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INDUSTRIE, SCIENCE ET TECHNOLOGIE CANADA

Upcoming Conference . . .

Knowledge-Based Growth and Micro-Economic Policies

As part of its Research Publications Program, Industry Canada recently commissioned a dozen experts in economic growth to study and report on the implications of knowledge-based growth for micro-economic policies in Canada. Professor **Peter Howitt** of the University of Western Ontario agreed to act as intellectual guide for the project and as the general editor of the volume in which the collected papers will be published. The authors will present their findings and submit their work for peer review at a conference in Ottawa on March 30-31, hosted by Industry Canada.

The conference will cover three areas of study in separate sections.

Concepts and Measurement Issues

The first part — Concepts and Measurement Issues — will deal with the measurement issues confronted in translating endogenous growth theory into action.

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The questions to be addressed include: how to define knowledge; why knowledge is operationally different from other goods; what are the relevant dimensions of knowledge by which its use as an input or output should be measured; how to make these measurements; how are different sources of growth related to each other; and identification of sectors or firms which use or produce knowledge intensively in order to understand the economic performances of high knowledge industries compared to medium or low-knowledge industries.

Factors That Facilitate Economic Growth

In the second part of the conference, participants will discuss factors which make for economic growth. Participants will present empirical evidence to support conclusions about two relationships:

- ▶ the linkage between trade and knowledge-based growth;
- ▶ the impact of economic integration on knowledge-based economic growth, and vice versa.

The conference will attempt to draw empirical conclusions from this evidence and to determine the policy implications for Canada.

The link between interprovincial barriers and endogenous growth will be explored by looking at existing estimates of the social costs of interprovincial barriers to trade and whether or not endogenous growth considerations significantly change the

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results. The link between intellectual property regimes and economic growth will also be explored. Case histories, focused on results associated with various microeconomics policies, will be presented to identify conditions which appear to favour or work against the success of these policies.

Canada and the Global Telecommunications Revolution

In the third part of the conference the focus will be on the so-called information highway. One aim will be to identify the highway's essential characteristics and its potential impact -- including that generated by infrastructure investment -- on Canadian economic performance. The conference will also examine R&D and productivity growth in the Canadian telecommunications industry and the factors that govern self-generated technological change in the telecommunications equipment industry. It will also look at the impact of this technological change on productivity growth in the industry itself and on the Canadian manufacturing sector.

Conference will review research on Corporate Decision-Making in Canada

Industry Canada - in collaboration with the Financial Research Foundation of Canada - has commissioned 18 research papers on the theme *Corporate Decision-Making in Canada*. Professors **Ron Daniels** (University of Toronto, Faculty of Law) and **Randall Morck** (University of Alberta, Faculty of Business) are serving as General Editors of the research volume. They will also act as rapporteurs for the project's midpoint peer review conference on March 20-21, 1995 in Toronto. This conference will bring together experts from business, legal, academic and government organizations to provide critical commentary on first drafts of the 18 papers.

The research project is intended to provide policy support on two fronts. By improving understanding of the distinctive features of the Canadian corporate landscape and the relative effectiveness of institutional linkages, the research should contribute to improving the growth and productivity performance of the Canadian economy. It will also deepen the analytical foundations supporting planned revisions to federal business legislation.

The project focuses on the following policy-related issues:

National Economic Growth

- ▶ the implications of encouraging a longer-term corporate perspective regarding investments in R&D and in human capital;
- ▶ the future role of Canadian subsidiaries; and
- ▶ the interrelationships between corporate governance structure and practices, corporate decision making, and corporate performance.

Governance

- ▶ the role of banks in corporate governance;
- ▶ the appropriateness of existing standards respecting the structure and composition of boards of directors; and
- ▶ the accountability of directors and managers of non-profit organizations.

Institutional Investors

- ▶ should Canadian law continue to emphasize minority shareholder protection;
- ▶ does the importance and special characteristics of institutional investors necessitate amendments to the Canadian Business Corporations Act;
- ▶ should insider-trading and takeover rules be amended for institutional investors; and
- ▶ what, if any, special provisions are required to ensure the accountability of institutional investor managers to fund beneficiaries?

Canadian Conglomerates

- ▶ the implications of directors' liability provisions and residency requirements for the governance of conglomerates;
- ▶ the adequacy of existing corporate and securities regulations with respect to intra-conglomerate transactions; and
- ▶ the implications of Canadian conglomerates for Canadian competition policy?

