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CANADA IN THE 21ST CENTURY

II. RESOURCES AND TECHNOLOGY

CAPITAL INVESTMENT CHALLENGES IN CANADA

*Paper Number 5
November 1998*

Industry Canada Research Publications Program

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CANADA IN THE 21ST CENTURY

II. RESOURCES AND TECHNOLOGY

CAPITAL INVESTMENT CHALLENGES IN CANADA

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Aussi disponible en français

Canadian Cataloguing in Publication Data

Giammarino, Ronald P.M. (Ronald Peter Mark), 1955-

Capital Investment Challenges in Canada.

(Canada in the 21st Century. II, Resources and Technology).

Issued also in French under title: Investissement : les défis à relever au Canada.

Includes bibliographical references.

ISBN 0-662-63631-3

Cat. no. C-21-27/2-1998

1. Investments – Canada.
2. Capital Investments – Canada.
- I. Canada. Industry Canada. Micro-Economic Policy Analysis Branch.
- II. Title.
- III. Series: Canada in the 21st Century. II, Resources and Technology.

HC79.C3G42 1998

332.6'0971

C98-980296-5E

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PREFACE

AS A NEW MILLENNIUM APPROACHES, Canadians are going through a time of dramatic economic change. Markets are becoming global and economic activity across nations is becoming increasingly integrated. Revolutionary developments in computer and communications technology are facilitating globalization, and are also altering a great deal the workplace and the lifestyles of Canadians. At the same time, largely as a consequence of the information revolution, knowledge-based activities are becoming increasingly important within the Canadian economy and the economies of other industrialized nations.

These and related major transformations of the economic environment invite a comparison with the Industrial Revolution of the 1800s. As in the earlier time, major structural changes are giving rise to uncertainties. Firms and workers are struggling to find their place in the new economic order. Canadians collectively face the question of whether their nation's physical, human and institutional resources will provide a firm foundation for continued prosperity. Many see Canada's prospects as being much less secure than in earlier years, when the country's rich natural resources played a major role in shaping the Canadian economy.

To examine fully the medium to longer-term opportunities and challenges of these developments, the Micro-Economic Policy Analysis Branch of Industry Canada asked a group of experts to provide their "vision" for Canada in the 21st Century on a number of important issues. Each author was required to undertake two formidable tasks: first, to identify major historical trends and develop scenarios to illustrate how developments in his/her respective area might unfold over the next ten to fifteen years; and second, to examine the medium-term consequences of these developments for the Canadian economy.

The papers coming out of this exercise are now being published under the general heading of "Canada in the 21st Century". This series consists of eleven papers on different aspects of Canada's medium-term outlook. The papers are divided into three major sections. The first section, *Scene Setting*, focuses on important developments that are going to shape the medium-term economic environment in Canada. The second section, *Resources and Technology*, looks at trends among some important components of Canada's wealth creation and considers the actions needed to ensure that these factors provide a firm foundation for continued prosperity. The last section, *Responding to the Challenges*, explores individual, corporate and government responses to the medium-term challenges and offers some options for appropriate course of action.

As part of the Resources and Technology section, this paper by Professor Ronald Giammarino of the University of British Columbia, notes various findings suggesting that there is an investment problem in Canada. The relatively poor productivity performance, low levels of R&D investment and the slow development of high-technology industries in Canada in relation to many of the OECD countries are indications that market failures may be impeding investment. To create an

improved environment for investment, a number of challenges must be addressed. The author argues that Canada needs to address a number of challenges for improving the investment climate: First, it is necessary to take into account the increased international mobility of capital by maintaining taxation rates in line with those of other industrialized countries, and direct tax revenues toward infrastructure investments that will enhance the quality of life and increase the efficiency of capital and labour. Second, R&D and other investments that generate significant spillovers need to be supported. To do this, the author suggests an international approach, such as a multilateral commitment to the improved enforcement of property rights. Third, environmental policies must not place Canadian firms at a competitive disadvantage. If Canadian companies, on the other hand, choose to exceed international environmental standards, the author suggests that it may be appropriate to offer them some financial incentives.

SUMMARY

THE PURPOSE OF THIS STUDY IS TO IDENTIFY CHALLENGES that Canadians will face in generating and exploiting investment opportunities over the next 10 to 15 years. Investment is the activity that leads to capital formation and is an important contributor to productivity and output growth. Capital formation increases labour productivity and income levels by providing the tools with which effort is levered into greater output. This report first discusses the role of investment in the Canadian economy and then reviews trends in Canada and other countries.

The productivity of Canadian industry went through a sharp decline in the mid 1970s similar to most industrialized countries. This suggests that Canadian investment levels might have been low. However, while productivity has levelled off or improved slightly for other developed countries, labour productivity growth in Canada has been below average and total factor productivity has actually declined over the past 15 years. The reasons for this are not clear. Some of the decline could be attributed to lower overall investment and, more specifically, to low levels of investment in R&D. In addition, more recent evidence suggests that Canada's industrial structure has not moved towards higher value, high technology areas as rapidly as other countries have.

Neither a low investment level nor a particular investment composition *per se* need be cause for concern since it might be that investment opportunities in Canada are not as valuable as those found elsewhere. It would be counterproductive to encourage investment in low return projects. However, there are externalities and market failures that might impede investment. If the decline in productivity, especially relative to levels found in other developed countries, reflects such impediments, then opportunities for improvement exist. The objective of this study therefore is to identify specific problems that might impede investment now or in the future. This will identify the challenges that must be dealt with over the medium term.

There is one main trend and one important theme that underlines this study of the investment policy environment that Canada will face. The trend is the increased level of factor mobility and international integration that world markets are experiencing. The investment decisions made by Canadian corporations and the policy decisions made by government must deal with the problems and opportunities that globalization implies. The theme that provides a base for this paper is that in most cases specific investment decisions are best made by individuals responding to market signals. In the past it has been common for policy makers to look at specific areas that are important to economic growth and provide investment or savings incentives to stimulate activity in these areas. It is not likely that this strategy will be successful in the future. First, past experience does not indicate that such a strategy is effective. More specifically, in most cases there is little reason to believe that policy makers are better able to make investment decisions than private corporations or citizens. For instance, it appears that efforts to stimulate R&D

investment have failed and that Canada has been slow to invest in new technologies. Furthermore, encouraging a specific sector has and will continue to run into challenges from our trading partners.

This does not mean that there are no opportunities for policy makers to improve investment; the sections below identify specific areas where opportunities do exist. However, the general point is that policy makers should be less concerned with specific decisions and more concerned with the decision-making environment. *The challenge is to develop new ways of supporting investment. The appropriate steps in doing so involve less direct incentives and more international policy coordination, regulation, and public investment.*

Following are key challenges resulting from areas where the market might not take full advantage of investment opportunities owing to externalities or market failures.

- Increased globalization will generate greater factor mobility: investment in particular will increasingly flow to the environment that offers the highest overall return. This return will include both pecuniary and nonpecuniary components so that many investments, especially those that rely on human capital, will be made where there are both low costs of operating and high quality of life. *The challenge is to ensure that Canada makes the infrastructure investments needed to maintain a high quality of life and to increase the efficiency of capital and labour.* The market might not meet this challenge on its own because increasing infrastructure provides a direct benefit to Canadians who use these investments and an indirect benefit by attracting investment. For instance, an increase in the education level of the work force not only increases the quality of life for the average Canadian, it also makes investment in Canada more attractive.
- It has been well established that investment, particularly in R&D, generates spillovers that benefit many firms besides the initial investor. As a result, the social value of some investment exceeds the private benefit, and this supports a case for investment subsidies. However, there is also evidence that the international knowledge spillovers are extensive so that subsidizing investment in one country could mean subsidizing a transfer of knowledge to another country. *The challenge is to replace direct subsidies with international mechanisms that help investors capture more of the total returns from their investments.* This could entail greater coordination and enforcement of laws protecting patents and other property rights. Alternatively, it could involve facilitating international collaboration in areas of basic research and R&D so that private networks take on the problem of protecting the benefits of investment.

