



Micro

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The Triumph of the New Economy?

The strength and vitality of ongoing economic growth, particularly in the trend-setting US economy, continues to astonish economic forecasters. As a result of this growth, a consensus is now emerging that something fundamental has changed. For example, a scan of recent pronouncements by the US Federal Reserve Board shows the extent to which policy-makers now accept that a substantial pick-up in trend productivity growth has taken place in the United States.

Despite this emerging consensus, economists remain divided over the nature, durability and pervasiveness of the recent rise in trend productivity growth. Proponents of the new economy argue that information technology is profoundly altering the nature of business, leading to a permanently higher trend productivity growth throughout the economy. But

skeptics retort that the recent surge in productivity growth is a temporary feature that can be explained in more traditional terms, without having to argue that the economy is now functioning differently in some fundamental way.



This issue of MICRO focuses on recent contributions to this debate, as part of Industry Canada's publications program. The first publication reviewed is a monograph on productivity edited by Dale Jorgenson, of Harvard University, and Frank Lee, of Industry Canada, featuring several articles analyzing developments in productivity in both the United States and Canada. In the second featured publication, Kevin Stiroh, of the Federal Reserve Bank of New York, presents an overview of the literature on investment and productivity and the different approaches of the neoclassical and the new growth theories.

INDUSTRY CANADA RESEARCH AND PUBLICATIONS PROGRAM

RECENT RELEASES

OCCASIONAL PAPER SERIES

No: 24: *Investment and Productivity Growth—A Survey From The Neoclassical And New Growth Perspective*, Kevin J. Stiroh.

PERSPECTIVES ON NORTH AMERICAN FREE TRADE SERIES

NAF 1: *Can Small Countries Manufacturing Survive Trade Liberalization? Evidence from the Canada-U.S. Free Trade Agreement*, Keith Head and John Ries.

NAF 2: *Modelling Links Between Canadian Trade and Foreign Direct Investment*, Walid Hejazi and A. Edward Safarian.

NAF 3: *Trade Liberalization and the Migration of Skilled Workers*, Steven Globerman.

NAF 4: *The Changing Industry and Skill Mix of Canada's International Trade*, Peter Dungan and Steve Murphy.

RECENT RELEASES

NAF 5: *Effects of the Canada-United States Free Trade Agreement on Interprovincial Trade*, John F. Helliwell, Frank C. Lee, and Hans Messinger.

NAF 6: *The Long and Short of the Canada-U.S. Free Trade Agreement*, Daniel Trefler.

FORTHCOMING

Industry Level Productivity and International Competitiveness between Canada and the United States, Dale W. Jorgenson and Frank C. Lee, editors.

The Economic Determinants of Innovation, by Randall Morck, and Bernard Yeung.

SMEs, Exports and Job Creation: A Firm-Level Analysis, by Elisabeth Lefebvre and Louis A. Lefebvre.

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Industry-Level Productivity and International Competitiveness between Canada and the United States

Since 1973, Canada and the United States, along with other industrialized countries, have experienced a slowdown in economic growth, and particularly in productivity growth. Only in recent months has productivity growth shown signs of revival, at least in the United States. However, the nature and causes of this growth, as well as its probable duration, have been the subject of considerable debate.

As a contribution to this debate, Industry Canada is

publishing *Industry-Level Productivity and International Competitiveness between Canada and the United States*, a monograph comprising four studies on the nature of productivity growth in both countries, edited by Dale W. Jorgenson and Frank C. Lee. Among other topics, it assesses economic growth in Canada and the United States separately, and compares economic growth and international competitiveness between the two countries using a common framework and comparable data sets.

Raising the Speed Limit: US Economic Growth in the Information Age

In this chapter of the monograph, Dale Jorgenson and Kevin Stiroh quantify the sources of the recent surge in economic growth in the United States. As the authors note, a consensus is now emerging that something fundamental has changed, with "new economy" proponents pointing to information technology as the causal factor behind the strong performance of the US economy. According to this view, technology is profoundly altering the nature of business, leading to permanently higher productivity growth throughout the economy. However, the authors also point out that skeptics view the stellar economic performance of recent years as the outcome of a series of favourable, but temporary shocks.