Compensation Policies

- ▶ do incentives contracts between managers and shareholders impact on corporate performance; and
- ▶ the need for and nature of legislative reform designed to ensure more rational performance-based executive compensation policies.

Filling a Research Gap

The new Canadian research was commissioned against the backdrop of intensified interest in corporate decision-making. This has followed largely from new economic growth theory, which holds that the structures and decision-making practices of economic institutions and corporations influence the growth prospects of firms and therefore nations.

According to new growth theory, several microeconomic factors influence the competitiveness of individual corporations and ultimately, national economic growth. They include: the corporate form, the organizational structure of firms and groups of firms, and differences in national relationships among governments, firms and financial agents.

Remarkably, research on Canadian corporate decision-making has remained largely uninformed by empirical data - either quantitative or qualitative - drawn from the Canadian experience. A further problem is the extent to which it has concentrated narrowly on the role of the board of directors and

has neglected the wide range of other market and legal constraints that affect corporate behaviour.

The new research is designed to fill these gaps and broaden the debate to include behavioural elements, the role of institutions and their inter-relationship, and their impact on Canada's economic growth performance.

Mergers and Acquisitions – The Corporate Impact

Interest in mergers and acquisitions -- never far below the surface -- has intensified since 1980s as a result of the wave of M&As in that period. Now, Industry Canada is publishing a study of their impact on corporations.

Contained in a recently released working paper by Industry Canada research economist **Gilles Mcdougall**, the study evaluates the profitability of U.S. and Canadian corporations that were the objects of mergers or acquisitions.

The author observes that studies evaluating the profitability of such companies can be divided, by approach, into two groups:

The first approach is **financial** -- the focus in this case is on what happened to the share prices and returns to shareholders of these companies compared with those of a control group formed of companies that were not taken over in the period. In this approach, corporate performance is considered to have improved if the returns to shareholders increase after the acquisition or merger.

Results obtained using this method, largely in the United States but also in Canada, show that corporate takeovers are generally good for shareholders and that stock markets generally react favourably to news of impending mergers and takeovers.

The second group of studies takes an **industrial organization approach** involving a before-and-after-acquisition look at specific aspects of the financial or economic performance of merged and acquired corporations. Trends in these variables, when compared to those of a reference group, provide an indication of the net effect of the acquisition on profitability.

Taking the second approach, **Mcdougall** examines the impact of mergers and acquisitions on corporate decisions and corporate performance, using data compiled by Statistics Canada specifically for the study.

This data relates to a group of firms that were the objects of merger or acquisition between mid-1985 and end of 1987 and all cases selected for analysis had come before Investment Canada for approval. Since that agency reviews only firms above a certain threshold, the companies studied were all large — and all became foreign-controlled as result of the mergers or takeovers

Using standard statistical techniques to disentangle the impact of the takeover on the performance of the continuing firm, **Mcdougall** drew the following conclusions:

- ▶ Corporations that have been taken over by foreign interests increase their capital investment and their R&D spending.
- ▶ Foreign takeovers do not help short-term profitability of the firm taken over -- in fact, the immediate effect is a sharp decline in their profit-to-sales and profit-to-equity ratios.
- ▶ In the longer-run, however, high R&D spending and high profitability seem to go together.
- ▶ Increased capital investment seems to go hand in hand with increased R&D spending, implying that these two inputs complement each other.
- ▶ Economies of scale appear to exist in R&D. As a firm grows, the relative amount of R&D spending it needs to do declines.
- ▶ Corporations taken over by foreign interests

behave differently from those taken over by Canadian interests. The latter seem to register an increase in short-term profitability and, at best, no change in investment in physical capital or research and development.

These findings imply an interesting adjustment by firms to a foreign takeover. One immediate effect seems to be that they seem more willing to invest in R&D or physical capital -- to the extent of accepting short-term reductions in profitability to do so.

This research appears to underline the importance of analyzing the longer-term consequences of mergers and acquisitions profitability.

The relatively poor profitability of the target firm in the period immediately following a **foreign takeover** apparently reflects a period of adjustment during which the firms learn to work together and acquiring companies learn how to make profitable use of their new assets.

Corporate assets are becoming increasingly knowledge-based and intangible, embodied either in some piece of equipment, or in the people within the firm. The internalization and technological competence theories suggest that acquiring these intangible assets is an important motive in making acquisitions. To profit fully from these intangible assets, corporations need time and complementary investments in physical capital and research and development. The findings of our research suggest that these two theories might lead to a correct interpretation of the motives for mergers and acquisitions activities.

