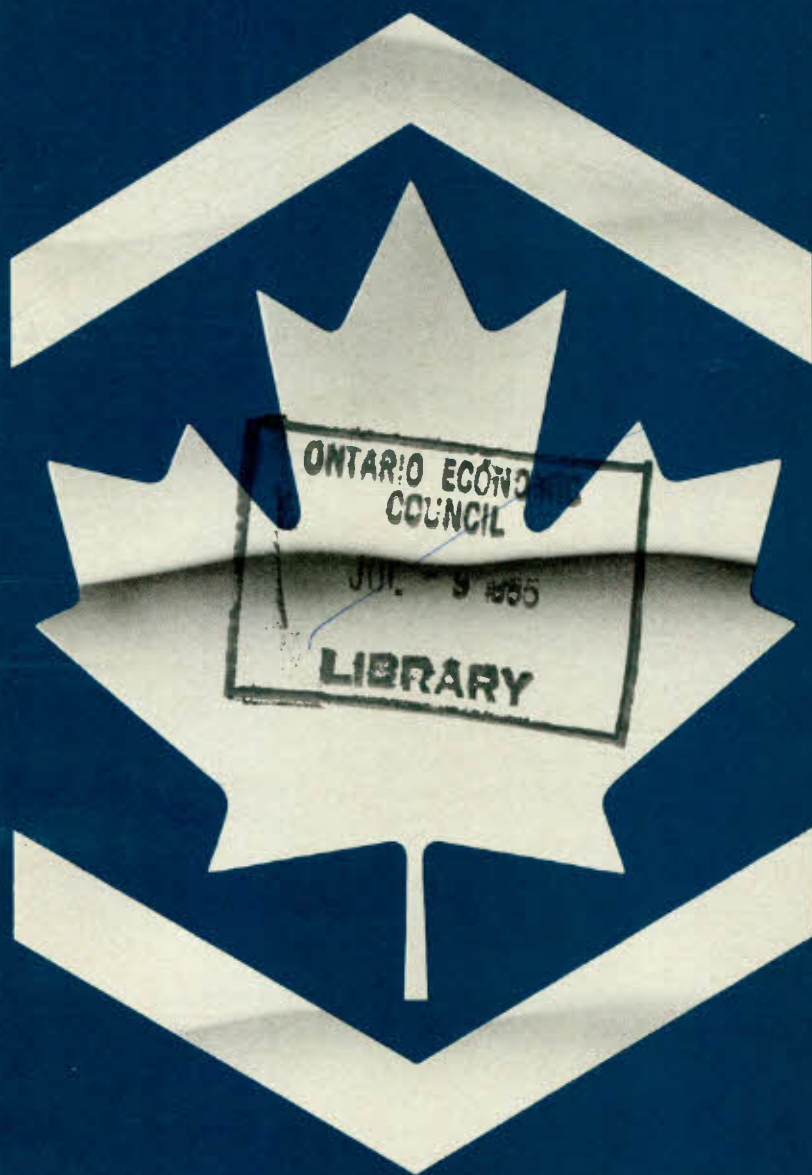


au courant

Economic Council of Canada

Volume 6, No. 1, 1985

Tech change and jobs



- R & D subsidies off target
- Canada's new oil supplies
- Council members appointed

PUBLICATIONS

Research Studies

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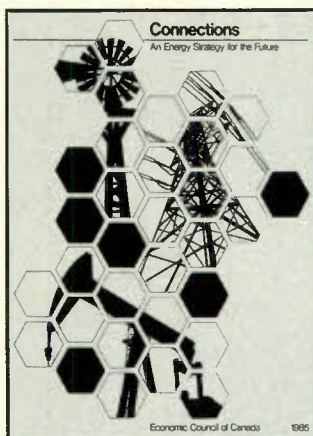
Structural Change and Industrial Policy: The Redeployment of Canadian Manufacturing, 1960-80, by R. A. Matthews. (EC22-127 / 1985E; \$6.95 in Canada, \$8.35 elsewhere).

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Tech change and the job market

Will the newest wave of technological change simply wipe out thousands of jobs across a whole range of industries? Or will emerging technologies create enough new employment to offset any losses in the traditional sectors of the economy.

On this score, historical evidence concerning the impact of tech change on employment seems to be reassuring – new jobs invariably appear as outmoded ones vanish. Whether that pattern will continue in the future (which some analysts doubt) is a question currently under investigation in the Economic Council's new project on the impact of tech change on the labour market (*Au Courant*, vol. 5, no. 4). And Council researchers have come up with some early and interesting results.

