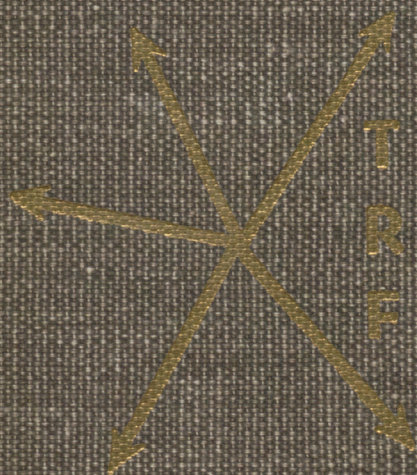
PROCEEDINGS —

Twenty-second Annual Meeting

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TRANSPORTATION RESEARCH FORUM



# PROCEEDINGS —

## *Twenty-second Annual Meeting*

Theme:

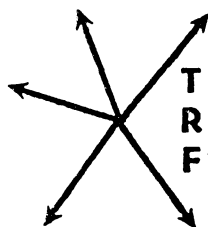
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**TRANSPORTATION RESEARCH FORUM**

# The Productivity Issue

by Edmund Maroti\*

## ABSTRACT

**PRODUCTIVITY** is of fundamental significance to an economy, being perhaps the single most important determinant of national economic well-being. Since Canadians depend to a higher degree upon their national transportation system than do most other people in the Western world, the productivity performance of this sector is of vital importance.

Recent estimates of total factor productivity suggest that Canadian railways have established a strong record of productivity improvement since the mid-fifties. This achievement reflects the cumulative impact of a host of factors, including the incentives towards efficiency that are generated by market forces, and innovation and experimentation undertaken on many fronts.

Throughout the eighties, it is imperative that Canada's railways continue to improve productivity, in order to alleviate the pressure of financing immense capital programs in an environment marked by high inflation and by arrangements which oblige the railways to bear the financial burdens associated with the provision of unprofitable transportation services.

## INTRODUCTION

The slowdown in productivity growth has attracted increasing attention in the news media and in economic literature in recent times. Here in Canada and internationally, the concern over the productivity situation centers upon the disturbing decline in productivity growth rates over the last decade and the fear that they will not return to previous levels.

Although published productivity statistics are by no means definitive, they do seem to point to one conclusion: productivity gains have slowed quite substantially, particularly since 1973-74. Table 1 shows one measure of labour productivity in the Canadian economy: real output per employee in the commercial non-agricultural sector. From 1947 to 1973, the average annual rate of growth of this measure of productivity ranged between 2½ to 3 percent per year, depending upon the period

chosen. Since then, the trend rate of growth of labour productivity has dropped to 0.7% per year.

Another way to look at the issue is to compare Canada's productivity performance with that of other countries. Table 2 shows that all other major western economies have suffered similar declines. While Canada's experience has not been unique, it is disturbing that the recent decline has pulled our rate of productivity down from a level which already placed us in the lower ranks in international comparisons.

The slowdown in productivity growth has not been uniform across industries. The pattern of productivity change in various industries is illustrated in Table 3. Fishing and trapping productivity actually grew more strongly over the recent period, largely owing to legislation

**TABLE 1**  
**LABOUR PRODUCTIVITY GROWTH,**  
**CANADA**

Average Annual Percentage Growth			
1947-55	1956-65	1966-73	1974-79
2.7	2.6	2.9	0.7

Note: Data relates to real output per employed person, commercial nonagricultural industries.

Source: Statistics Canada, Cat. 14-201.