- Environmental issues and their impact on investment decisions will increase in importance and complexity as Canada adjusts to more open markets. As a wealthy, developed country, Canada could wish to exceed international environmental standards by devoting more resources to improving and protecting its environmental endowment. However, imposing higher standards might place Canadian firms at a competitive disadvantage and could lead to flights of capital. The policy problem is how to support private sector investment and implement specific social choices at the same time. *The challenge is to ensure that firms have a competitive cost base while simultaneously ensuring that Canadian political choices are implemented.* This will require new ways of dealing with corporate incentives. For instance, if the political system encourages Canadians to exceed international environmental standards, then it might be better to subsidize firms that incur the cost of exceeding the international standards rather than simply impose on firms the standards and the attendant increase in the cost base.
- The specific problems of low investment in general, low R&D investment in particular, and a slowness in channelling resources from low technology to high technology activities can all be explained by the way in which Canadian managers assess investment opportunities. There is concern that Canadian managers underinvest in long-term, risky projects. One common explanation is that Canadian investors are too averse to risk. However, this is inconsistent with the diversification opportunities, both domestic and international, that exist. An alternative explanation is that today's managers tend to be myopic because they undervalue the long-run benefit of investments. Managers' response to this complaint often is that they do assess opportunities correctly but are inhibited from making long-term investments because of the behaviour of modern capital markets. The argument is that investment in a long-run venture will reduce current period profits and this will lead to a drop in share price and/or a hostile takeover of the firm. Consequently, some managers argue that they must reject long-term valuable investments (such as technological advancement) in favour of less valuable investments that have more immediate cash payoffs (such as resource extraction).

There is no evidence that capital markets do not value long-term investment. Moreover, the threat of a hostile takeover has not been shown to have a large impact on long-term investments. There is, however, evidence that Canadian managers use evaluation techniques that are known to cause valuation errors. This might contribute to the failure among managers to recognize the inherent value of high risk, long-term ventures. *The challenge is to increase competitive pressure on Canadian managers so that they will be induced to pursue valuable investment opportunities vigorously.* This will require opening up investment opportunities to competition and making the market for corporate control (the takeover market) more competitive. Policy

makers will need to review ownership restrictions, corporate governance guidelines, barriers to capital markets, and product market barriers to entry.

- Corporate decision making is also influenced by the regulation of financial markets. For instance, bank loans are a significant channel through which resources are invested; however, it is widely recognized that bank lending can be drastically distorted through deposit insurance regulations. *The challenge is to implement a system that consistently and regularly evaluates and improves the regulation of financial markets.*

INTRODUCTION

THE FUTURE ECONOMIC AND SOCIAL WELL-BEING of Canadians will be fundamentally influenced by the investment choices made individually and collectively by private and public sector decision makers. Employment, consumption, lifestyle and the environment will all be influenced by the capital stock of the economy and the rate of capital formation that results from investment.

The purpose of this study is to consider the investment challenges that Canadians will face over the next 10 to 15 years. The focus is on challenges that must be met in order to gain maximum benefit from investment opportunities. Some challenges are quantifiable and straightforward. Many others are complex and emerge from an increasingly globalized economy undergoing rapid technological and social change.

The first part of this study addresses the question of whether or not there is 'an investment problem' in Canada. Investment adds to social and economic well-being by increasing productivity. Trends in productivity suggest that Canadian investment levels have been rather low and that investment seems to be weighted towards middle technology industries. Neither a low investment level nor a particular investment composition *per se* need be cause for concern if they reflect optimal investment decisions. However, certain externalities and market failures might impede investment and prevent Canadians from deriving the full benefit of their investment opportunities. Indications that such impediments exist include the decline in productivity, especially compared to levels in other developed countries, the relatively low levels of R&D investment and the relatively slow development of high technology industries. This also points to opportunities for improvement.

The remainder of this paper identifies specific problems that might impede current and future investment. This will help to describe the challenges that must be dealt with over the medium term.

This report first examines the implications of globalization on investment decisions. It is worth noting that the globalization of world markets for both commodities and investment has made investment 'footloose'. This factor mobility has implications for the types of investment that will be undertaken and for the importance of policy to investment choices. There could be an investment flow to low-cost countries that could render policies towards a particular type of investment ineffective. Alternatively, globalization could focus policies on producing benefits to clusters of networks of industry.

The study next considers the question of knowledge transfer through investment and trade. This is followed by an examination of the implications of business investment, globalization, and growth of the economy for the environment.

The final section examines the possibility that investment inefficiency stems from the decision-making environment. This includes exploring in some

detail the possibility that management is myopic in its investment choices. The impact of the regulation of financial markets on investment decisions is also examined.

Although demographic trends and infrastructure considerations are important factors, this report will not analyze these forces in depth as they are the subject of other studies commissioned by Industry Canada.

IS THERE AN INVESTMENT PROBLEM IN CANADA?

“When the first primitive man decided to use a bone for a club instead of eating its marrow, that was investment.”
anonymous, cited in Copeland and Weston (1988)

THIS QUOTE IS USED IN A WIDELY-USED TEXT ON CORPORATE FINANCE to convey the simplicity and importance of an investment decision. Investment provides labour with tools needed to improve economic well-being. The question ‘Is there an investment problem?’ refers to whether Canadians are taking too much or too little out of current consumption in order to create the chance of a future payoff.

The textbook answer to this question is that investment should be undertaken when the value of the additional future benefits from investment exceed the cost. This is called the Net Present Value of (NPV) rule: invest when the present value of the benefits exceed the present value of the costs. When capital markets are frictionless, there is no need to review the aggregate level of investment since individuals and firms would be able and willing to undertake all valuable investments. Corporate managers, fearing employment loss through dismissal or a takeover will strive to maximize share value which implies that they will seek and exploit all opportunities with positive NPVs. In such a situation, there is no reason to question the resulting level or composition of investment. Private agents responding to market signals exploit valuable investment opportunities.

In fact, however, capital markets and the decision-making process are not frictionless. It is widely believed that externalities and market failures could impede investment and thereby prevent an optimal level from being attained. One classic example is the development of a new technology through R&D. An investment in technology provides a return, perhaps in operating efficiency, to the company sponsoring the R&D. In addition, competitors and other industries also benefit from the new technology. Hence, the social value is higher than the private value and the level of investment might be considered too low by society.

In this context, it is difficult to assess the quality of investment decisions being made in Canada. The ideal approach of evaluating a representative set of individual investment decisions is impractical. It would be necessary to evaluate the private and social benefit as well as the appropriate discount rate for each opportunity. It would also be necessary to consider the impact of policy decisions on these estimates.

This section takes the alternative approach of considering basic determinants of investment levels. These fundamentals relate to demographic trends, broad ratios of capital to labour, and the proportion of output that is reinvested in the economy. While broad aggregate trends help to determine rough guidelines for the required quantity of investment, they do not offer

much information about the quality of the capital stock. To examine this aspect of the problem, it is useful to consider productivity growth. Productivity is measured in terms of output per unit of input. To the extent that returns on investment will translate into higher future output, productivity growth can be seen as a reflection of the aggregate return on investment. This section also examines the level of R&D investment in Canada relative to other countries.

Conclusions about whether or not there is an investment problem in Canada are based on aggregate levels of investment and trends in productivity.

INCOME, INVESTMENT AND DEMOGRAPHIC FACTORS

THE MOST BASIC AND WIDELY-USED MEASURE OF OUTPUT is gross domestic product¹ (GDP). On an absolute per capita basis, Canada's GDP is high by international standards, as Table 1 indicates. Among the G7 nations only the U.S. and Japan have higher levels of income.

In recent years about 21 percent of Canada's output has been 'plowed back' through investment. As seen in Table 2, the largest component of investment comes from the private sector with machinery and equipment leading the way.² Strong investment growth in machinery and equipment is also evident, continuing a trend that has held up for most of 1980s.

As Canada's population grows, the need to add to the country's capital stock will also grow. A larger population brings an increased demand for output, a larger supply of labour, and an attendant increase in investment opportunities. Statistics Canada (1993) predicts that Canada's population of about 30 million will grow to about 35 million by the year 2011. This implies an average growth rate of about 1 percent per year.³

TABLE 1

GDP PER CAPITA, 1993
US DOLLARS BASED ON PURCHASING POWER PARITY

Canada	19,409
France	18,702
Germany	18,506
Italy	17,823
Japan	20,279
United Kingdom	17,030
United States	24,302
Average G7	19,435

Source: *OECD Historical Statistics*, 1995.