Jorgenson and Stiroh find that productivity statistics, beginning in 1995, have begun to reveal the impact of information technology. Both labour productivity growth and total factor productivity (TFP) growth have jumped to rates not seen for such an extended period of time since the 1960s. While a substantial portion of these gains can be attributed to computers, there is growing evidence of similar contributions from software and communications equipment – each equal in importance to computers. They question, however, whether this represents a new paradigm.

In the authors' view, productivity growth in the production of information technology is responsible for a

sizable part of the recent surge in TFP growth and can be associated with price declines in high-tech assets and semi-conductors. This has induced heavy investments in these assets that are responsible for capital deepening in industries that use information technology. They argue, however, that there is no evidence of a corresponding productivity growth in these sectors that would indicate spillovers from production in the information technology sectors.

They do concede that many of the goods and serv-

"Both labour productivity and total factor productivity growth have jumped to rates not seen for such an extended period of time since the 1960s."

-Jorgenson and Stiroh

ices produced using high-tech capital may not be adequately measured. This may help to explain the surprisingly low productivity growth in many of the high-technology-intensive service industries. It may also be leading to an underestimation of US economic performance. They conclude that a clearer picture

will depend on improved data and methodology for analyzing these sectors.

The authors also note that the strong performance of the US economy has led forecasters to raise projected growth rates, in effect raising the speed limit. They caution, however, that relying on a continuation of higher growth rates may be risky until such patterns have been observed for a longer period of time.

They conclude that the uncertainty surrounding projections has become much greater as a consequence of widening gaps in our knowledge, rather than changes in the volatility of economic activity. Research that underlies estimates of prices and quantities of computer investment has provided much needed illumination of the impact of information technology, but as the role of technology continues to expand, uncertainties will remain.

Economic and Productivity Growth in Canadian Industries

In this chapter, Wulong Gu, Frank Lee and Jianmin Tang analyse the sources of output and labour productivity growth in the Canadian economy since 1961, using a methodology patterned on that used by Jorgenson and Stiroh.

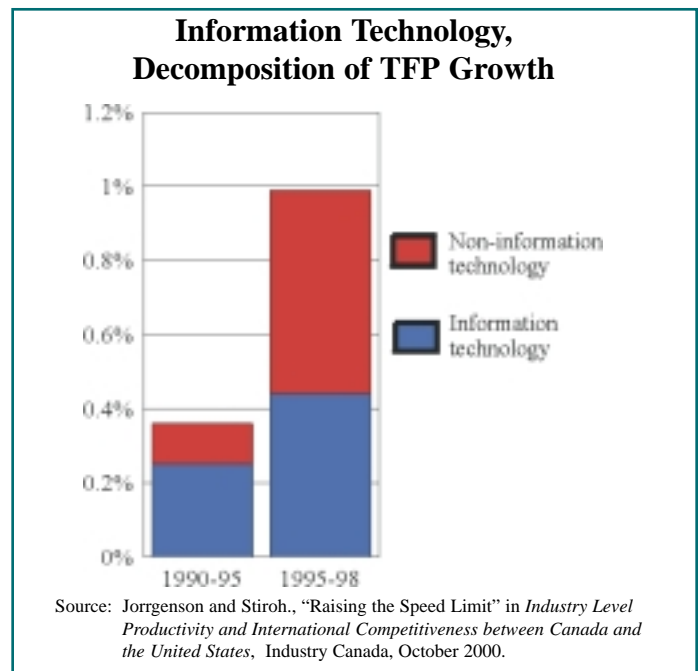
They find that the Canadian business sector's output growth slowed from an annual rate of 5.6 percent during 1961-1973 to 3.3 percent during 1973-1988, and to 1.5

“Over 80 percent of the slowdown in output growth between 1961-73 and 1973-88 was attributable to the slowdown in TFP growth...”