**TABLE 2**  
**LABOUR PRODUCTIVITY GROWTH,**  
**VARIOUS COUNTRIES**

	Average Annual Percentage Growth		
	1965-69	1970-74	1975-79
Japan	7.3	7.4	4.2
Germany	6.1	1.4	2.0
U.K.	2.8	3.4	1.7
U.S.A.	1.8	0.5	0.8
Canada	2.1	2.1	0.5

Source: Bank of Montreal *Business Review*, September 1980

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TABLE 3  
LABOUR PRODUCTIVITY GROWTH,  
CANADA

Industry	Average Annual Percentage Growth	
	1966-73	1974-79
Agriculture	4.3	1.9
Forestry	4.4	0.4
Fishing, Trapping	-0.6	2.1
Mining, Quarries & Oil Wells	4.6	-5.5
Manufacturing	3.6	1.0
Construction	1.5	-0.6
Utilities	5.4	2.8
Transportation, Storage Storage & Communication	3.9	2.6
Trade	2.4	0.2
Finance, Insurance & Real Estate	1.7	0.3
Services	0.3	-0.2
Public Administration and Defence	-0.7	0.2

Source: Informetrica Ltd. Ottawa.

which extended fishing limits and led subsequently to increased fish harvests. The worst performer was the mining industry, which experienced an absolute decline in productivity at a rate of 5½ percent annually. A dramatic reversal has occurred in the productivity performance of the oil and natural gas industry, attributable to both falling output and accelerating employment growth. This has had a major impact upon productivity growth in the overall mining sector, and (through the pipeline sector) has contributed to the decline in productivity growth in the transportation, storage and communication industry.<sup>1</sup>

The freight transportation system in Canada might be described as the lifeblood of the economy. The productivity of the railway industry, in particular, is crucial to the health of numerous sectors, most notably the primary resource industries. Hence it is a vital matter to examine the productivity performance of Canadian railways. I will attempt to do that later in this paper, and will speculate on what factors influenced this

pattern of productivity growth. To provide a framework for that portion of the paper, it is worthwhile to review what is meant by productivity and what explanations have been advanced by observers for the disappointing performance of productivity in the seventies.

### PRODUCTIVITY DEFINED

Productivity is of fundamental significance to a national economy. From a macro-economic viewpoint, productivity may well be the single most important factor determining national economic well-being. Our ability to consume ultimately depends on our ability to produce. The rate of growth of productivity is a measure of improvement in the efficiency with which the economy uses its resources. Raising productivity is the key to resolving such economic issues as the improvement of real standards of living, the control of inflation, the competitiveness of Canadian industry, and the balance of international trade and payments. Moreover, productivity improvements serve to ease social strains and conflicts which may derive from struggles over real income shares in an economic pie that is unchanging in size or indeed shrinking.

"Productivity" is a seemingly straightforward concept: it is a measure which relates the output of a production process to the inputs used in the process. Yet it is more instructive to say that the term "productivity" signifies a family of ratios of output to input, since there are several ways to view productivity.

First, production processes can be examined at many different levels. At the national level, aggregate productivity statistics reflect the complex interplay of all factors which bear upon the production of goods and services in the economy as a whole. Yet, like national economies, the welfare of individual industries or enterprises depends upon their comparative productivity performance. So in many circumstances it is of importance to focus at a more disaggregated level upon a particular industry, an individual enterprise, or specific units within an organization.

Furthermore, in most production processes several resources are used. Frequently, the term "productivity" is restrictively taken to signify output per person or output per man-hour. Yet the productivity of any or all productive resources, whether human or non-human, is also of critical importance. Such measures as output per unit of labour, per unit of capital, and per unit of intermediate purchases (such as energy and

materials) make up a spectrum of partial productivity measures. A more general notion is that of composite or total factor productivity, which relates output to the entire set of resources employed in the production process.

The usefulness of any particular measure is likely to depend crucially on how it is to be applied. Clearly some measures serve certain purposes better than others. A distinctive feature of the debates which surround productivity is the extent to which discussion can proceed at cross-purposes owing to misunderstanding over which of the family of productivity concepts is used by different parties. Very often, the special interests of the person who is speaking determine what definition is used.