Measuring Competitiveness – A New Study

Everyone talks about competitiveness. But what is it, and how do you measure in it? In a forthcoming paper titled *Competitiveness: Concepts and Measures*, prepared for Industry Canada, Professor **Donald G. McFetridge** of Carleton University, presents a convenient and formal (but not overly technical) summary of prevailing views.

The author considers competitiveness at three levels: the firm, the industry and the nation. He points out that concepts can be valid at one level of aggregation but not at another — and that different measures or indicators apply at each level.

The Competitiveness of Firms

McFetridge believes competitiveness is most meaningful when considered in relation to firms. Furthermore, any indication of competitiveness needs to be measured over several periods of time rather than one.

There are some sophisticated measures of the competitiveness of firms. One mentioned in this paper is called “Tobin’s q”. In this case the measuring-stick is the market value of a firm’s debt and equity. If they are less than the replacement cost of its assets, the firm would be considered to be uncompetitive. This would be an indication that some or even all its past investments had been in error.

Other indicators of firms’ competitiveness are average costs relative to the competition (including unit labour costs), total factor productivity (average productivity of all inputs) and market shares.

Competitiveness can also be measured in terms of people’s capabilities — specifically in terms of the calibre of management and the ability to exploit a firm’s unique “core competencies.” The author also cites a 1991 OECD report which suggested that a

variety of factors that have nothing to do with output or input prices can cause case differences in the productivity of labour and capital and the quality and performance of products. Mentioned specifically were scale economies, process systems, size of inventories, management quality, the state of labour relations.

The Competitiveness of Industries

How do we measure the competitiveness of industries and sectors? At this level, says **McFetridge**, comparisons have to be made — a given industry in one region or country must be measured against a counterpart in another with which it is now a trading partner or with which it may be in the future.

He adds that most of the measures of competitiveness used for firms can be applied to industries. Profitability is one: an industry that consistently earns average or above average rates of return in open competition with foreign counterparts can be regarded as competitive. Comparisons can also be made of costs, productivity and market share.

The author notes that in assessing the cost competitiveness of industries, economists have come to regard the cost of capital as a more general indicator than labour costs. He suggests that a broader unit cost measure might incorporate both the cost of capital and the cost of labour.

Two other measures of industry competitiveness are mentioned. One is trade balances. Another is “revealed comparative advantage” — based on the relative share of the world market captured by a nation’s products or product classes.

Sources of comparative or competitive advantage include factor costs, market access and innovation. Factor cost advantages may reflect natural resource or labour endowments — this is the traditional explanation of comparative advantage. Favourable

market access may be the result of locational advantages or of tariffs. Innovation-based comparative advantage grows out of human capital endowments. This advantage can be "engineered" in as much as skills and knowledge can be acquired.

The author refers to Porter's conclusion that productivity is a result of innovation, which flourishes in properly-functioning industrial clusters or "diamonds." The study of clusters, he says, is an attempt to better understand the growth process and to determine where innovation comes from — products, process and organization. Its point of departure is a recognition that innovation does not just happen but is the end result of a long cumulative process of past learning. That process, he observes, is interactive since "we must learn from someone."

This being so, the extent to which domestic firms interact with their customers, suppliers, rivals and the public sector is a factor in their productivity growth and their competitiveness. And, if industrial clusters are indeed the well-spring of innovation, then firms tied in with effective clusters are at an advantage.

The Competitiveness of Nations

The author notes that at the level of the nation, many indicators of competitiveness have been suggested. They fall into two broad classes - one based on real per capita income or productivity growth — the other on trade performance.

The two are not always separate, the author points out, since there may be improvements in "terms of trade" that increase a country's per capita income. These may result from a world-wide excess demand for the goods and services a country exports and/or a world-wide excess supply of the goods and services it imports. In this sense, the "trade" and "per capita income" approaches are related.

Furthermore, says the author, a national "export portfolio" concentrated in high-growth industries

and/or an "import portfolio" concentrated in slow-growth or declining industries may presage an improvement in the future terms of trade, hence, in per capita national income.

Although **McFetridge** is sceptical about measures of competitiveness at the national level, he allows that per capita income growth is the best indicator of a nation's economic success. And, since the most important source of per capita income growth is total factor productivity growth, it too could also serve as a benchmark of national competitiveness.