TABLE 2				
INVESTMENT LEVELS IN CANADA				
MILLIONS OF 1986 DOLLARS				
	1992	1993	1994	1995
Government Investment	16,217	16,334	17,264	17,797
(% of GDP)	2.9	2.9	2.9	2.9
Residential Construction	32,908	31,517	32,463	27,973
(% of GDP)	5.9	5.5	5.4	4.6
Business Nonresidential	25,730	25,861	27,196	25,971
Construction (% of GDP)	4.6	4.5	4.6	4.3
Machinery and Equipment	56,564	48,383	54,010	59,477
(% of GDP)	8.3	8.5	9.0	9.7

Source: Statistics Canada, Cat No. 13-001.

Demographic projections of this sort can be used to derive a rough estimate of Canada's investment requirements over the next 15 years. For instance, based on reasonable assumptions about labour force growth and the relationship between capital stock and labour productivity, Slater (1992) estimates gross investment will have to be between 20.6 percent and 26.9 percent of GDP to maintain even modest increases in labour productivity. Slater's forecast does not include public sector investments in environmental protection of infrastructure. Depending on how those areas are dealt with, Canada's investment requirements could be even higher.⁴

Table 3 presents the percentage of GDP devoted to investment over the past 15 years. Table 4 indicates how Canada compares to Japan, the U.S. and

TABLE 3														
INVESTMENT AS A PERCENTAGE OF GDP														
MILLIONS OF 1986 DOLLARS														
1981	82	83	84	85	86	87	88	89	90	91	92	93	94	95
22	20	19	19	20	20	21	22	23	22	22	22	21	22	21

Source: Statistics Canada, Cat No. 13-531.

TABLE 4		
GROSS FIXED CAPITAL FORMATION AS A SHARE OF REAL GDP SHARE OF GDP		
Average	1980s	1989
Canada	21.0	23.2
Japan	29.5	34.2
U.S.	17.3	17.9
OECD	20.5	22.1

Source: Investment Canada, derived from OECD national accounts.

all other OECD countries in recent years. These figures suggest that on average Canada's investment has been in line with other OECD countries.

However, the relatively low levels of investment in the early 1980s might be responsible for declines in productivity in recent years. Furthermore, recent investment shares are at the low end of Slater's estimates.

Demographic trends can also help to determine the geographic distribution of future investment needs. Table 5 presents estimates of recent levels and projections of interprovincial migration over the 1996-2001 period. The table indicates an expected continuation of migration to British Columbia and Ontario from all other parts of the country. This suggests that investment,

TABLE 5					
INTERPROVINCIAL MIGRATION THOUSANDS					
	1975-76	1980-81	1985-86	1990-93	1996-2001
British Columbia	-5.0	39.0	-3.7	73.2	326.4
Alberta	26.6	46.0	-5.1	6.7	12.8
Saskatchewan	5.3	-3.6	-7.0	-19.8	-88.4
Manitoba	-5.0	-8.8	-1.9	-13.0	-72.3
Ontario	-18.9	-33.9	32.7	-14.6	124.1
Quebec	-13.4	-23.5	-4.8	-27.3	-191.0
Atlantic Provinces	10.1	-13.5	-13.2	-6.5	-72.65

Source: Statistics Canada (1993).

TABLE 6		
REGIONAL INVESTMENT		
% CHANGE		
	1986-1989	1990-1991
B.C.	25.0	-2.0
Prairie Provinces	7.0	2.0
Ontario	14.0	-8.0
Quebec	15.0	-8.0
Atlantic Provinces	11.0	-4.0
Canada	14.0	-4.0

Source: Statistics Canada (1993).

especially in infrastructure, will be a major source of demand over this period, particularly in British Columbia. Figures presented in Table 6, taken from the Canada West Foundation (1992), suggest that some investment growth may be in anticipation of future population growth. These figures must nevertheless be viewed with caution because both migration and investment tend to be highly cyclical. A recession in British Columbia could cause a repeat of the mid 1980s when the province experienced net out-migration and a slow-down in investment.

TRENDS IN CANADIAN INCOME, INCOME GROWTH, AND PRODUCTIVITY

IN TERMS OF PRODUCTIVITY, CANADA'S ECONOMY HAS A HISTORY that is quite similar to other industrialized countries. Table 7 displays some of these common features. The period from 1960 to 1973 is often referred to as the 'golden age' for industrialized countries as income grew at consistently high rates. This is followed by a period of considerably slower growth over 15 years beginning with the sharp decline in 1973.

Has the slowdown in GDP growth been the result of declining productivity and investment? To answer this question it is useful to employ various measures of productivity and consider its movement over time. One simple measure of productivity is real GDP per employed person. This is a better measure of productivity than GDP per capita because it adjusts for changes in the labour force. Table 8 shows the trend in industrialized countries over a period of four decades, based on this measure of productivity. Using Canada's output as a base measure each year, the table indicates that total GDP per employed

	1960-73	1973-79	1979-89	1989-93	1960-93
Canada	3.6	2.9	1.8	-1.0	2.4
France	4.3	2.3	1.6	0.2	
Germany	3.7	2.5	1.7	2.1	2.7
Italy	4.6	3.2	2.4	0.7	3.2
Japan	8.3	2.5	3.4	2.2	5.0
U.K.	2.6	1.5	2.2	-0.3	1.9
U.S.	2.6	1.4	1.5	0.8	1.9
G7 Average	3.7	2.0	2.0	1.0	2.6

person in Canada has trailed the United States since 1950 although the gap has narrowed considerably. This measure also shows that Canada's lead over the other G7 nations has diminished.

Other measures of productivity show similar trends. *Capital productivity* is a widely-used indicator based on output per unit (usually dollars) of investment. *Labour productivity* is another measure that simply considers the amount of output produced for each unit of labour input. Output is usually measured by the value added of GDP and labour input is considered to be the number of workers or hours of work.

	1950	1960	1970	1980	1989
Canada	100	100	100	100	100
France	50.1	60.3	77.0	87.7	91.4
Germany	45.3	62.3	74.7	84.8	87.2
Italy	38.6	52.9	76.0	89.4	92.8
Japan	20.0	29.5	55.1	68.5	77.3
U.K.	70.8	69.1	70.3	72.7	76.0
U.S.	131.6	126.8	120.6	109.3	106.3

Source: Rao and Lempriere as cited in Slater (1992).

TABLE 9

LABOUR PRODUCTIVITY AND TOTAL FACTOR PRODUCTIVITY

	Labour Productivity			Total Factor Productivity		
	1960-73	1973-79	1979-94	1960-73	1973-79	1979-94
Canada	2.0	0.6	-0.1	2.9	1.5	1.2
France	4.0	1.7	1.7	5.4	3.0	2.6
Germany	2.6	1.8	0.5	4.5	3.1	0.9
Italy	4.4	2.0	0.9	2.8	2.9	1.9
Japan	5.6	1.3	1.4	8.3	2.9	2.5
U.K.	2.6	0.6	1.6	3.9	1.5	2.0
U.S.	1.6	-0.4	0.4	2.2	0.0	0.8
G7	2.9	0.6	0.8	4.3	1.4	1.4

Source: OECD, *Economic Surveys* 1994-1995.

Although both measures are useful, they have drawbacks. For example, investments can lead to long and uncertain payoffs. A large investment one year might depress measured capital productivity considerably during that year and in the future until the return on this investment is recognized. This makes the capital productivity indicator notoriously volatile. Moreover, capital productivity is highly cyclical because it depends on capacity utilization rates that vary directly with output.

Labour productivity is a complex measure that reflects a number of factors. One set of factors relates to inputs, such as capital, energy, and infrastructure that are used in producing goods. Other things being equal, more complementary inputs will make labour more productive. The second set of factors concerns the efficiency of the production process. This includes management skills, education levels of workers, government policy on competition, and pollution standards.