Even when there is general agreement over the terms of discourse, common misconceptions often provide a basis for superficial and erroneous interpretations of productivity trends. A case in point is the analysis of partial productivity measures. For example, a time series of labour productivity can be employed to measure what savings in labour inputs are achieved over time due to all causes, but changes in output per unit of labour input cannot be attributed directly or solely to labour. Output is determined not only by the skills and efforts of the labour force, but also by the services provided by other productive resources, the manner in which all are combined, and the effectiveness with which the entire production process is organized over time in relation to changes in demand, competition, relative prices of productive inputs, technical knowledge, organizational practices and external factors of various kinds. Hence, so-called "labour productivity" measures also reflect the impact of changes in technology, capital investment, capacity utilization, work-flow, managerial skills, and the quality of working life. Labour productivity indicators are used so commonly simply because of the severe conceptual and measurement problems inherent in measuring other inputs.

As Peter Drucker once pointed out, raising productivity doesn't mean working harder. It means working smarter.<sup>2</sup> People, machines, systems, and capital—all are determinants of productivity. A complete understanding of the concept demands recognition of this inter-relationship.

## SEVEN SOURCES OF THE SLOWDOWN

Why has productivity fared so badly, both in Canada and around the world? Many suggestions have been made to

account for the decline in productivity growth, yet considerable controversy exists over the relative importance of the various suggested causes.<sup>3</sup>

Many analysts have proposed a cyclical explanation for the stagnation of productivity growth. The traditional view of productivity growth over the business cycle is that productivity growth usually slows during recessions and speeds up during recoveries as idle men and machines are put back to work. It is argued that the recent slowdown is merely a temporary by-product of the mid-1970's "oil slump."

Two recent Canadian studies have accepted this argument as a partial explanation of our productivity experience. The Economic Council of Canada, which devoted a large part of its latest annual report to an investigation of the productivity problem, assessed that one-quarter of the decline in our rate of productivity growth was probably due to cyclical weaknesses of aggregate demand in the economy.<sup>4</sup> Researchers in the Department of Finance also accepted that part of the post-1973 slowdown in productivity growth is related to the cyclical performance of the economy over this period.<sup>5</sup> But each study concluded that the extent of the slowdown appears to have been larger than can be accounted for by cyclical factors alone.

What other factors may have contributed to a secular decline in the trend rate of productivity growth? Several other explanations are commonly cited by analysts:

**The changing demographic composition of the labour force.** It is argued that rises in the proportion of young workers in the labour force and in the participation rates of women have, on average, made the labour force less experienced, less skilled and therefore less productive.

**The impact of government intervention in the economy.** One aspect of this explanation is that the sharp acceleration of government regulation has diverted resources from market-oriented production to government-regulated goals, and has imposed substantial "start-up" requirements for new initiatives. Another aspect relates to the general thrust of monetary and fiscal policies.

**Shifts in the industrial mix.** In the past, changes in the sectoral pattern of employment and output worked to raise productivity growth as workers shifted out of low-productivity agriculture into high-productivity manufacturing. Now, it is argued, a shift from manufacturing to the service sector may have the opposite influence.

**Oil price increases.** Some argued that

the rise in the relative price of energy distorted the world economy and damaged its ability to raise productivity. Efforts to economize on energy in production by substituting other resources have worked to dampen productivity growth in the medium term.

**Slowdown in rate of capital formation.** One of the most plausible explanations is the decline in the growth rate of capital per worker, since one of the main sources of productivity growth is an increase in the quantity and quality of capital equipment that each worker has to work with. The reasons cited for the slow pace of capital formation are as diverse as those that account for productivity developments. To name a few: the low utilization rate of existing capacity, the oil price shock, government regulations, government deficit financing which drains funds otherwise available for new capital projects, the uncertainty created by higher inflation and interest rates, and the tendency of inflation to reduce the purchasing power of fixed dollar depreciation charges against accelerating replacement costs.

**Slower rate of technological change.** Some relate this to a relative decline in research and development expenditures both here in Canada and abroad. However, others suggest that the problem is related more closely to the general slowdown in investment, since knowledge is potential until applied. For gains in measured output to result from advances in knowledge, they must be incorporated in production through organizational change and capital spending.