His summary conclusion:

- ▶ at the firm level, the concept of competitiveness is well-defined and useful;
- ▶ at the industry level the concept can be applied but the fit is not as comfortable as it is at the firm level; and
- ▶ at the national level the concept is not particularly useful. It is most important at the firm level, and nations are not firms.

What makes Firms and Industries Flexible? And Why?

Why does Japan seem to invest more in Flexible Manufacturing Systems (FMS) than Canada or the United States? Interest in this question led CIRANO (Centre interuniversitaire de recherche en analyse des organisations) to make a wider study of the relationships between strategic technological choices and their impact on economic growth.

Last December, **Dr. Marcel Boyer** reported some of the findings of this study in a lecture in Industry Canada's Distinguished Speakers in Economics series. **Dr. Boyer** is Vice-President and Scientific Director of CIRANO and Professor of Economics at the University of Montreal.

In his paper, **Dr. Boyer** identified certain characteristics that have made FMS popular throughout the world. One is that although these technologies cost more in terms of initial investment, they cut subsequent setup costs significantly. This permits more product and volume flexibility in terms of lead time, unit variable cost, and average batch size.

The research suggests that the flexibility of a given industry depends on six factors: the size of the market, the variability or risk in the level of demand, the price sensitivity of demand, the average cost-minimizing level of production, the additional investment cost required for a flexible technology, and the minimum level of the average variable production cost of an inflexible technology.

What about the flexibility of firms? According to **Professor Boyer**, whether a given company chooses a flexible technology or an inflexible one depends partly on efficiency or cost considerations and partly on strategic ones. The latter include: the selection of the amount produced in a situation given an unknown market size, variability or risk in the level of demand, and competitors' reactions to particular technological and production choices.

The research suggests that these new technologies are likely to cause very significant changes in both the terms of competition and in growth patterns. This will happen as shifts in production processes, caused by FMS, trigger changes in the internal organization of firms, their market environments and their relationships with suppliers and customers.

Flowing from the research are some predictive assumptions about corporate behaviour *vis-a-vis* technologies such as FMS. In a given firm, the value of flexibility will increase with the intensity of competition and in step with increases in the size of the market. Under the pressure of competition firms can be expected to switch, one at a time, from an inflexible technology to a flexible one. Finally, as the investment cost of these technologies go down, their use will increase.

**From Paul Romer:
A Plan for Fostering Innovation**

Given a fixed resource base, the most important factor in the growth of an economy is innovation, says **Paul Romer**. That being so, it is crucially important to have institutional frameworks in place that foster innovation. One of the ways that policy can influence the rate of economic growth, therefore, is through its impact on the institutional framework.

Romer, who is one of the foremost economic authorities in the area of knowledge-based growth theory, spoke on this theme in a January presentation in Industry Canada's Distinguished Speakers in Economics lecture series.

Precompetitive research is an area critical to innovation-building because the knowledge or "non-rival goods" developed at this stage can be used with equal value by large numbers of firms as more productive inputs to production. As a result of this characteristic, non-rival goods have high social rates of return — estimated at 30 to 50 per cent.

Precompetitive R&D generally involves very high initial investment. This feature requires sufficient intellectual property protection for appropriating the benefits resulting from possible product and process innovation. However, that leads to some degree of monopoly power and obstruction of the optimal distribution of non-rival goods. As a result, these factors lower the social rate of return and the economic growth rate.

To get around this problem and stimulate innovation and economic growth, **Romer** suggests that the government *institutionalize* the type of industrial alliance that has proven successful in financing R&D. **Romer** proposes establishing a regular procedure which would allow for the sharing of high development costs and industry selection of promising investment opportunities. Companies of a given industrial sector could collectively finance

knowledge-oriented investments by agreeing upon and imposing a self-initiated levy on the entire industry. Revenues would be retained within the industry to finance investment projects with large positive spillover effects. Because the entire sector would contribute to the financing, research results and other benefits would be freely available to all companies in the industry.