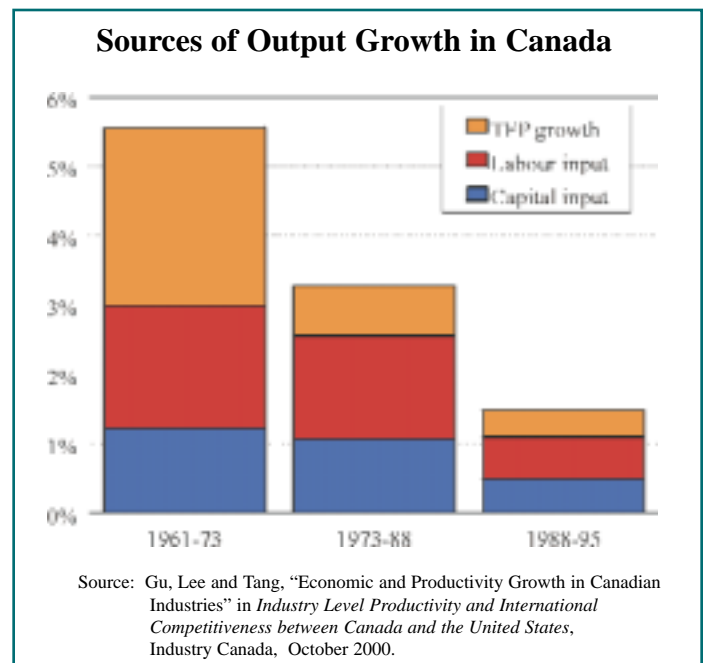
-Gu, Lee and Tang

percent during 1988-1995. Over 80 percent of the slowdown in output growth observed from the first to the second period is attributable to a slowdown in TFP growth. In contrast, over 80 percent of the slowdown in output growth from the second to the third period resulted from a slowdown in the growth of both capital and labour inputs.

For a majority of the industries studied, input growth



was a dominant source of output growth during the first two periods. Over 1988-1995, however, TFP growth accounted for more than half of output growth in slightly more than half of these industries. The authors conclude that this was primarily due to the fact that input growth slowed down more than productivity growth between the second and third periods.