To a considerable extent, however, Canada's recent productivity performance remains a puzzle. In its study, the Economic Council of Canada suggested that one half of the economy-wide productivity slowdown was due to cyclical factors, capital accumulation, changing labour force composition, identifiable technical change, structural shifts and internationally generated inflation. The other half remained unexplained.<sup>6</sup> The Department of Finance study estimated that the absolute decline of productivity in Canadian oil and gas related industries accounted for one quarter of the drop, as did slower growth in capital-labour ratios in several industries. The remainder was unaccounted for.<sup>7</sup>

In the United States as well, explanations of the decline of productivity have been inconclusive and inconsistent. Edward F. Denison, for example, concluded a major study of the causes of the 1973-76 decline in productivity growth with the judgment that a large portion of the decline was "a mystery."<sup>8</sup>

There can be no doubt, however, that

the problem is real. The marks of malaise are all around—entire industries in serious difficulty, sluggish growth in real living standards and skyrocketing inflation. U.S. economist Lester Thurow anticipates that reversing the decline in productivity growth will not be easy:

"If an autopsy on American productivity were written, it would list the cause of death as 'death by a thousand cuts.' There is no one factor to which the decline can be attributed; there is no magic button that can be pushed to resurrect the economy. The cure will require a thousand treatments for each of the thousand cuts."<sup>9</sup>

Clearly, some determinants of the slow-down in productivity growth are simply beyond our control: the age mix and experience level of the work force, price shocks from foreign cartels, and adverse weather conditions, to name a few. But we do have a say over some important causes of poor productivity performance notably the twin I's—investment and innovation.

#### PRODUCTIVITY PERFORMANCE OF THE CANADIAN RAILWAYS

Canadians depend to a higher degree upon their national transportation system than do most other people in the Western world. Partly this is due to the sheer size of the country and the pattern of settlement. It is also because about one-fifth of our domestic production is sold in foreign markets. The movement of large volumes of resource products, processed goods and manufactured products to distant markets contribute to the fact that, in terms of ton-miles per capita, we transport more freight than any other country in the Western world.<sup>10</sup>

Because of the immense impact that transportation has on the health of other industries and on the welfare of the country as a whole, one of the greatest challenges facing our industry is that of productivity. A modern and efficient transportation system is essential to Canada's growth and development.

I would like to focus upon one element of our transportation system, the railways, and draw attention to their productivity performance record. Major problems are associated with the measurement of productivity in any sector. The difficulties are at once conceptual, theoretical and practical, yet the characteristics of the rail transportation industry make productivity measurement particularly difficult.

Output measurement is complicated



TABLE 4

TOTAL PRODUCTIVITY GROWTH FOR  
CANADIAN AND U.S. RAILROADS

	Average Annual Percentages		
	1956-63	1963-74	1956-74
Canada	1.7	4.0	3.3
United States	0.6	0.1	0.5
Canadian Nat'l	1.8	4.3	3.3
Canadian Pac.	1.7	3.3	2.7
Atchison, Topeka and Santa Fe	1.4	1.0	1.1
Southern Pac.	3.1	0.4	1.4

Source: D. W. Caves et al., "The High Cost of Regulating U.S. Railroads," *AEI Regulation* (January-February 1981), p. 43.

by the great variety of rail outputs which have different unit costs of production and different unit values to customers. In many studies, changes in the mix of traffic are not taken into account. Similar problems exist in the treatment of inputs. Measurement of the volume of capital stock employed is inherently troublesome, both conceptually and practically. Moreover, the data series which are typically available measure inputs in terms of some quantitative total (such as numbers of employees) and fail to capture the qualitative dimension (such as the education, training and experience of labour). These problems are really only the tip of the iceberg. The difficulties that I have cited should serve as a warning that productivity measures should never be taken to be absolutely definitive. Nevertheless, some painstaking and sophisticated efforts have been made to provide both better statistical bases for productivity measurement and more comprehensive productivity computation and analysis.