An alternative view of productivity is offered by the *total factor productivity* (TFP) measure. This is defined as total output minus a weighted sum of factor inputs. Hence TFP gives a residual measure that captures technological advances, improvements in the quality of inputs, changes in scale and capacity utilization. A general decline in productivity is evident in the total factor productivity and labour productivity figures shown in Table 9.

All of these measures of productivity show a decline that starts in the mid 1970s and continues through to the late 1980s for most countries. It goes beyond that period for Canada. In fact, the decline in productivity is so pronounced and widespread that Stanley Fisher (1988) refers to it as "the most significant macroeconomic development of the last two decades."

Understanding the decline in productivity is critical to understanding Canada's investment challenges. If productivity declines can be arrested or reversed, the resulting changes in income growth could be dramatic. Fisher drives this point home by relating productivity to expectations about income growth.

“When per capita income is growing at 4 percent it doubles every 18 years; when it grows at only 2 percent it doubles every 35 years. The permanent income, defined as the annuity of a 25-year old German citizen, basing her expectation of income growth on the average performance in the period 1955 to 1973 would be 80 percent above her current income; that of a 25-year old basing her expectations on the

TABLE 10	
GROWTH CONTRIBUTORS: USA 1929-1982	
Average annual growth of real business output attributed to:	3.1%=100%
Increased Labour Input	25%
Increased Educational Qualifications	16%
Increased Capital Input	12%
Improved Allocation of Resources	11%
Economies of Scale	11%
Technological Progress	34%
Less: negative factors inhibiting growth	9%
Source: Palda (1993).	

More recently, DeLong and Summers (1991) have provided evidence that the role of investment in productivity growth is much larger than Dennison's work suggests. They have found a strong statistical relationship between investment in machinery and equipment and economic growth. Using data on the 1960-1985 period, they have found that each percentage of GDP that is invested in machinery and equipment is associated with one-third of a percentage point increase per year in subsequent GDP growth. They also estimate that the social return on equipment investment in a well-functioning market is on the order of 30 percent.

R&D INVESTMENT

INVESTMENT IN R&D IS CONSIDERED CRITICAL TO PRODUCTIVITY and economic well-being. The breakdown of productivity presented in Table 10 highlights the importance of R&D because 34 percent of growth is directly tied to technological progress and another 16 percent is related to educational qualifications.

Griliches (1988), who has reviewed substantial work on this issue, has found that R&D plays a large and statistically significant role in explaining productivity. Moreover, reductions in R&D investment can be tied to some of the productivity slowdown of the mid 1970s. However, because it accounts for only 15 percent of the decline, several other factors come into play, such as the monetary policy response to the oil price shock.

Given that Canadian productivity continues to lag many other G7 nations, Canada's relative R&D performance could be the cause. The Conference Board of Canada (1994) presents this view and its implications for Canada in a recent survey of R&D spending intentions. It states:

“Canada’s preparedness for the ‘new economy’ is often called into question due to, among other issues, the level of resources allocated to performing R&D. Compared with other industrialized nations... the level of business enterprise expenditure on R&D in Canada in 1991 as a percentage of GDP at 0.8 percent... [is] far behind the allocation of leading economies such as Japan (2.2 percent), the United States (1.9 percent), Germany (1.8 percent) and Sweden (1.6 percent).”

An OECD study (1995) similarly suggests that Canada has not been very successful in picking up high-growth investment options and that the country’s overall productivity has suffered as a result. The report states that “Canada (and Australia) had relatively small shifts in output shares into high growth and out of low growth industries. In particular, Canada was one of only two countries that experienced gains in medium technology manufacturing. While in many other countries the output share of high-technology industries increased considerably, in Canada it remained virtually unchanged.” This trend might reflect an improvement in Canada’s comparative advantage in the medium technology areas. Alternatively, an underlying factor might be that Canadian managers are not properly valuing new technologies. This is elaborated upon in the next section.

Palda (1993), while recognizing the importance of innovation, cautions against viewing innovation and R&D as the same concept. He argues that R&D is too narrow. He argues convincingly that R&D is a proxy for total innovation and that this can be misleading when used in isolation. In particular, he correctly points out that R&D is part of an investment management process and must be examined in this light. The extent to which financial decision making contributes to investment challenges is examined in the next section.

CONCLUSION

ALTHOUGH THEY DO NOT MAKE AN OVERWHELMING CASE, the trends examined in this report suggest that there is an investment problem in Canada. The quantity of investment, measured by the fraction of total output that is invested, is consistent with levels found in other developed countries. However, recent levels could be too low to support modest productivity growth. Moreover, the productivity of the Canadian economy has trailed other developed nations. The relatively low levels of R&D investment and indications that Canadian industry has not moved towards high technology sectors as rapidly as other countries also suggest that the level of investment is less than optimal. This is cause for concern when valuable investment opportunities are not being utilized because of market failures and externalities.

INVESTMENT CHALLENGES

THIS SECTION LOOKS AT SOME SPECIFIC AREAS where investment can be enhanced. Certain challenges are already evident; others are more hidden.

INVESTMENT, TRADE, AND GLOBALIZATION

THE MOST SIGNIFICANT CHALLENGES IN THE COMING 15 YEARS will stem from the opening up of markets to liberalized trade and the mobilization of factors of production.

The role of trade in fostering investment and the role of investment in fostering trade is well documented and examined. Some of the more traditional models of trade⁶ begin with the observation that international trade in goods and international trade in investment can substitute each other. When there are no economies of scale and no barriers to the flow of capital and goods across borders, trade and investment are perfect substitutes. A firm can either invest in its home country and ship to a foreign country or invest in the foreign country and ship to the home country.

This concept has long been rooted in economic theory and is recognized as a special case. Recently it has been popularized in the work of Reich (1991). He states:

“We are living through a transformation that will rearrange the politics and economics of the coming century. There will be no national products or technologies, no national corporation, no national industries. There will be no national economies.”

The implication is that globalization will not only have an impact on production; it will also change the way in which policy and social decisions are made. This view has very significant implications for investment. The ‘foot-loose’ corporation will have no national allegiance; investment will hinge on providing an environment that supports low-cost output. In addition, infrastructure investments that improve the quality of life are critical to attracting both the most productive workers and the capital they will use in production.

Such a position is in contrast to Porter (1991) who sees a ‘clustering’ of investments and corporations to take advantage of product market opportunities and gains from collaboration. In Porter’s view, governments can promote investment by spurring productivity through increased product market competition while at the same time supporting the linkage of industry-based clusters.⁷

A concrete and important example of an economy of scale that might result from liberalized trade is the accumulation of human capital through ‘learning by doing.’ The benefits of learning by doing within a closed economy have been recognized for some time. Lucas (1993) has recently used this concept in the context of trade to explain what he describes as the ‘economic miracle’

of Korea. The basic idea is that trade enables labour and capital to be used for new production processes. Because these processes are new, the returns on human capital investments on learning by doing are high. In turn this generates a greater accumulation of human capital and higher levels of productivity. Lucas further supports his theory as he compares South Korea with the Philippines in the early 1960s and finds that they were very similar in size, income levels, labour force participation, and education. He observes that over the next 28 years Korea experienced a 6.2 percent increase in per capita income per year while over the same period the average growth in the Philippines was only 1.8 percent. Noting that similar 'miracles' occurred in Taiwan, Hong Kong and Singapore, Lucas argues that one common feature of these 'miracle' economies is that "all of the East Asian miracle economies have become large scale exporters of manufactured goods of increasing sophistication." This allowed for learning by doing in advanced areas, high returns on human capital, and a positive investment spiral.

This phenomenon will undoubtedly be studied further in great detail in the years to come. It does indicate that many of the investment opportunities that are emerging with more liberalized trade will be in the area of human capital. Hence it is critical for Canadian policy to focus on human capital development.

The challenge is to ensure that Canada makes the infrastructure investments needed to maintain a high quality of life and to increase the efficiency of capital and labour. The market might not meet this challenge on its own because increasing infrastructure provides an indirect benefit by attracting investment as well as a direct benefit to Canadians who make use of the infrastructure. For instance, an increase in the education level of the work force not only makes investment in Canada more attractive. This in turn provides spinoff benefits to other Canadians. In addition, a direct benefit is provided to those who improve their education.