A Comparison of Industrial Productivity Growth in Canada and the United States

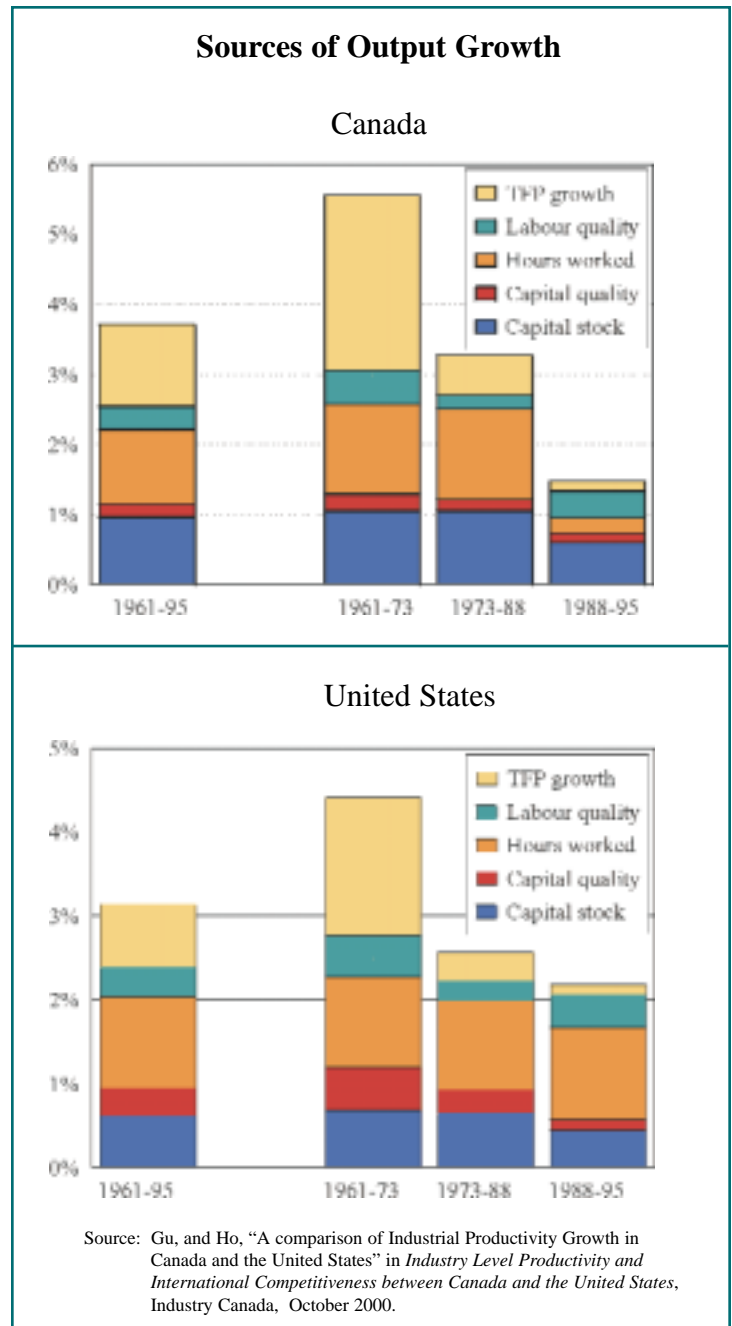
In this chapter, Wulong Gu and Mun S. Ho compare the patterns of growth in Canadian and US industries. They note that while much comparative work has been focused on total factor productivity in the two countries, this work has often been based on concepts that are not entirely comparable. The authors' approach is to use almost identical methods and definitions for the two countries to provide a better sense of their relative productivity performance.

They find that average growth rates of output in

“An interesting feature of Canadian economic growth has been the high growth of intermediate inputs.”
 -Gu and Ho

Canada were higher than in the United States in almost all industries before 1988. Subsequently, output growth in Canada has been slightly lower than in the United States. As for productivity, Canadian industries were able to bring their productivity levels closer to US levels and had a higher rate of output growth during the 1961-1973 period. Afterwards, however, the growth of output and productivity in the business sector slowed down in both countries, and was almost identical during the 1973-1995 period. As a result, the gap in productivity levels between the Canadian and US business sectors remained virtually unchanged after 1973.

The authors conclude that, in both countries, input growth was the predominant source of the growth recorded in almost all industries over 1961-1995. In particular, they find that a rise in the quality of labour and capital inputs played a significant role in the economic growth of Canada and the United States. Productivity growth, on the other hand, contributed only about 20 percent to the growth of industrial output in the two countries during this period.



Productivity Levels and International Competitiveness Between Canada and the United States