I believe that some very meaningful insights can be gained from the comprehensive investigation of Canadian railway productivity conducted by Caves, Christenson and Swanson of the University of Wisconsin. The results of this research were reported in a paper presented to the 1979 session of the Canadian Transportation Research Forum.<sup>11</sup> Since that time, these same authors have published comparisons of the relative performance of U.S. and Canadian railroads from the mid-fifties to the mid-seventies.<sup>12</sup>

Their estimates of total factor productivity suggest that the productivity performance of Canada's railways has far exceeded that of U.S. railroads over this period. Table 4 shows that from 1956 to

1963, the Canadian industry experienced 1.7 percent annual growth in productivity compared to 0.6 percent a year for U.S. railroads. The spread in growth rates widened in 1963 to 1974 period when railway productivity grew at a rate of 4.0 percent annually in Canada, while that in the U.S. dropped to 0.1 percent. The average annual rate of productivity growth in Canada over the full period is more than six times greater than the U.S. gain of 0.5 percent annually.

Not only did the Canadian railways exceed their U.S. counterparts in productivity growth, over the period the Canadian railroads also overtook the U.S. industry in terms of the overall level of productivity. Table 5 indicates that

TABLE 5

COMPARISON OF TOTAL PRODUCTIVITY LEVELS FOR  
CANADIAN AND U.S. RAILROADS

	1956	Ratios	
		1963	1974
United States/Canada	1.24	1.15	0.82
Atchison, Topeka and Santa Fe/Canadian National	1.22	1.18	0.82
Southern Pacific/Canadian National	1.33	1.45	0.95
Atchison, Topeka and Santa Fe/Canadian Pacific	1.07	1.05	0.81
Southern Pacific/Canadian Pacific	1.17	1.29	0.94

Source: As for Table 4.

the U.S. railroads had a 24 percent higher level of productivity than the Canadian railways in 1956, but that this superiority had fallen to 15 percent by 1963 and had been reversed by 1974 when the Canadian railways were superior by 18 percent.

As can be seen in Tables 4 and 5, the findings are very similar for comparisons of CN and CP with the Santa Fe and the Southern Pacific, two American railroads which have similar characteristics to the Canadian carriers, and are generally regarded as being among the strongest U.S. railroads.

Why has the Canadian performance been superior? Caves, Christensen and Swanson argue that the answer is the greater freedom from regulation that has characterized the environment of Canadian rail system.

I agree that one of the most important factors behind the superior economic performance of Canadian railways is the extent and degree to which regulation of the industry was relaxed in the wake of the MacPherson Royal Commission on Transportation and the National Transportation Act. Without question, increased reliance on the forces of competition has served to create and maintain incentives that are effective in stimulating the efficient allocation of productive resources in the transport sector. It is highly significant that the basic orientation of Canadian transport policy, this emphasis on competitive market forces, is now emerging with great fanfare in the United States in the form of such legislation as the Staggers Rail Act of 1980.

To be sure, then, the discipline of the market place and its incentives towards efficiency have contributed to the enhancement of productivity in the Canadian railway industry. Yet a further question concerns how railway management and staff have responded to the challenges and opportunities of the transportation marketplace. To adapt to evolving markets and intensified competition, innovation and experimentation has been undertaken on many fronts. The cumulative effect has been to increase the efficiency with which productive resources are combined in meeting

In the space available, it is only possible to cite a few of these initiatives. Some of the most dramatic changes have resulted from our determined pursuit of technological innovation. Railroading in Canada has been revolutionized through the introduction of computer systems, electronic signalling and communication systems, and automated classification yards. Other technological developments include the acquisition of

larger freight cars of specialized design and the growth of "piggyback" and unit train operations.

Other dramatic changes have arisen out of the creative thinking embodied in marketing strategies. Rail's share of key markets and its place in the overall transportation system depend upon imaginative innovations in pricing and service. Sophisticated computer-based costing models have made it possible to carry out very tight analysis of costs to ensure that rates are soundly based individually, and collectively provide for an adequate profit. This analytical capability has also provided a basis for in-depth examination of movements and services from the perspective of adopting the least costly overall method of physical distribution.