SPILLOVERS AND KNOWLEDGE TRANSFERS

ANOTHER BENEFIT OF INVESTMENT WITH AN INTERNATIONAL DIMENSION is the diffusion of knowledge. Knowledge transfers have occurred in the domestic intra-industry, domestic inter-industry and at an international level. All of these transfers and spillovers have been studied in the context of investment in R&D although it is reasonable to suspect that transfers will occur through basic investment as well.

An investment in R&D is commonly viewed as a way to decrease the costs of production. It is also widely recognized that the outcomes of investments in R&D are difficult to protect. The technology that results from an R&D investment can often benefit firms in the same industry, in other industries and in other countries. Consequently, the total returns on the R&D investment are not fully captured by the private investor. A gap therefore

develops between the return that accrues to the investing firm (the private return on the firm's initial investment in cost reduction) and the return that accrues to all users of the technology (the social return). This wedge gives an indication of the extent to which there are R&D spillovers.

Bernstein (1988) estimates the intra and inter-industry spillovers for seven Canadian industries, using data from the 1978 to 1981 period. He finds significant spillovers for all of the industries; the lowest spillover is in the food and beverage industry and the highest in the chemical industry. Using a different methodology and international data for a longer time period – 1964-1986, Bernstein (1996) extends these results. He finds the social rates of return in Canada are from 2.5 to 12 times greater than the private returns. In the U.S. the range is from 3.5 to 10.

These combined results indicate that investment spillovers, both domestically and internationally, are extensive and a direct benefit from investment activity. However, because the returns on these investments do not all accrue to the investing firm, the investment incentives might be unclear.

The challenge is to facilitate technological investments in a global context. It will be necessary to replace direct subsidies with international mechanisms designed to help investors capture more of the total returns from their investments. This could call for greater coordination and enforcement of laws protecting patents and other property rights. Alternatively, it could involve facilitating international collaboration in the areas of basic research and R&D so that private networks take on the challenge of protecting the benefits of investment.

ENVIRONMENTAL CONCERNS

GLOBALIZATION AND INCREASED TRADE WILL CREATE NEW CHALLENGES for managing the environment. Even if labour and capital do not become as mobile as Reich maintains, they will still be important factors contributing to an increasingly mobile work arena. This will have a significant impact on environmental practices and the ability of government to control these practices. The possible consequences of globalization are very diverse and current research in this area is still too early to formulate predictions. Olewiler (1992) has categorized current economic thinking on this matter into two broad camps: the 'Optimists and Pessimists'.

The optimistic view of globalization is that the decline of national concerns in decision making, giving way to an increase in global perspectives, will lead to higher wealth and a higher level of environmental quality of life. The basic notion is that globalization will generate both an increase in wealth through gains from trade and a convergence of wealth internationally. The indicators on productivity presented in the previous section suggest that a great deal of convergence has already taken place. If it is assumed that increased environmental quality is a luxury good, then income growth will lead to a higher demand for environmental investment as the world will be able to 'afford' lower

levels of pollution. As a result, companies will compete to produce 'green' products. Moreover, technological transfers will also increase so that the latest technologies will be available. This implies that developing countries will not follow the usual pattern of adopting polluting industries and then moving into non-polluting industries. The technology transfers and integrated capital markets will allow firms to move directly into non-polluting technologies.

The pessimistic view essentially dismisses all of these points. The difference is based on varying assumptions about how consumers will treat environmental quality. Rather than viewing environmental investment as a benefit, as the optimists do, the pessimistic view regards pollution abatement and investment in environmental improvement as a cost that is to be minimized. Globalization makes it more difficult for government to enforce environmental policies that bring optimal social benefits because firms will respond to more stringent requirements simply by moving investment elsewhere. The lack of trade restrictions and the competition for investment will hinder policy makers. Moreover, with increased capital mobility, attempts to finance the massive costs of cleaning up polluted areas will be met with flights of capital. Resources will move to clean 'havens' with low clean-up liabilities.

Neither of these extreme views represents an accurate forecast. However, they help to illustrate one of the biggest investment challenges facing Canada. Given the desire of protecting this country's environmental endowment, how does Canada ensure that investment will be directed appropriately in light of the new competitive implications of such an investment? Government has an important role to play on this front. However, the knowledge to help guide actions in this area is quite limited.

Olewiler (1992) summarizes some relevant findings, while emphasizing their preliminary nature. Following are her observations:

- The link between traditional measures of welfare (per capita GDP for instance), the economic activity associated with growth, and pollution is not well established. However, the OECD⁸ (1991) has compiled the following estimates that suggest a possible link. In a comparison of six countries on a per capita basis, Canada, which at the time had the second highest level of GDP per capita, had the highest emissions of carbon dioxide (CO₂) and nitrogen; the highest sulphur dioxide (SO₂) and intensity of energy use.
- Although most countries including Canada do not have historical records on environmental expenditures relative to GDP, the available evidence does suggest that expenditures are relatively small. In the U.S. for example pollution abatement expenditures have averaged about 1.7 percent of GDP over the past 25 years. This percentage has been fairly constant, peaking at 1.9 percent in 1981 and reaching a low of 1.4 percent in 1972. Some argue that this is because progress has

TABLE 11
ENVIRONMENTAL INDICATORS

	GDP ^a	CO ₂ ^b	SO ₂ ^c	Municipal Waste ^d	Energy ^e Intensity
Canada	15.5	4.8	146.4	632	9.6
West Germany	11.3	3.2	21.3	331	4.5
Japan	12.8	2.2	6.8	394	3.3
Spain	5.0	1.5	NA	322	2.2
U.K.	9.3	2.9	63.1	353	3.7
U.S.	18.4	5.8	84.0	864	7.8
OECD	12.2	3.4	48.3	513	4.8
World	N.A.	N.A.	N.A.	N.A.	1.6

a 1989 U.S. dollars at 1985 prices and exchange rates.

b CO₂ in tonnes of carbon emitted in 1988

c SO₂ in kilograms, average annual in late 80s

d municipal waste is in kilograms, late 80s.

e energy intensity is in tonnes of oil equivalent, 1988.

Source: OECD (1991), cited in Olewiler (1992).

been made in reducing the level of pollution in the U.S. so that lower investment in pollution abatement is sufficient. On the other hand, an Environmental Protection Agency (EPA) study done in 1990 predicts that environmental protection costs will increase to 2.6 percent of GDP by the year 2000.

- The effect of environmental policy on the location and quantity of investment is not clearly established. However, as Olewiler points out, most contemplated increases in current levels of expenditure are not likely to have a large impact on pollution investment activities. Moreover, if environmental requirements induce industries to locate elsewhere, the industries that leave are more likely to be the so-called 'dirty' industries so that the net cost of the lost investment is reduced somewhat. Leonard (1988) provides support for this in a study on the impact of environmental regulations on location. He finds that there were very few industries in the U.S. that were influenced in their choice of location by environmental regulation. Those that were fell into the following categories: i) manufacturers of toxic, dangerous or carcinogenic products; ii) copper, zinc and lead processing; iii) manufacturers of organic chemicals.

Other studies are either theoretical or simulations and estimates. For example, Jorgenson et al (1993) uses a simulation to show that if a carbon tax of \$60 per ton had been introduced in 1990, emissions would fall by 30 percent by the year 2020, coal production would fall by 50 percent, oil and gas extraction would fall by 10 percent, the capital stock would fall by 2.2 percent and GNP would decline by 1.6 percent. Although the impact of such a large change is considerable, actual policy changes have been very small.

- Environmental regulation could lower investment by reducing productivity and hence the return on investment. Because increases in productivity are the main reasons of investment decisions, a decrease in return might reduce investment by reducing productivity.

The policy problem facing Canada is how to support private sector investment and implement specific social choices at the same time. *The challenge is to ensure that firms have a competitive cost base while simultaneously ensuring that Canadian political choices are implemented.* This will require new ways of dealing with corporate incentives. For instance, if the political system requires that Canadians exceed international environmental standards, then it might be necessary to subsidize firms that incur the cost of exceeding the international standards.