Past patterns

Tech change is nothing new. In fact, it's been a force to reckon with since the late eighteenth century, when the Industrial Revolution began introducing new machinery, methods, and organization to the world of work. The resulting factory system, for example, radically transformed the meaning of work, its pace, and its rewards for literally millions of people. The development of the textile industry, railroads, steel, and steam in the nineteenth century hastened the transformation of society from a largely agrarian to an industrial one; and the internal combustion engine, the assembly line, and advances in chemistry and electricity sped up that process in the twentieth century.

This process of change was accompanied by massive shifts in the employment structure. As the chart on this page shows, over one-third of Canadian workers in 1911 had jobs in the primary industries (agriculture, forestry, fishing, mining and oil wells); by 1981, that proportion had dwindled to 7 per cent. The increasing industrialization that caused this decline is also reflected in the employment growth that took place in the secondary sector (manufacturing and construction) between 1911 and 1951. That has now levelled off, while employment in the tertiary sector (which includes transportation, communications, and utilities; trade;

finance, insurance and real estate; community, business, and personal services; and public administration and defence) has rocketed from about one-third of all jobs in 1911 to two-thirds in 1981.

Present situation

Many observers maintain that a new industrial revolution is now under way, based on information processing, telecommunications, robotics, biotechnology, and advanced materials. They contend that the rapid pace of change in these new technologies and their diffusion could have a traumatic effect on the adjustment and adaptation of workers, and that more jobs will be destroyed than created. And they question whether, in today's bleak economic climate, the emerging technologies can provide enough jobs to offset the erosion of new job opportunities in the more traditional sectors of the economy.

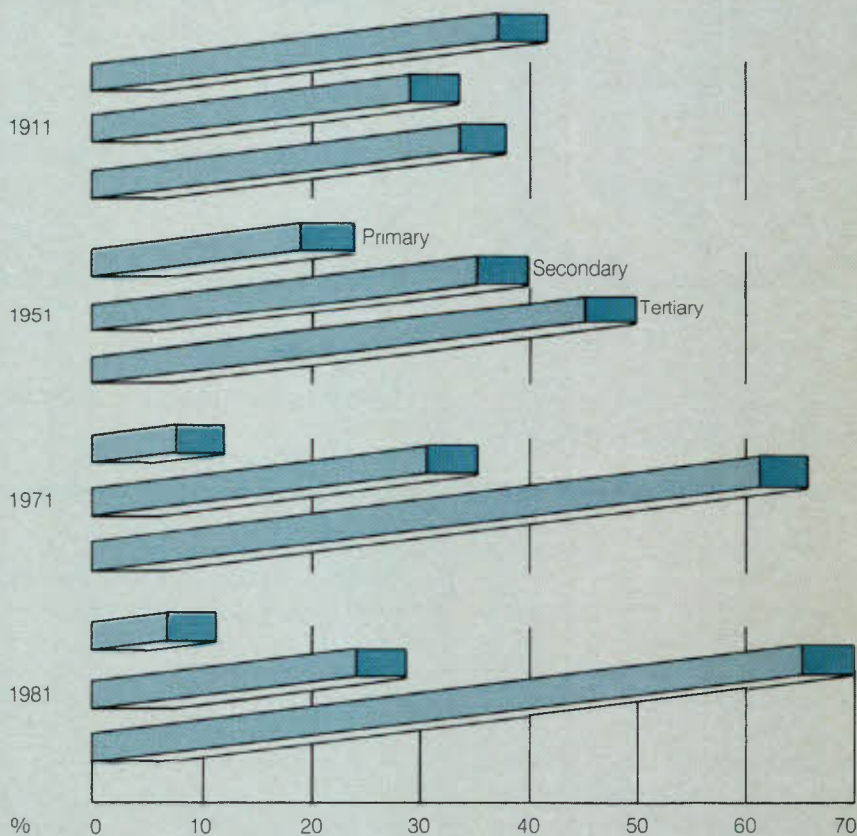
In the light of these concerns, researchers on the new Council project decided to examine the employment record of Canada's "high-tech" industries.

What's high tech?

While most people have a hazy idea of what constitutes a high-tech industry, Council researchers found it hard to pin down one unanimously accepted definition. Two, however, appear to predominate. The first, which might be called the R&D definition, accords the high-tech label to those industries with above-average ratios of research and development spending to total investment expenditures. The second, or Sci-Tech, definition includes those industries with large proportions of scientists, engineers, and technical employees. Since neither definition seems entirely satisfactory, Council researchers are currently developing

How employment has shifted over time

Employment patterns by industry sector in Canada, 1911-81



one, based more on the technological sophistication of the products produced and/or used by an industry.