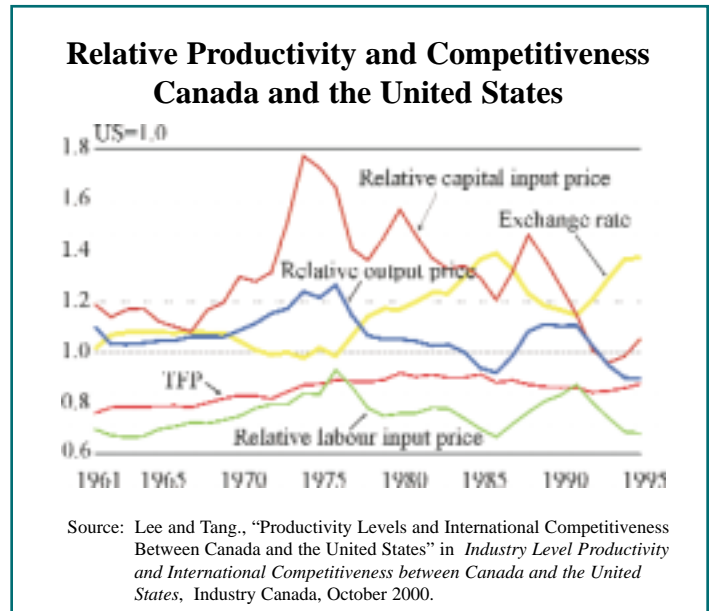
In this chapter, Frank C. Lee and Jianmin Tang compare total factor productivity levels and international competitiveness among 33 Canadian and US industries, using Canada-US bilateral purchasing power parities (PPP) for

“...the relative total factor productivity level is an important element of international competitiveness....”

-Lee and Tang

outputs and inputs. They find that in 1995, 23 of the 33 Canadian industries had lower TFP levels than their US counterparts, which affected their competitiveness adversely.

Over time, however, exchange rate movements appear to be the most significant factor behind international competitiveness. The authors find that, generally, exchange rate movements coincided with movements in relative output prices of the business sector in the two countries over 1961-1995. Focusing on a more recent period (1976-1995) revealed that Canada's business sector competitiveness improved relative to that of the US business sector, even though its TFP performance was



not improving during those years.

Despite the importance of the exchange rate, the authors find that PPPs vary across industries as well as over types of outputs and inputs. As a result, they conclude that it is critical to use PPPs rather than the market exchange rate to assess the relative productivity levels and international competitiveness of two countries.

Investment and Productivity Growth

– A Survey from the Neoclassical and New Growth Perspectives

Economists have long recognized that investment is a crucial source of productivity and economic growth, but explanations of the links between the two have evolved over time. Initially, economists focussed on private investment in tangible assets in a neoclassical framework. Subsequent theorists extended the neoclassical model to include a broader view of investment. Another major innovation was the move away from the neoclassical model to examine alternative productivity channels in the context of the new growth theory.

In Industry Canada Occasional Paper No. 24, *Investment and Productivity Growth – A Survey from the Neoclassical and New Growth Perspectives*, Kevin Stiroh undertakes to review the recent literature linking investment to productivity. He provides a broad overview of recent theoretical developments on the relationship between investment and productivity, and summarizes the corresponding empirical evidence.

The first part of the paper sketches the role of investment as a determinant of productivity in both the neo-

classical and the new growth frameworks. Stiroh concludes from the evidence that the traditional neoclassical focus on input accumulation and internal returns remains

"The evidence suggests that a traditional neoclassical focus on input accumulation and internal returns remains the best explanation for improvements in labour productivity."