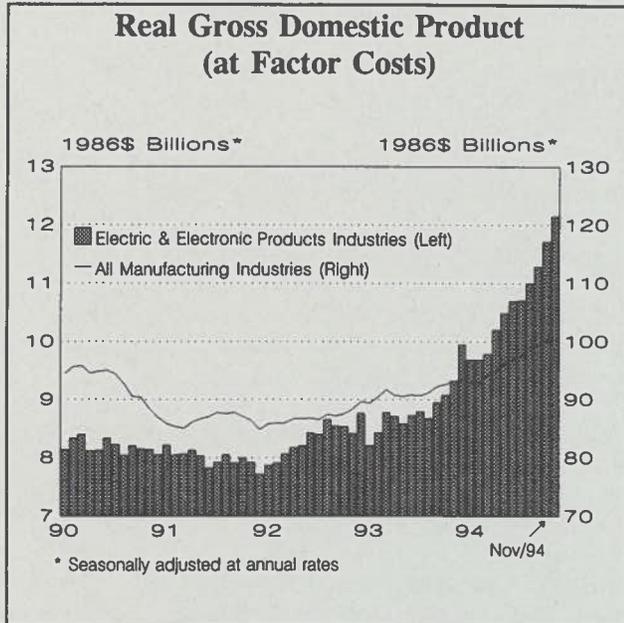
Industry would have to apply to the federal government for permission to establish a board to finance a given industry-specific public good. The government would be responsible for analyzing industry proposals and judging their merits. It would also be available to provide guidance in the initial determination and development of project targets.

If government sector experts found merit in a proposal, they would convene hearings to confirm that it addressed a genuine public need. If it did, the next step would be a vote within the industry to ensure that a minimum specified majority of firms supported the proposal. If a large enough fraction of the industry supported the initiative, a modest, agreed levy would be imposed on the entire industry. Proceeds would be returned to the industry to finance the specified initiative.

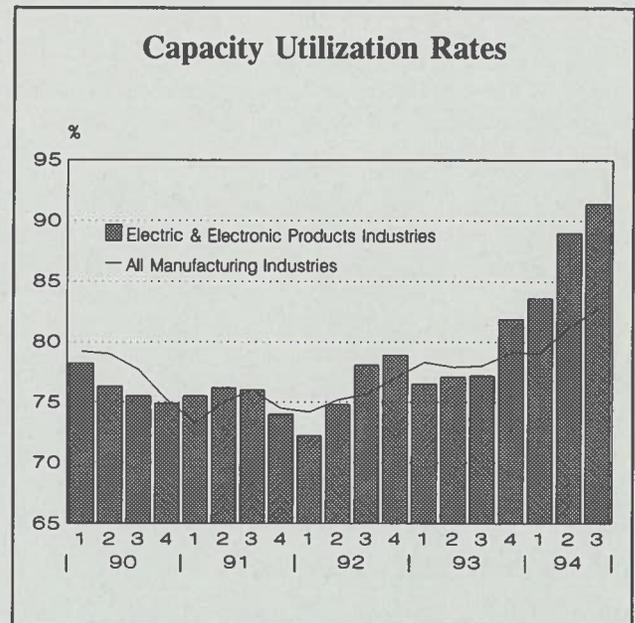
This approach would promote primary innovation and its secondary spillover effects, without recourse to government financing, loan guarantees or tax credits.

FROM THE COMPETITIVENESS NOTEBOOK

Spotlight on Electric and Electronic Products Industries



Source: Statistics Canada



Source: Statistics Canada

- The manufacturing sector was hard hit by the recession and was slow to recover. Last year marked the first strong year of growth in quite some time. The key factors fuelling growth were the continuation of both the export boom and strong business investment in machinery and equipment.
- The electric & electronic products industries were leading contributors to the manufacturing performance. The products of these industries include: office, store and business machines; small and major appliances; home audio and video equipment; electronic equipment; batteries; and, communications, energy wire and cable.
- Electric & electronic products (EEP) industries have experienced significant growth since the trough of the recession. In November 1994, the output of these industries was 57.5 per cent higher than in December 1991. For all of manufacturing, the increase was only 20.0 per cent. As a consequence of faster growth, EEP industries' share of manufacturing output has risen 2.8 percentage points to 11.9 per cent.
- Part of their success can be attributed to substantial efforts to improve competitiveness, for instance by restructuring, shedding labour and moving to world product mandates. Unit labour costs have come down significantly and productivity has been rising.
- EEP industries were able to raise production quickly by utilizing unused capacity. These industries are now operating near full capacity.

PUBLICATIONS

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No. 3 - *International R&D Spillovers Between Canadian and U.S. Industries*, Jeffrey I. Bernstein, September 1994.

No. 4 - *The Economic Impact of Mergers and Acquisitions on Corporations*, Gilles McDougall, February 1995.

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No. 4 - *Gender Tracking in University Programs*, Sid Gilbert and Alan Pomfret, March 1995.

Industry Canada Discussion Paper Series

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