In order to assess the high-tech employment record, Council researchers looked at a set of 33 industries fitting the Sci-Tech definition and compared their employment figures in the 1971 Census with those a decade later. These industries were first identified in a study undertaken for the Canada Employment and Immigration Commission.

Research results

The first major finding of the research team is that between 1971 and 1981 employment in the high-tech industries grew considerably faster than the 3.1 per cent average annual growth rate for Canadian industry as a whole. The second chart shows that the average yearly growth rate for the high-tech industries was 3.9 per cent. This result may be compared with U.S. figures for the period 1969-79, which show little difference between employment expansion in the high-tech sector and that in the economy as a whole.

Twenty of the thirty-three Canadian

high-tech industries chalked up annual employment growth rates in excess of the all-industry average. Compared with the 3.1 per cent annual growth rate for the whole economy, a group of five closely related high-tech industry "stars" stand out. The Computer Services industry, with an annual average job creation record of 21.2 per cent per year, was clearly the leader, followed by Offices of Management and Business Consultants at 17.9 per cent, Miscellaneous Services to Business Management at 9.4 per cent, Engineering and Scientific Services at 7.9 per cent, and Offices of Architects at 7.1 per cent. However, these impressive growth rates must be placed carefully in perspective, Council experts warn. Inspection of the chart reveals that Canadian high-tech industries as yet account for only a relatively small (one-quarter) slice of the overall employment pie. The high-tech sector accounted for 23.6 per cent of total Canadian jobs in 1971 and increased that share to 25.5 per cent in 1981 (by contributing proportionately more than its share of the total jobs added over the decade).

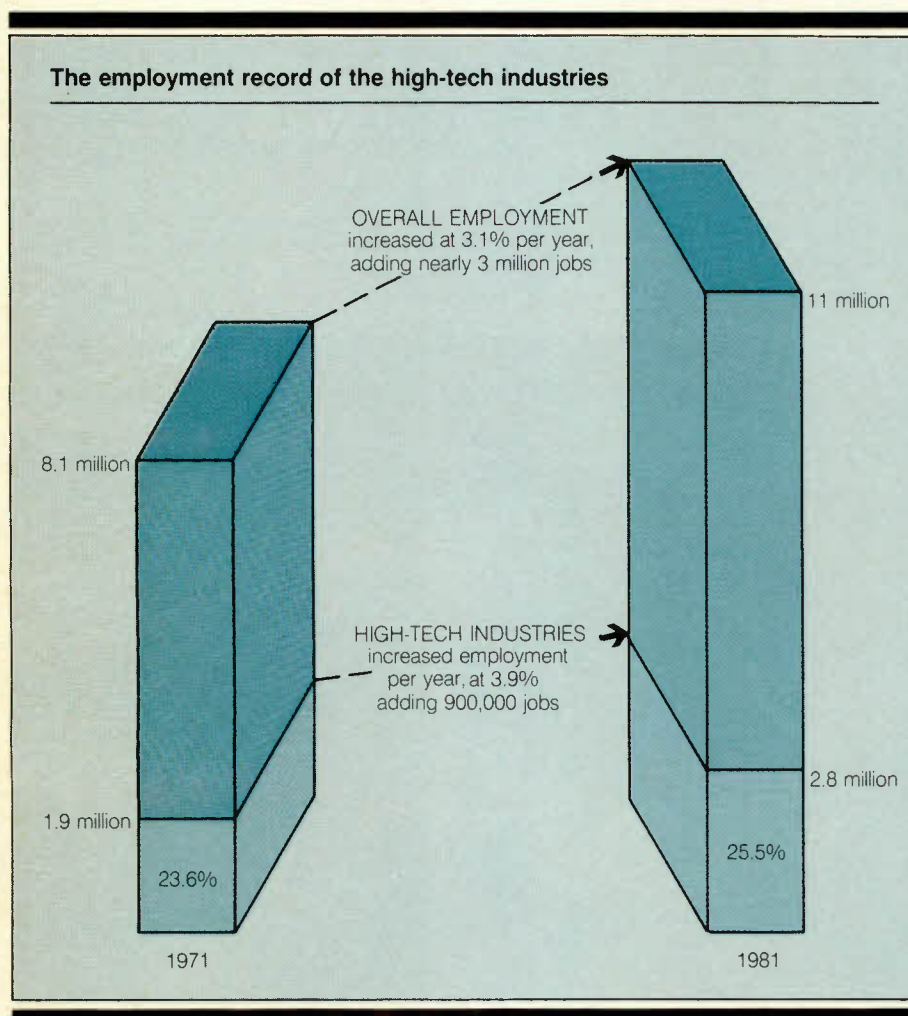
But even the aforementioned "star"