-Kevin J. Stiroh

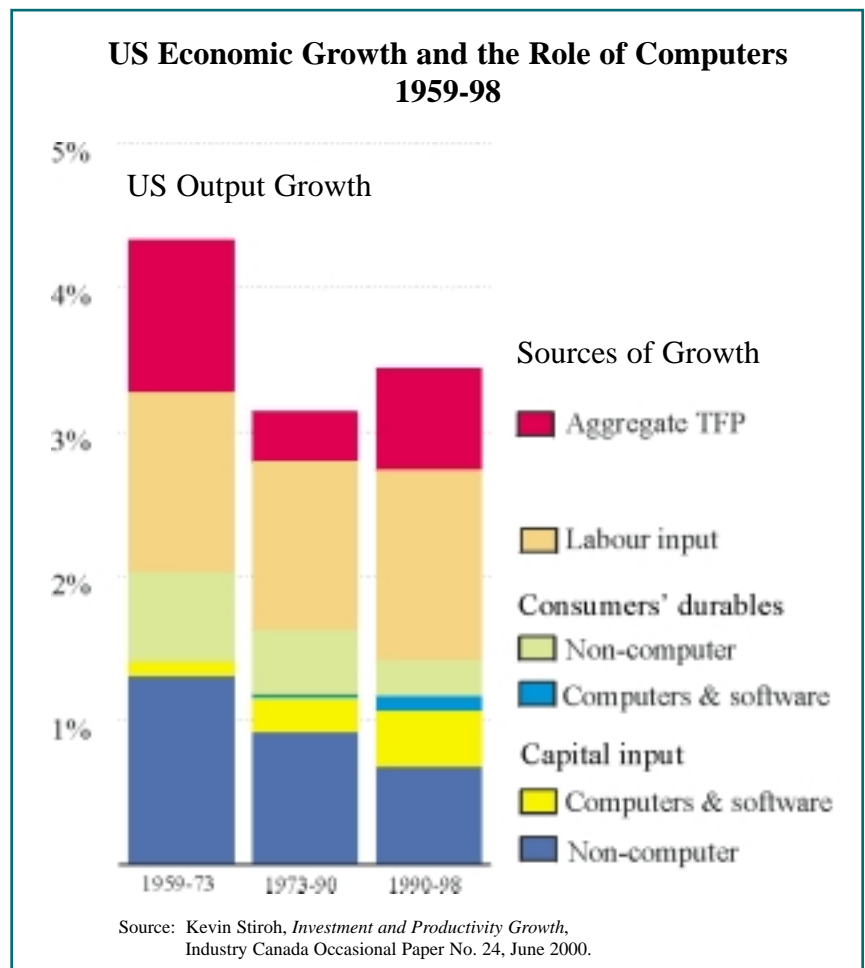
the best explanation for improvements in labour productivity. He concedes, however, that investment and input accumulation are not the whole story, as roughly one-fifth of US post-war growth remains unexplained in a complete quality-adjusted, neoclassical model.

This leaves an obvious need to provide an explanation for technological progress and alternative sources of productivity. Stiroh argues that the new growth theory can fill this gap. In his view, the two frameworks can be viewed as complements rather than substitutes, with neoclassical input accumulation explaining the majority of growth and the new growth theory providing a conceptual foundation for the remainder of productivity growth that falls outside the neoclassical framework.

In the second part of the paper, the author reviews a wide range of current issues relating to investment and productivity: the international evidence on spillovers from equipment investments; potential research and development spillovers; the "computer productivity paradox"; the impact of investment on labour market outcomes; the renewed embodiment controversy; and recent micro-

economic evidence from large longitudinal databases. By outlining some of the policy implications of current research work and summarizing relevant questions that remain unanswered, this section highlights specific areas for future research on the relationship between investment and productivity.

The author concludes that while different schools of thought emphasize alternative transmission mechanisms and some empirical results are inconclusive, one observation appears universal: investment – broadly defined – is the crucial factor that increases productivity, generates economic growth, and raises living standards. Moreover, the neoclassical model of broadly defined investment and capital, with returns that are primarily internal, appears to provide the best explanation for observed variations in productivity.





DISTINGUISHED SPEAKERS SERIES



The Canadian Standard of Living: Is There a Way Up?

Pierre Fortin
Université du Québec à Montréal

During the 1990s, Canada's aggregate economic performance has been lacklustre, particularly when compared to the strong economic performance of the United States. Pierre Fortin looked at the causes of this poor standing and the hopes for a turnaround, in a lecture entitled *The Canadian Standard of Living: Is There a Way Up?*, delivered on December 10, 1999.

He argued that everything that could go wrong did go wrong. Canada's economy became simultaneously underemployed, overtaxed, and under-productive. Growth in Canada's real private disposable income per capita came to a near-standstill during the 1990s. At the same time, income per capita in the United States continued to grow steadily. As a result, Canada's disposable income per capita declined in relative terms, from 78% of the US level at the end of the 1970s to 66% in 1998. Instead of shrinking, the Canada-US income gap has widened, particularly in the last ten years.