TECHNOLOGICAL CHANGE

THIS IS A PERIOD OF RADICAL CHANGE IN PEOPLE'S DAILY LIVES. Technological advancements have brought flexibility to the workplace and are playing a big role in shifting lifestyles. These social and economic changes present two significant challenges.

First, the economy must channel resources towards new markets and opportunities. Development, production and marketing requires financing in the private sector. This financing will likely take place under conditions where the issuer is better informed about the profitability of the venture than is the investor. This is known as asymmetric information. It is recognized that asymmetric information in financial transactions can lead to market failure when potentially valuable investments are not funded. Solutions to this problem rarely involve government intervention because government does not have an extra advantage of more information in this area. Venture capital firms and innovative financial contracts provide at least a partial solution to the problem. A competitive, efficient financial sector is perhaps the most important solution to facilitate this area of investment.

Second, the public sector must make appropriate investments in infrastructure. For instance, work that can be done on a flexible schedule and from home will have greater communication requirements but perhaps less growth

in municipal transportation. Education is another area requiring further support so that new technology can be understood and utilized.

Given the considerable uncertainty about where the current wave of technology is heading, it is impossible to provide accurate quantitative forecasts of Canada's investment needs in this area. It is nonetheless critical to meet this investment challenge because new investment will have a tremendous affect on this country's productivity and standard of living.

THE DECISION-MAKING ENVIRONMENT

THIS STUDY HAS SHOWN THAT POLICY CONCERNS MUST BE DIRECTED towards supporting investment opportunities for the private sector. Ultimately, therefore, the benefit that Canadians will derive from these opportunities will be determined by corporate decision making. In turn, the most important influence on decision making will come from corporate governance mechanisms including the role of the board, corporate control through takeovers and proxy contests, and the role of institutional investors and regulators on investment decisions.

The importance of the decision-making environment to aggregate investment performance has too often been understated. Just consider the massive investment losses experienced by financial institutions in the 1980s to understand the importance of governance and regulation. Despite warnings that the deposit insurance system created dangerous investment incentives, these problems with bank regulation in Canada and the U.S. were largely ignored. It took massive losses and failures to bring about a flurry of regulatory action. The price of this lesson is huge. Estimates of the cost of the savings and loan crisis in the U.S. indicate that taxpayer losses will be equal in size to the entire Canadian federal debt. Similar losses in Canada, though not nearly as large, are massive.

Currently, Canada is at another critical juncture in regulatory policy with respect to corporate governance. The large number of corporate failures and apparent managerial excess has raised concern that the cost of the current governance system is too high and that a new structure is needed. Given the importance of organized security exchanges in the process, it is not surprising to find securities exchanges as well as securities regulators around the world commissioning detailed examinations of corporate governance. In Canada, the Toronto Stock Exchange set up a committee that produced a report (1995) entitled "Where Were The Directors." While some applauded the effort, many felt that the recommendations of the report were insufficient given the size of the problem.

This section offers a brief overview of some of the issues that have arisen in the area of corporate decision making. This includes a description of basic issues in investment decision making in Canada, and a comparison of commonly reported techniques used in Canada with approaches used elsewhere. This review suggests that the low level of investment in long-term, risky projects such as in R&D could be rooted in managerial myopia. It also considers the argument that the lack of R&D investment in Canada is the result of pressures placed on management by short-term investors, i.e., an impatient capital market. Views are that the capital market will not tolerate long-term investments and looks only for short-term profits. This report confirms that there is no evidence to support this claim. Some pressing regulatory issues are also examined in this section.

HOW INVESTMENT DECISIONS ARE MADE IN CANADA

SEVERAL METHODS OF EVALUATING CAPITAL INVESTMENT are currently being used.⁹ The most widely accepted approach bases investment decisions on a project's Net Present Value (NPV). The NPV measures the magnitude and timing of resources used, the time value of money, and an appropriate adjustment for risk. Other widely-used approaches include the internal rate of return (IRR), the payback method, and the accounting rate of return. All methods except the NPV are known to have pitfalls that can lead to incorrect investment decisions.

A 1991 survey of approaches to capital budgeting in Canadian businesses by Jog and Srivastava (1994) indicates that Canadian firms use a number of different approaches for capital budgeting. The survey was sent to 582 firms taken from the TSE 300 and a number of large foreign-owned and private corporations. A total of 133 firms responded. The respondents indicated not only that they use a number of different capital budgeting techniques but, in many cases, that more than one technique is applied simultaneously. At the same time, the survey found that either the NPV or IRR are widely used by corporations in evaluating expansion plans. About one-half of the firms use the payback method and a number of firms continue to use the accounting rate of return. The use of the latter two techniques is surprising and alarming given that these techniques are conceptually flawed and could lead to resource misallocations, especially in the case of the accounting rate of return method.

Jog and Srivastava also examined the opportunity cost of funds and found that over one-half of the respondents use the weighted average cost of capital that can provide an accurate measure in many cases. Surprisingly, about one-quarter of the respondents use the cost of debt to evaluate the firm's cost of capital, despite the fact that there is little justification for using the debt rate. Canadian firms are slower than their American counterparts to correct this error. A similar study of American firms conducted more than one decade earlier by Schall et al (1978) indicates that only 17 percent of the respondents in the U.S. used the cost of debt at that time.

While the increasing use of discounted cash flow methods is encouraging, there is no indication that more recent developments in capital budgeting are being used. There are two key problems to applying standard capital budgeting techniques to long-term, risky investments that can make investment decisions appear myopic.

The first problem is that standard applications of discounted cash flow methods do not always recognize changes in the risk of an investment over the project's life. Instead, a single discount rate is estimated and applied to each cash flow over what can be a lengthy investment horizon. Owing to the uncertainty of the investment, the discount rate is often quite high. This approach usually does not correctly assess the value of long-term risky investments such as R&D. For example, an initial investment is usually made in a pilot project. The result of the pilot project will determine the viability of subsequent devel-

opment stages. At each stage new information is provided to redefine the risk. The risk of the new project might be high initially but then could diminish substantially once new information is subsequently provided. By applying the large initial discount rate to long-term cash flows, the analyst overstates the risk and the risk adjustment and consequently underestimates the value of the project.

The second concern is a failure among managers to recognize the 'real options' inherent in any long-term and very risky project. When a firm enters a new market or develops a new technology, it is investing in the option to take advantage of future opportunities. The firm need not invest additional future funds in new capacity. It has the option of abandoning any productive capacity put in place if new information indicates that the investment is not worth undertaking.

The value of options inherent in an investment opportunity has been shown to depend *positively* on the underlying risk and the length of time before the subsequent investment outlays are needed. For this reason, ignoring the options inherent in an investment will understate the value of the investment. The understatement will be especially strong for very long-term, risky investments.

To illustrate this problem, suppose that a natural gas producer in Canada is given the opportunity to bid on a contract to develop the resource in an Asian country.¹⁰ The investment goes through the following sequence of stages: i) initial exploration; ii) reservoir development; iii) production; and iv) distribution. The entire venture will take 30 years. Management decides that, in the context of its Canadian operations, such a project has a required rate of return of 20 percent. However, managers conclude that there is considerably more risk in operating in this foreign country; there is political risk and the risk that the expertise will not be as effective in a different sociological and political climate. They therefore increase the required return to 30 percent.

The errors are fundamental. First, the socio/political risk that the company faces might be resolved quickly. Within the first year managers will learn how well their expertise works in the foreign environment. Therefore, while the discount rate can be higher for the first year, there is no need to apply the same high rate to subsequent years. Second, management is ignoring the option to abandon the project if it cannot operate profitably. Third, management is ignoring the option to expand. If the company can develop the expertise to operate in Asia, then it can apply this expertise to other countries. By making these fundamental valuation errors, management not only deprives its shareholders of an opportunity to invest profitably, it also deprives Canadians of the opportunity to invest in high value-added human capital.

IS THE CAPITAL MARKET IMPATIENT?

AN ALTERNATIVE EXPLANATION OF THE INABILITY OF CANADIANS to exploit valuable investments is that capital markets are inefficient and cause managers to

become short sighted. This is further based on the assumption that many investors in today's capital markets are interested only in short-run gains. Investment dealers and fund managers whose livelihood depends on regular performance evaluations must often be more concerned with short-term trading profits than long-term capital gain or dividend income. It has been argued that such investors would be unwilling to hold the shares of companies that make investments with long lead times.