performers in terms of rapid growth accounted for such a minor proportion of total employment that their contribution to job creation in 1971-81 was relatively small. Together, the five industries accounted for only 1.1 per cent of total Canadian employment in 1971. Thus the addition of 145,245 jobs in that group accounted for only 5 per cent of all new jobs created in the decade.

What's in store?

The 1981-82 recession led to a massive job loss: some 595,000 jobs disappeared between September 1981 and November 1982, for example. Though some employment gains have been made recently, staffing levels are still below pre-recession levels in some industries. Always bearing in mind that the prospects for improvement depend on the performance of all sectors, can high-tech industries improve the employment outlook? A prudent response would reflect guarded optimism, project researchers say. If the trend of the 1971-81 period were to continue, employment in the high-tech sector would continue to grow faster than employment in the overall economy; its share of jobs would thus increase and so, correspondingly, would its total addition to national employment.

Set against this are two disquieting considerations. First, dynamism and flux mean dislocation. The very process of change that creates new vistas for some will leave others stranded and desperate. That means policies must be framed to ease the trauma of workers in transition. As well, some analysts suggest that the quality of the unfolding employment structure may be changing in a fundamental way. Clearly, not all jobs in high-tech industries are high-tech jobs. But many may not even be "good" jobs. Even in Silicon Valley – the high-tech mecca of the United States – some production and assembly jobs are poorly paid. Furthermore, the new technologies are bringing new health and safety problems to the workplace. In particular, there are fears about the distribution of occupations. Many U.S. analysts maintain that future job growth will be at the top and bottom of the occupational ladder, while job opportunities in the middle will be eroded, with obvious consequences for income distribution. The Canadian evidence on this issue is as yet unclear. It remains a major challenge for Council research.



More women now hold "male" jobs

Working women have made some impressive gains over the past decade in their quest for equal status with men in the labour market.

That progress is largely due to the career choices of younger women, who have made real inroads into the higher-paying, traditionally "male" occupations in recent years. Older women still tend to opt for the so-called "female" occupations that are often lower-paying.

In a study undertaken as part of the Council's modest research program on the economic status of women in the labour market, economists Jac-André Boulet (of the Economic Council) and Laval Lavallée (of the Canadian Industrial Renewal Board) use Statistics Canada census data to trace the changes that occurred in the labour market situation of women between 1971 and 1981.

Changes over the decade

Over the decade, the authors find, almost two million women entered the labour force – far more, proportionately, than did men. Just under half of those women – most of them under 40 years of age – chose occupations that were male-dominated in 1971. For example, the number of female doctors more than doubled over the decade,

increasing from just under 3,000 in 1971 to 6,500 in 1981. Similarly, there were nearly 5,000 women lawyers in 1981, compared with only 770 ten years earlier; about twice as many university teachers; and about six times as many government administrators.

This younger group succeeded in pushing up the average earnings of female workers from 51.2 per cent of that for male workers in 1970 to 54.4 per cent in 1980. On an hourly basis (a more accurate measurement in the authors' opinion, since it excludes the differences in hours worked) female earnings rose to 72 per cent of male wages in 1981 from 66 per cent a decade earlier.

Gains offset

These gains would have been more significant, however, had they not been offset by the tendency of an even larger group of women (mostly over 40 years of age) to follow traditional occupational paths. Many of the jobs chosen by that group are poorly paid, the authors note. The numbers of women in the 20 lowest-paid occupations – babysitters, waitresses, and hairdressers, for example – increased over the decade, in some cases substantially.

The concentration of women in these low-salary jobs accounts for most of the

persistently large difference in average earnings between the sexes, the authors say. As more and more women move into the well-paid "male" professions – and hence into the high-income brackets – that wage gap should narrow dramatically. The authors point to a 54 per cent jump in female university enrolment in the 1970s as an encouraging sign that this shift is well under way.