The speaker outlined how our fiscal and monetary policies and a stagnating productivity all contributed to the slowdown. On the positive side, he noted that we have now passed through the worst phase of the fiscal crisis.

Deficits are down and governments appear to be adopting a balanced budget policy. We may even witness the beginning of a move to reduce taxation to a more reasonable level. And the Bank of Canada appears to have

adopted a more pragmatic approach to balancing its inflation and employment goals.

Fortin then turned his attention to the productivity

**"...from a long-term perspective
the productivity slowdown
is the most important
cause for concern."**

slowdown, which he characterized as the most important cause for concern. Our standard of living is about

- *During the 1990s, Canada's aggregate economic performance has been the worst since the Great Depression, and very nearly the worst among all industrial countries.*
- *Our economy became simultaneously under employed, overtaxed, and under-productive.*
- *We need to make a necessary turnaround simultaneously in three policy areas: monetary, fiscal and innovation.*
- *The signs are positive; there has already been a turnaround in monetary and fiscal policies, and there is renewed questioning of our innovation policy.*

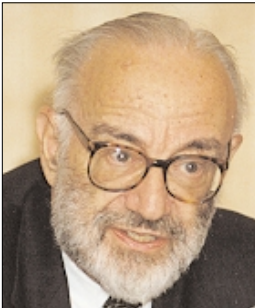
75 percent of the US level. But even if our central bank brings the unemployment rate down to the minimum non-inflationary level – he suggested 6% – the Canada-US income ratio would probably not increase above 80 percent. The remaining 20-percent gap between the two countries' standards of living is largely due to the discrepancy between their productivity levels. Over the last two decades, Canada's productivity level has not

risen as fast as that of the United States. If we cannot manage to get Canadian productivity to grow faster than it has during that period, then we will have to forget about catching up with the US standard of living.

He argued, however, that this is not an impossible task, provided that Canada makes the right policy choices in the area of knowledge-capital formation. In particular, we must review three key areas: the innovation system, corporate taxation and investment in machinery and equipment.

Fortin concluded that although the 1990s have been a very disappointing economic decade for Canada,

there is hope for improvement. Canada did worse than the United States because of a poor record in the three areas of monetary, fiscal and innovation policies. But there is definitely a way back up for the growth of Canadian incomes over the next decade if we can just make the necessary turnaround simultaneously in these three policy areas. He went on to add that the evidence is actually very good that this has begun to happen.



Multinationals, Technology and Trade

Robert Lipsey

National Bureau of Economic Research

The steady stream of reports about mergers, acquisitions and joint ventures, and the proliferation of conferences on "globalization" might give the impression that multinationals are rapidly swallowing up all the world's industry, resulting in jobs being shifted abroad. But is this really the case? In a lecture entitled *Multinationals, Technology and Trade*, presented on October 22, 1999, Richard Lipsey examined the empirical evidence on the United States and concluded that, as a geographical

entity, the US has not been losing production or employment to foreign operations of American firms.

He noted, however, that foreign direct investment (FDI) and internationalized production are concentrated in two sectors: manufacturing and petroleum. While

- *In the key manufacturing sector, the internationalized output of US manufacturing firms continues to increase relative to US domestic gross manufacturing output.*
- *However, fears that US multinationals have been exporting jobs by substituting foreign production in the US have very little empirical support.*
- *Almost every study shows that foreign-owned plants are more trade-oriented than domestically-owned plants, pay better wages, and raise national productivity levels.*
- *Large flows of foreign direct investment (when coupled with a highly skilled labour force) typically go together with high rates of economic growth.*

these sectors represent about 18 percent of US production, they account for almost three quarters of production abroad by US multinational corporations (MNC). Within US manufacturing MNCs, affiliate employment has been over 30 percent of total firm employment since 1977 and has been rising since 1989. This growth in the share of manufacturing production taking place in overseas operations seems like the popular picture of displaced production. But at the same time, foreign MNCs

have been increasing their manufacturing activities in the United States, offsetting this trend. Thus, both US and foreign manufacturing multinationals are internationalizing their production, producing more of their total output outside their home country and within the

other group's home markets.