This argument is inconsistent with a good deal of conventional financial theory and empirical evidence. Investors, whether they plan on holding shares for the long run or the short run, rationally anticipate selling the shares to other investors at the end of their investment horizon. They would be concerned with the selling price and the fact that it depends on the future holding period of some unknown investor. Even if it is assumed that shares must be sold to a succession of short-term investors, the price at any time will anticipate the chain of prices at which the shares will be sold and this chain, taken as a whole, reflects the long-run value of the firm.

There is substantial evidence to support the notion that share prices reflect the long-run value of the firm. McConnell and Muscarella (1985) offer one example in their evaluation of the joint hypothesis that managers maximize the value of the firm and that the value of the firm reflects long-term capital investments. They analyzed 547 announcements of long-term investments made by 285 different industrial companies. Their empirical results support the joint hypothesis: the market price of the stock did increase after the announcements.

The Canadian capital market does not seem to differ from the U.S. market in this respect. In another study of Canadian firms, Johnson and Pazderka (1993) test whether the market places a positive value on research and development expenditures. Using data from the 1985-88 period, the study estimates the relationship between the market value of equity and the following: the book value of equity, a measure of market power, R&D expenditures and other investment expenditures. The analysis takes into consideration a number of subperiods; all cases show that the market value of the firm is significantly and positively related to R&D expenditures.

These studies and several others focus on R&D or strategic investment decisions and place no condition on the role that current earnings play in the market's reaction. The firms studied might have invested in R&D only in good times, when earnings were positive and pressure to improve short-run performance was negligible. A more recent study by Chan, Martin, and Kensinger (CMK) (1990) addresses this concern directly and, in the process, further supports the view that stock markets are generally not myopic.

The CMK study examines R&D announcements over a six-year period from 1979 to 1985. The research was restricted to firms with available stock price data. Further restrictions in the research produced a final sample of 95 announcements. The announcements only lead to a market reaction if the information provided is not previously known to the market (the authors had

to first decide what was and was not new information). The authors conservatively classified new information in an ad as one that mentions a change in R&D spending from the previous year. Because the market is likely to expect some increase in R&D in general, this classification would, if anything, reduce the estimated market reaction to R&D information.

The empirical results of the CMK study are quite striking. The study shows an abnormal return of 0.85 percent on announcement day that is statistically significant and economically quite large. Moreover this is followed by a post-announcement return of 0.53 percent that is again statistically significant.

To address the question of how current earnings affect the market's reaction, CMK split its sample into those firms (62) that announced an earnings increase in the quarter in which the R&D announcement is made and those firms (33) that announced an earnings decrease. The estimated abnormal return over two days for both groups was positive and statistically significant. Moreover, although the estimate for the earnings increase group is 1.54 percent and for the earnings decrease group is 1.01 percent, the authors were unable statistically to reject the hypothesis that the effect of the announcement was the same for both samples.

R&D announcements are normally greeted positively by investors. There are some cases, however, where the market reaction is negative. The CMK study sheds some light on why this occurs. It finds that announcements by firms that are considered to be low tech generate negative and weakly significant abnormal returns while announcements by firms in the high-tech sector report lead to significantly positive returns. There is no reason to suggest that R&D cannot be valuable in low-tech industries; however, the chances of this are lower and the market might react accordingly.

CMK also shows the relationship between the announcement effect and the following: i) the intensity of the firm's R&D relative to an industry norm; ii) the level of technology in the industry; iii) the increase in R&D relative to the company's sales; iv) industry concentration; and v) an announcement of the firm's market power. The only significant variable that could influence an announcement is found in the ratio of the firm's R&D intensity relative to an industry norm, and only when the firm is in the high-tech sector.

In summary, empirical evidence does suggest that the market is generally patient in its valuation because stock market value does reflect long-run decisions. As has been shown, the market responds to an announcement of long-term strategic plans generally and to R&D decisions more specifically. Moreover, the response is generally positive and significant, although the market does seem to differentiate between R&D investments made in different industries. The positive response might be restricted to firms in high-tech areas. A positive response has even been found among firms that report operating losses in the period in which the R&D announcement is made. These results indicate that managers do not abandon long-term investment in R&D in favour of enhancing short-run earnings.

Another area of concern is that attempts to avoid costly disruptions brought on by a myopic market for corporate control could lead to managerial myopia. To illustrate, suppose that managers know more about the value of a firm and the firm's investment options than the market does.¹¹ The informational asymmetry is greater for long-term projects than for short-term projects. Consequently, managers with valuable long-term prospects who face the threat of a takeover will respond by shifting to short-term projects that the market can better value and respond to. The social and private cost of such a decision translates to the loss of valuable long-term investment opportunities. This is where public policy could be important; it is possible to increase the value of the firm through policies that shelter managers from takeover threats.

The stock market's reaction to the adoption of protectionist measures in the form of an anti-takeover charter amendment is mixed. Linn and McConnell (1983) find positive abnormal returns while DeAngelo and Rice (1983) and Jarrell and Poulsen (1987) find insignificant returns. Hence, it is not certain whether increased managerial protection causes the value of a firm to go up. If it does, it is uncertain whether the increase is due to expectations of more efficient investment or to greater bargaining power given to corporate managers.

Meulbroek et al (1990) examine this more closely by considering the level of R&D investment undertaken by firms before and after they adopt anti-takeover provisions. Meulbroek et al base their study on a sample of 554 anti-takeover amendments proposed between 1979 and 1985. The authors exclude firms that did not report any R&D expenditures during the entire sample period, leaving a total of 203 proposals of which 179 were passed in the last three years of the sample period.

The authors look at the ratio of R&D to sales and examine the change in this ratio for three windows surrounding the date of adoption of the amendment. The windows considered are (-1,1), indicating the period beginning from the year prior to the amendment through to the year after the amendment, (-1,2) and (-1,3). They find that none of the estimated changes are statistically different from zero. The authors then adjust the figures to reflect general changes in R&D expenditure during this period by subtracting the rate of growth of R&D/sales for all firms covered by the Compustat database. Here, significant negative changes in R&D are reported for all windows: Relative to the market, R&D fell by 15 percent in the (-1,1) window, 25 percent in the (-1,2) window and 36 percent in the (-1,3) window. Surprisingly, greater takeover protection led to lower levels of R&D spending.

The authors consider the possibility that the decrease in R&D spending results is because of takeover pressure, despite the anti-takeover amendments. In fact, 52 of the 203 firms were subsequently subject to a successful or unsuccessful merger, or tender offer. The authors report similar findings in a subsample of firms that are not subsequently subject to a takeover attempt. It thus appears that reducing the threat of a takeover does not lead to an increase in R&D activity.

Another possibility for myopic behaviour is an actual takeover or restructuring. The concern is that high leverage, either due to a takeover or for other reasons, means the firm cannot afford to invest in valuable R&D because this will diminish its ability to service its debt in the short run. In an extensive study of this matter, Hall (1990) examines a panel of annual data for 2,500 manufacturing firms. The data cover the period 1959 to 1987 and contain information on R&D spending and other corporate characteristics. The objective of the study is to determine the effect of the following factors on R&D spending: i) leveraged buyouts, ii) mergers and acquisitions, and iii) increases in debt not accompanied by ownership changes.

As Hall points out, leveraged buyouts (LBO) have received a great deal of attention even though they account for a relatively small portion of total activity: Of the 780 acquisitions that were identified among the firms studied, only 76 could be classified as an LBO. In an LBO the firm becomes privately owned by a group that extensively uses debt financing to facilitate the acquisition. The resulting debt load is believed to lead to a reduction in R&D spending, as has been pointed out.

However, Hall turns this assumption on its head by suggesting that for this very reason companies that place great importance on R&D spending will not be subject to an LBO. In fact, of the 76 LBOs only six were in industries that seemed to invest a significant amount (i.e. more than 3.5 percent of sales) in R&D. The unimportance of LBOs to R&D activity is further illustrated by the fact that firms subject to an LBO account for only 1 percent of the total R&D activity in 1982. The post LBO investment activity in R&D is difficult to determine because firms that go private are not required to provide the same reports as others. Whatever the effect, it is unlikely that LBOs have an important impact on overall R&D performance.