Problems remain

Boulet and Lavallée caution against complacency, however, in the face of recent improvements. A number of serious problems that affect women in particular – such as the poverty confronting the elderly and most single-parent families – demand enlightened policy action, in such forms as improved pension rights and stricter enforcement of maintenance support payments. Other concerns also require attention: adequate daycare, better training programs, and more diversified curricula for female students are some of the goals to be met if women are to improve their economic status.

The Changing Economic Status of Women, by Jac-André Boulet and Laval Lavallée (EC22-122/1984E; \$6.95 in Canada, \$8.35 elsewhere).



Women no longer choose only "female" jobs

Government R&D grants miss the mark

Each year private firms get millions of dollars from the public purse to help them finance research and development (R&D). Surprisingly, the government doesn't know if it's getting its money's worth (nor does anyone else).

The reason, according to a Council study of five R&D subsidy programs administered by the federal government, is that methods of selecting and evaluating R&D projects lack substance. On the whole, the study concludes, administrators of these programs simply fail to ask the right questions, making it impossible to determine effectively which projects warrant support and whether or not the benefits to society outweigh the costs of subsidization.

Council economist Abraham Tarasofsky, who undertook the study as part of the Council's research into technology and productivity (*Au Courant*, vol. 4, no. 1), bases his findings on a thorough analysis of the Enterprise Development Program, the Defence Industry Productivity Program, and three smaller subsidy programs.

The first two are administered by the Department of Regional Industrial Expansion; the others, by the National Research Council. And while each scheme has its own objective, all are intended to promote innovations in industry.

A suitable yardstick

Tarasofsky looks first at the rationale behind government subsidies and the practicalities of determining their effectiveness. This provides a suitable yardstick against which to measure the programs in question.

In essence, subsidies are supposed to encourage firms to undertake projects that are in the interests of society but would not otherwise be undertaken, usually because the costs to a firm exceed the returns it can expect within a reasonable time period. That, in itself, is one of the key guidelines that Tarasofsky recommends for determining the objective need for a subsidy and its optimal amount.

Other criteria include whether or not a subsidy would displace a similar project by another firm and whether or

not it would benefit society at least as much as the cost of handing it out. The cost, when processing, financing and tax considerations are included, adds up to 81 cents on every dollar granted.

Tarasofsky's research also breaks new ground in describing a workable method for calculating the benefits to society of subsidizing private innovation. These gains, which he terms "inappropriate benefits," accrue as price reductions in the innovation's ultimate product and in the number of

cost-benefit analysis. A third (the Technical Information Service), by providing information and advice to smaller firms that would otherwise go without, probably has a positive overall impact, Tarasofsky says.

Unique problems

The Defence Industry Productivity Program presents unique problems in that some of the data required for sound judgment of its effectiveness must be withheld for national security

The collective story to date has been one of failure to ask — let alone answer — the right questions.

units sold over time — benefits that are measurable from the same data that companies produce to estimate their own returns from an R&D activity.

The results

Regrettably, these criteria have little bearing on the way that subsidy programs actually operate. Under the Enterprise Development Program, Tarasofsky studies six of the largest projects granted funding. Only one of them, he finds, comes close to meeting his suggested conditions, while the others "probably would have been pursued" without government aid.

The program's most striking administrative shortcoming — and one that applies equally to the other programs analysed — lies in its failure to consider the benefits to society of granting a subsidy and to determine whether the benefits exceed the costs. As such, Tarasofsky recommends adopting the guidelines identified earlier, arguing that this could be accomplished "fairly readily." He also calls for the development of a comprehensive monitoring and evaluation system as "an indispensable element of an efficiently administered subsidy program."

His analysis of three smaller subsidy programs led him to conclude that two (the Industrial Research Assistance Program and the Program for Industry/Laboratory Projects) lack adequate

reasons. Also, projects of this nature are undertaken largely for export purposes, making it difficult to measure the resulting benefits to Canadian society. Indeed, the author has serious reservations about whether any such benefits do in fact accrue. And even by the program's own standards, a large proportion of the projects it supported "were probably failures," Tarasofsky reveals, adding that in many instances losses were allowed to grow beyond a reasonable limit.

Tarasofsky recommends that a public group — perhaps an all-party parliamentary committee — be empowered to oversee and review spending under this program. And because of the difficulties in assessing the benefits to society of subsidizing defence-related innovation, he suggests that the program shift its focus from subsidizing specific projects to supporting firms in general, to the extent that this is necessary to induce them to remain in defence production.

Collectively, the story to date with respect to Canada's R&D subsidy programs "has been one of failure to ask — let alone answer — the right questions," Tarasofsky concludes.