Lipsev argued that the driving force behind this internationalization trend is the contest among firms with special, mobile skills, based on firm-specific human and intellectual capital, to enlarge and maintain their markets. According to him, the substitution of capital movements for trade

that many economists started out looking for was a false trail. The comparative advantages of these firms reside in various kinds of knowledge, and exploiting that knowledge in many countries is the way they maximize the returns on their investment in knowledge. At the same time, advances in transportation and communications technology have increased the ability to control and coordinate operations in different countries. It means that even smaller firm-specific advantages are sufficient to justify multinational operations.

"Just the presence of foreign affiliates itself tends to raise average national productivity levels."

In looking at the impact of internationalization, Lipsey noted that almost every study shows that foreign-owned plants are more trade-oriented than domestically owned plants, pay better wages, and raise national productivity levels. Internationalized production is much more capital-intensive, skill-intensive, and efficient than production in gener-

al. Not only is output per worker higher in these operations, but it has also been growing faster than in the rest of the world's production. MNCs are also world leaders in disseminating advanced technology from one country to another. The speaker concluded by saying that it is fairly clear that, across countries and over time, large inflows of FDI (when coupled with a highly skilled labour force) typically go together with high rates of economic growth.



Integrating Policy Trends into Dynamic Advantage

Elizabeth Bailey
Wharton School of Finance and Commerce,
University of Pennsylvania

Public sector policies and regulatory change can present firms with strategic opportunities. Yet, many firms do not consider the implications of policy as part of the process of analyzing and formulating their competitive strategy. In a lecture given on October 29, 1999, entitled *Integrating Policy Trends into Dynamic*

"In assessing their strategic positions, managers should ask: What are the opportunities created by policy changes?"

Advantage, Elizabeth Bailey argued that managers need to understand and take advantage of trends in regulatory change in the public sector.

In particular, she stressed the importance of understanding the contestability of markets and the notion that an industry's products and services could be unbundled.

This offers regulators the opportunity to deregulate specific segments of markets, based on whether or not they offer an opportunity for competition. And although there has been a strong push to deregulate some industries in recent years, there will be continued pressure for more effective regulation in such areas as health and safety, and environmental protection. It is important for managers to understand the form such regulations will take, and the greater reliance on market-based solutions, such as tradable pollution permits.

The speaker also insisted on the importance of understanding that public policy is characterized by windows of opportunity – a public perception that the timing is right for something to happen. Often, these are triggered by a specific event or public controversy. Managers need to recognize the importance of such policy windows and know how to make them serve their firm's strategic interests, either by riding the wave of events or by actively work-

ing to influence the direction of policy changes.

Bailey discussed as well the notion of political competition in the realm of policy change, and the key role played by the distribution of costs and benefits in making a policy change acceptable. For example, she noted that when airline deregulation was discussed in the United States, the concept of widespread public benefits in the form of lower fares for travellers made it politically attractive to implement. Policy changes with such majoritarian benefits are easier to effect. On the other hand, changes with narrowly concentrated benefits require a strategy that seek to offer

something to each affected party, perhaps through legislation.

She concluded by saying that a good understanding of the public sector should be an integral part of a firm's overall strategy. In their strategic thinking, managers must be aware of long-term patterns of change in the public sector that could influence the future growth path of industry profitability.

- *The public sector is sometimes treated as an external factor in formulating strategy.*
- *But public policies serve as non-market drivers of company success.*
- *In assessing their strategic positions, managers should look for opportunities created by policy changes.*
- *An understanding of the public sector should be an integral part of a firm's overall strategy.*

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