Hall also examines the R&D intensity (R&D/sales) of the 336 firms that were involved in acquisitions during the period. She performs a regression analysis to determine whether firms that have acquired other firms change their R&D intensity relative to other firms in the same industry. The analysis is performed for all acquisitions and then separately for the group of firms that did not report any R&D activity during the period. The result is that R&D intensity does show a decline. While the estimated effect is statistically insignificant for the entire sample, it is significant for those firms that had reported R&D activity. Firms that engage in R&D activity and acquire other firms decrease their R&D intensity relative to the mean level of R&D intensity in their industry. This undoubtedly reflects economies of scale in R&D activity, such as the elimination of duplication and better coordination of activities and support services. These economies of scale could in fact provide the synergy that motivates the takeover in the first place. They are also part of the reason why research clusters and coalitions are supported in the previous section.

Finally, Hall considers the effect of leverage on R&D intensity. A total of 177 firms were classified as having engaged in a leveraged restructuring. This

classification was given to firms that had increased their long-term debt by more than 75 percent of their total market value at the beginning of the year. This analysis is similar to the analysis for acquisitions. The results indicate that leveraged restructurings are associated with significant reductions in R&D intensity relative to the industry. In addition, Hall ran separate regressions to account for acquisitions. She finds that any effect of acquisitions on R&D is essentially attributable to the increase in leverage that accompanies the acquisition.

These studies indicate that acquisitions and leverage increases are both tied to reductions in R&D intensity. However, the threat of a takeover does not seem to have a significant impact on R&D. What does this mean for decisions on R&D spending? Unfortunately, these studies report only correlations and do not determine cause and effect. It could be that higher leverage forces managers to reduce spending on valuable R&D. However, if the capital market is not myopic, why would managers voluntarily increase leverage if this will lead to value-reducing activity? An alternative explanation of this correlation is that, owing to asymmetric information, managers of firms with R&D opportunities do not engage in leverage, preferring instead to rely on internally generated funds for financing, while managers of firms that have exhausted valuable R&D opportunities are able to issue debt and do so to benefit from the tax advantage of debt.

REGULATION

REGULATIONS IMPOSED ON CAPITAL MARKETS ALSO HAVE A STRONG IMPACT on investment. Perhaps the most important example of this is bank regulation. Bank lending is a large and important channel through which savings are directed towards investments. Regulations that have an impact on bank policy will also have an impact on investment decisions. Two important developments in the last 15 years that will continue to play an important role in the future are: i) competition in the banking segment and ii) deposit insurance regulation.

Competition in banking was severely restricted prior to the 1981 revision of the *Bank Act*. Since that time, foreign banks and financial institutions outside of banks have gained access to the traditional bank market. At the same time Canadian banks are gaining access to new markets such as investment banking. Canadian banks are now making their way into the international marketplace and international banks are becoming more visible in Canada. The increased product market competition should lead to improvements in investment decisions by the banks. However, the largest banks in Canada have restrictions on ownership concentration making the market for corporate control less effective.

Bank regulation has had a huge impact on investment decisions and will continue to do so. The deposit insurance system leans towards riskier institutions resulting in high risk investments that often have low value.

Regulation also has an impact on corporate governance and the market for corporate control. This report used the fundamental precept that a well-

functioning capital market would operate at optimal investment levels. This is based on the assumption that managers act in the best interest of shareholders and, accordingly, vigorously seek valuable investment projects. Corporate governance, involving the board of directors and active shareholders, is the mechanism that keeps managers' incentives aligned with shareholder welfare. Impediments in a healthy market environment will insulate managers from discipline and allow inefficient practices to occur. One impediment is the restriction on maximum shareholdings that are found by law in the banking sector and in other sectors of the economy. Anti-takeover laws also dampen the discipline on management. *The challenge is to review corporate governance impediments on an active basis to increase the market discipline among managers.*

THE CHALLENGES AHEAD

THIS STUDY HAS IDENTIFIED A NUMBER OF INVESTMENT CHALLENGES that Canadians will have to meet in the medium term. They are summarized below. The analysis leads to a more general message: The openness of Canada's economy, the increase in factor mobility, and the rapid pace of technological change imply that there will be major investment requirements over the next 10 to 15 years. With globalization and the integration of financial markets, funds for investment will come from a larger 'global' pool than has been the case in the past. As a result, the ability of Canadians to benefit from investment opportunities will depend upon the ability of management to recognize and exploit opportunities. It will also depend upon policies that facilitate investment. Such policies would not entail direct government involvement in investment incentives nor compromise the lifestyle Canadians desire. This is a difficult balance to maintain and is perhaps one of the biggest challenges.

The following is a synthesis of other challenges ahead:

- Demographic trends suggest that in the long run Canada must at least maintain, but should more likely increase, the share of output devoted to investment in order to achieve even modest levels of productivity growth. Regionally, migration to British Columbia and Ontario from the rest of the country will require further and different investment allocations. While the private sector must adjust to these movements through market shift, the public sector must also make adjustments to allocations for infrastructure and social services.
- Globalization is one of the most significant challenges over the medium term. The management of the investment environment over this period will be critical as factor mobility — the mobility of both labour and capital increases. The implications of factor mobility are not clear at this stage. There are views that investment will be enhanced simply by keeping production costs down and investing in infrastructure that improves the quality of life. Others see the need to create a competitive environment for firms; one which allows them to form mutually beneficial clusters. Whatever policy mix is prescribed, it is clear that investment and productivity growth opportunities are enhanced by trade.
- Environmental concerns and their impact on investment decisions is also a major challenge for both public and private sectors. Currently, a relatively small fraction of output is devoted to environmental protection and improvement. It is unclear whether this investment will increase in the face of globalization. However, existing evidence suggests that current environmental policy has not had a significant impact on investment location and quantity. On the other hand, sim-

ulations of more significant policy changes suggest that it can have a large impact on investment and incomes. More research is needed to clarify whether more significant policy decisions on the environment will have a strong impact on investment.

- Investment demands certain spillovers that are not captured by the investor. This 'externality' can lead to lower investment and diminish the full social value that could be drawn from such activity. Policy directed towards the ability to appropriate returns from investments are therefore desirable. This is particularly important in sectors of the economy that engage in trade, which has shown to give rise to significant international spillovers.
- The productivity of the Canadian economy has not improved to the same degree as other OECD countries. One reason might be the slowness of corporations to respond to high-technology opportunities. Another could be the significantly lower levels of R&D expenditures in Canada. Policy concerns such as these have previously been addressed through government incentives. This does not seem to have worked in the past and is less likely to work now owing to a more integrated market setting.
- Management practices in Canada point to a problem of myopic decision making. There is no evidence that myopia is induced by capital market imperfections or the threat of takeovers. It appears that competition in the market for corporate control might provide the incentives needed to improve management practices.

NOTES

- 1 Although GDP is a widely-used measure of income it includes gross investment and hence overstates net income by depreciation, the amount of capital stock used up in producing this level of output.
- 2 The figures provided in Table 2 are not directly comparable to those found in Table 1. This is because of the need to place the figures in Table 2 on a common basis to facilitate international comparisons.
- 3 This is based on Statistics Canada's medium growth projection. Statistics Canada also considers a high and a low growth scenario with 2011 populations of 33 and 37 million, respectively.
- 4 Some aspects of investment infrastructure and environmental enhancement are discussed in the next section.
- 5 In particular, regulations that affect corporate governance and product market competition.
- 6 See, for example, Melvin (1996).
- 7 For an excellent analysis of Porter, Reich and work by Thurow (1992), see Harris and Watson (1992). The next section discusses the way in which clustering can help to internalize the externalities associated with technological advances.
- 8 Additional information and elaboration on the measures provided can be found in Olewiler (1992).
- 9 This subsection is based on this author's paper "Patient Capital? R&D Investment in Canada" (1995).
- 10 This example, though fictitious, is based on an actual investment opportunity that a Canadian company decided not to pursue.
- 11 This example is based on Stein (1990).

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