The Subsidization of Innovation Projects by the Government of Canada, by Abraham Tarasofsky (EC22-121/1984E; \$7.95 in Canada, \$9.55 elsewhere).

THE OUTLOOK FOR CANADA'S

Is Canada doing a first-rate job of developing its ample oil resources?

That's a question the Economic Council raised in the course of its three-year study on energy (*Au Courant*, vol. 5, no. 3). It concluded that two major changes in domestic oil policy – tying domestic prices to world prices, and establishing more efficient tax and incentive structures for exploration and development – would boost oil production considerably.

As part of that investigation into the oil supply situation, the Council looked at the broad picture of costs, prices, and profitability for Canada's potential sources of new oil. The resulting case studies have been set down in a number of discussion papers, several of which are highlighted on the following three pages. (All were written prior to the recent federal/provincial energy agreement.) One deals with the prospects for frontier oil in the Beaufort Sea; another analyses the policy framework governing oilsands projects; and a third considers the viability of enhanced light-oil recovery from conventional pools in three Alberta projects.

The Beaufort Sea

The Beaufort Sea region is one of the key frontier areas currently under exploration for possible oil and gas production. The area is of particular interest in the unfolding of Canada's oil supply prospects because geographically it is the northward extension of the Western Basin, where most of this country's oil is currently being produced.

While prospects look good for the Beaufort, its remoteness, weather conditions, and consequent high exploration costs slow the pace of exploration. Inevitably, the companies making the investment and the federal government, which subsidizes it, are asking themselves whether their gamble will pay off. With that in mind, economists Peter Eglington and Maris Uffelman, assisted by two Beaufort operating companies (Gulf Canada and Dome Petroleum) look at three key factors: the viable minimum project size, the potential for low-cost oil, and the effect of the fiscal system under the National Energy Program for frontier areas.

The authors determine the approximate minimum oil-reserve size that would allow for viable economic development – that is to say, the minimum size at which development costs (including production and transportation to Montreal) would break even with the Montreal oil price. Dome Petroleum calculations put this size in the range of 35 to 55 million cubic metres for a single platform development offshore, under the Canada Lands fiscal system prevailing at that time and assuming unchanging oil prices. The mid-range of this reserve estimate would mean about 280 million barrels.

This estimate is interesting for two particular reasons, say the authors. First, smaller-scale "pilot" development, which is environmentally less risky and socially more acceptable, could pave the way for larger-scale development. Second, it increases the probability of economic supplies from the Beaufort, since small reserves are more likely to be discovered than large ones.

The authors also assess the potential for acquiring relatively low-cost oil from the Beaufort, assuming extremely favourable physical and economic conditions (however unlikely). They reach an optimistic conclusion in this regard, observing that "although the Beaufort oil play is extremely risky, it is entirely possible that the per-cubic-metre cost of oil will prove itself to be lower than other sources of oil in Canada." The authors estimate the lowest possible per-cubic-metre cost (excluding taxes and royalties) of producing and delivering this oil to Montreal, at between \$10 and \$15 a barrel.

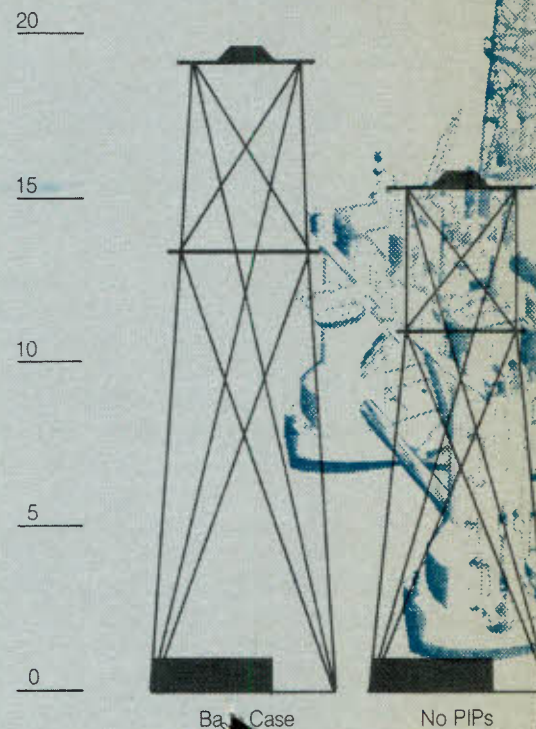
Finally, the authors evaluate the appropriateness of the prevailing Canada Lands fiscal regime for future development. The top chart illustrates some of their results for a single platform project. The "base case" assumes the existing Canada Lands fiscal regime is in play for the development cycle. That includes the Base Royalty of 10 per cent on gross revenue, the Petroleum and Gas Revenue Tax (PGRT) at 12 per cent on operating revenue, the 25 per cent government "back-in" provision (allowing the federal government a retroactive share in