All this activity has helped to boost the productivity statistics. An example is the increase in freight car productivity recorded by CN Rail. Since 1975, the on-line car cycle (serviceable car days per carload) has been cut by 30% from 17½ days to 12½ days. Better utilization of the car fleet generates substantial capital savings. To give a rough estimate, if the productivity of the CN Rail car fleet had not improved from 1975 levels, about 19,000 more freight cars would have been required to meet our present workload. Literally, this productivity increase has saved us nearly \$1 billion. A similarly bright tale can be told of locomotives.

This tremendous productivity improvement has many causes. Partly it is due to a gradual shift in CN Rail's traffic mix towards commodities which are well suited to long hauls in unit trains. It is also due to a \$300 million capacity improvement program on the transcontinental mainline. This involved investments in plant that are consistent with the "long train" concept, including longer sidings, enhanced signalling and train control systems, and yard improvements. Another contributing factor is the fact that we have progressively purchased higher capacity cars and have retired some of our less-efficient older stock. But much of the car fleet productivity gain is due to the new on-line computer system called TRACS (Traffic Reporting and Control System) which lies at the heart of CN Rail's car monitoring and distribution process.

This example of improved freight car productivity and its multiple causes illustrates the character of productivity adjustments in the railway industry. Productivity performance measures typically reflect the cumulative impact of a host of factors. Productivity adjustments can only be understood, explained, or an-

ticipated through detailed knowledge of the complex linkages and relationships which join together different parts of a railway's productive system.

### THE IMPERATIVE OF IMPROVING RAILWAY PRODUCTIVITY

The health and long-term viability of a commercial enterprise hinges upon its ability to generate an adequate rate of return. Retained earnings are essential if plant and equipment are to be maintained in good condition, and if the additional funds needed for upgrading and expansion are to be attracted in the capital markets.

Typically, a consequence of low earnings in the railway industry is a deterioration of road property, as is evident from even a cursory examination of the U.S. industry. There, railroads which have lacked the funds to maintain their plant in good physical condition now are left with low productivity rail systems. For example, deterioration of track and roadway has engendered low speed and high cost operations, frequent derailments, costly delays, and drastic losses of business which have further compounded financial problems. Associated with these shifts of traffic is an absolute loss of economic efficiency for the nation as a whole, since railways are the lowest cost carriers for a large percentage of all freight transport, particularly when volume and distance are large.

Another consequence of low earnings is an inability to raise the capital to finance expansions and improvements. Again, this can have serious adverse consequences for the nation as a whole from the standpoint of retarding worthwhile economic development.

Looking forward, Canada's two major railways will face considerable challenges in our efforts to meet the growing transportation requirements of Canadian economy. To start with, high levels of maintenance spending will be required just to keep our existing plant in working order. From 1975-79, CN Rail's maintenance spending totalled \$2.8 billion in current dollars, but this is projected to rise to \$5.1 billion for the first half of the eighties and \$8.2 billion for the period from 1985-89. It should be borne in mind that the railway is the only mode of transportation which must build and maintain its own roadway. At CN Rail, maintaining track and structures now costs almost half a billion dollars each year.

Moreover, huge amounts of capital must be spent to expand capacity, to purchase new freight equipment and locomotives, and to enhance the produc-

tivity of the entire operation. Rapid growth in world demand for Canada's natural resources translates into a strong upsurge in Canadian rail traffic. Much of this will be concentrated in the West, where a dramatic rise is forecast for major bulk commodities including coal, potash, sulphur and grain. In fact, the railways expect total traffic to rise over the decade by about 70 percent in the West, compared with a 30 percent forecast increase in the East.

The traffic growth in the West is pushing the rail lines close to or even beyond their capacity. Ambitious programs are being undertaken to increase line capacity by selectively adding sections of double track, and through major alterations and expansions of terminals. Even taking into consideration the revolutionary advances made in engineering and construction, the scope of this program is almost as large as the construction of the original railways through the West. CN Rail's capital spending, which totalled \$1.6 billion for the period 1975-79, is expected to escalate to \$3.0 billion in 1980-84, and \$5.5 billion in 1985-89.