How a fiscal regime can affect profitability

Beaufort Sea

Real rate of return for a 64 million cubic metre, single platform development offshore, under various assumptions

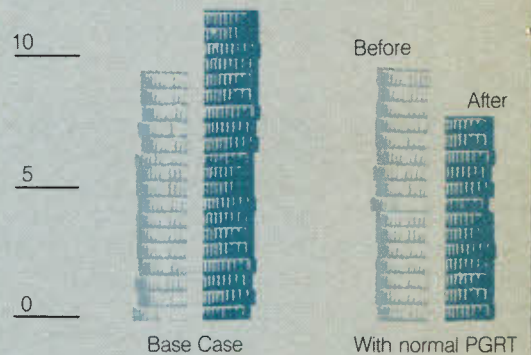
25 Per cent



Wolf Lake

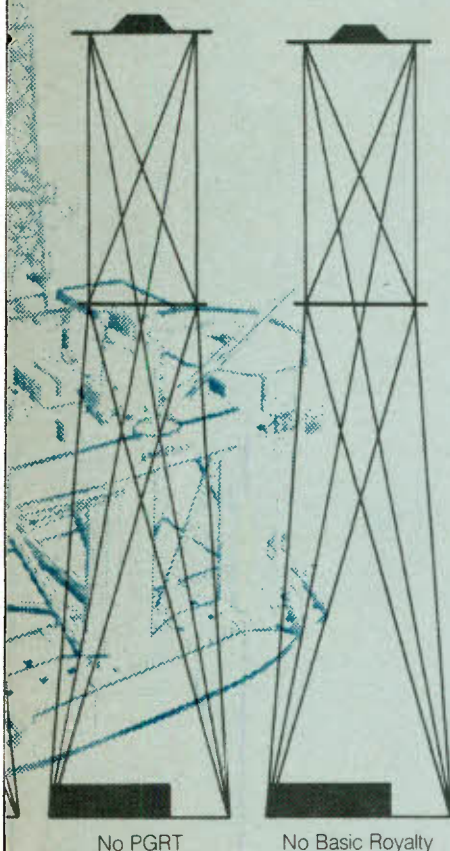
Real rate of return (before and after taxes and royalties)

15 Per cent

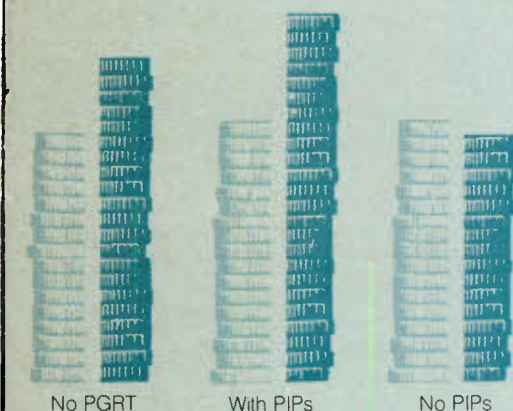


NEW OIL SUPPLIES

platform project



es)



the benefits of frontier development), the 40 per cent Progressive Incremental Royalty (PIR) on profits, and the 20 per cent Petroleum Incentive Program (PIP) on intangible development expenditures.

As a result of their overall analysis, the authors reach the following conclusions:

- The general outlook for the Beaufort is encouraging, given the feasibility of a relatively small threshold reserve size and the possibility of acquiring relatively low-cost oil.
- The Basic Royalty and the PGRT do not respond to changing economic conditions; the PGRT becomes particularly damaging when circumstances deteriorate, while under improving conditions it fails to capture a larger share of net revenues.
- PIPS are valuable primarily in the exploration phase of activity; thereafter, they do not appear to be all that important.
- The only fiscal mechanism that really works is the PIR, which is designed to collect revenues only if a certain level of profitability is reached; however, its effectiveness in taking a growing share of the profits is hampered by the deduction of the Basic Royalty and the PGRT.
- A more efficient system might result from replacing the PGRT by a PIR that would take effect at an earlier stage and at a lower profit level.