It is an urgent matter to find the financial resources needed for programs of this magnitude. However, like certain other commercial Crown corporations, CN depends upon retained earnings to produce equity capital. The dilemma faced by CN stems from the fact that, at existing profitability levels, reliance on retained earnings and external debt to meet our financing requirements will raise our debt ratio to unacceptably high levels, threatening CN's financial integrity. Yet to cut back on planned expenditures will curtail the programs which are crucial to meeting the traffic demands of this decade.

There are several environmental factors which contribute to the imbalance between our capital requirements and our financing capability. Foremost are the statutory or regulatory arrangements that oblige CN to bear the financial burdens associated with the provision of non-economic transportation services, notably the transportation of grain at statutory rates (1980 shortfall exceeded \$150 million) and the rail service in Newfoundland (1980 deficit exceeded \$26 million). The problem is compounded by high inflation, which diminishes the contribution made by depreciation to internally generated funds. Since depreciation charges are based upon historical rather than replacement costs of assets, during periods of high inflation they underestimate the economic value of capital consumed in production. This effect is pronounced for relatively long-lived assets, so that the rail-



way industry is especially hard hit in this respect.

All of this makes us keenly aware that it is imperative to continue to improve our productivity performance. We recognize that more efficient utilization of our resources represents a means by which the pressure of large-scale financing can be alleviated in some measure.

This is the challenge that CN presently faces. Our productivity accomplishments in the past decade make us confident that we are up to the task and that our efforts are on the right track. Despite these gains, the conditions of the eighties demand new initiatives and innovations. On one hand, a wide range of new opportunities are open to the railway industry. One of the most exciting new developments being worked on by CN is in the field of railway electronic identification systems—silicon chips for freight car identification. This development conceivably could yield us productivity improvements on the order of those achieved with the original implementation of TRACS.

On the other hand, many new constraints are emerging. The continued escalation of energy prices is one example. In addition Canada's demographic structure is expected to be marked by two dramatic changes in the eighties: slower population growth and an aging population structure. The effects of these developments are numerous and far-reaching, but of particular concern to the railway industry is the anticipated absolute decline in the number of young people in Canada, since this age bracket is our prime target for recruiting.

Previously in this paper, it was stressed that people, machines, systems, and capital are all determinants of productivity. It was emphasized that productivity performance depends on a wide range of factors: the skills and efforts of management and labour, changes in technology, capital investment, capacity utilization, organizational practices, the quality of working life, and external factors of various kinds. To meet the challenges of this decade, we at CN anticipate that we must seek out every possible avenue to advance productivity. At stake is our ability to continue to play a leading role in the development and growth of Canada.

In a sense, when it comes to the imperative of improving productivity, CN's situation parallels that of the economy as a whole. The Canadian economy faces many of the challenges that we face. Yet there are many bright opportunities for productivity to be enhanced. Rational macroeconomic and regulatory policies could pave the way towards a return to real growth in living standards, increased employment and reduced inflation.

## FOOTNOTES

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2 Quoted in Arthur J. R. Smith, "Productivity in the Economic Context," speech to American Compensation Association Conference, Toronto, March 2, 1978.

3 For example, see Economic Council of Canada, *A Climate of Uncertainty*, (Ottawa: Minister of Supply and Services Canada, 1980); Department of Finance, *Recent Changes in Patterns of Productivity Growth in Canada* (Ottawa: Minister of Supply and Services Canada, 1980); Edward F. Denison, "Explanations of Declining Productivity Growth," *Survey of Current Business*, vol. 59 (August 1979), part 2, pp. 1-24; John W. Kendrick, "Productivity Trends and the Recent Slowdown," in *Contemporary Economic Problems 1979* (Washington, D.C.: American Enterprise Institute for Public Policy Research), pp. 17-69; Burton G. Malkiel, "Productivity — The Problem Behind the Headlines," *Harvard Business Review* (May-June 1979), pp. 81-91; Lester G. Thurow, *The Zero Sum Society* (New York: Basic Books, 1980), pp. 76-102.

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