Oilsands

Oilsands policy has undergone some fairly radical changes over time, Eglington and Uffelmann found, when they looked into that particular source of new oil in another research endeavour. For the purpose of their analysis, the two economists assess two types of oilsands projects: a mining megaproject – Alsands – which has been shelved for an indefinite period, and an experimental *in situ* project – Wolf Lake – scheduled to begin production this year.

Alsands

This project did not go ahead for a number of reasons, including policy concerns. But the main reason for the deferral is that, at a cost of \$315 per

cubic metre (before taxes and royalties), the project would not be economically viable. The authors observe, however, that “to the extent that lessons were learned, there was perhaps some value in the effort.”

Wolf Lake

This project is an example of the state of oilsands policy in 1983 and, according to the authors, gives evidence of “a more pragmatic approach to policy making and negotiation on the part of both government and industry”. (BP Exploration Canada and Petro-Canada Exploration Inc. each hold a 50 per cent share in the undertaking.)

As Wolf Lake is likely to serve as a model for future oilsands projects, Eglington and Uffelmann carry out a thorough examination of the effectiveness of the fiscal regime governing the project, to determine whether it allows for the efficient collection of economic rents and responds well to changing levels of profitability.

The bottom chart illustrates some of their findings. The base case assumes that real prices and costs remain constant, under prevailing fiscal arrangements. The main conclusion to be drawn from their analysis (apparent in a comparison between the rates of return before and after taxes and royalties) is that “the fiscal regime is quite responsive to the economic conditions under which the project operates. As the conditions become more favourable, the governments receive more revenue.”

The authors caution, however, that without an oil price increase, surplus revenues for governments are unlikely, while declining prices would render the project uneconomic. “Oil from the Wolf Lake Project is relatively high-cost oil,” they warn, “and since there are a number of experimental features, the project is subject to potential technological failure.”

“An Economic Analysis of Hydrocarbon Developments in the Beaufort Sea,” by Peter Eglington and Maris Uffelmann. Discussion Paper No. 258.

“An Economic Analysis of Oilsands Policy in Canada: The Case of Alsands and Wolf Lake,” by Peter Eglington and Maris Uffelmann. Discussion Paper No. 259.

How revenues could be affected by oil price changes

South Swan Hills

Existing situation
(oil price constant)

Oil price increase

Oil price decrease

Deregulation

\$1983 millions

0 40 80 120

Nipisi Gilwood

Existing situation
(oil price constant)

Oil price increase

Oil price decrease

Deregulation

\$1983 millions

0 20 40 60

Violet Grove

Existing situation
(oil price constant)

Oil price increase

Oil price decrease

Deregulation

\$1983 millions

-2 0 2 4 6

Enhanced light-oil recovery

In another undertaking, economists Peter Eglington and James Nugent assess the cost of extracting light oil by means of a process known as "miscible flooding" (whereby a reservoir is flooded with fluids that mix readily with crude oil). Three projects in Alberta – at Violet Grove, Nipisi Gilwood, and South Swan Hills – were analysed to determine their economic viability, under both the fiscal system prevailing at that time and a variety of different assumptions.

The accompanying charts illustrate some of the results. Evidently, South Swan Hills and Nipisi Gilwood are currently very profitable projects, whereas Violet Grove is only marginally economic and, as such, riskier to develop. Under the prevailing fiscal system, the federal and, to a larger extent, the provincial governments skim off approximately 84 per cent of above-normal profits (or "economic rent") from South Swan Hills and Nipisi Gilwood, leaving about 16 per cent for the private sector. Surprisingly, the authors note, in the much less profitable Violet Grove, the governments take 95 per cent of above-normal profits, leaving the company with only 5 per cent. The authors ascribe this result partly to the impact of a particular royalty relief clause, which is less effective on low-productivity projects.

Changing oil prices

When real oil prices rise by 5 per cent a year, all three projects become more attractive; when real prices fall by the same percentage, Violet Grove ceases to be viable, but the other two projects weather the drop. All three are adversely affected by oil price deregulation, although Nipisi Gilwood and, to a lesser extent, South Swan Hills remain profitable. Deregulation has this negative effect, the authors explain, as a consequence of the accompanying shift to "new" oil (post-1974 oil) prices and royalties. With this change, pricing incentives in existence under the current old-oil/new-oil pricing policy are eliminated, and their disappearance is sufficient to make Violet Grove uneconomic. As well, royalties payable actually increase under deregulation, even though royalty rates decrease. The federal share of net revenues remains more or less the same, but the provincial share rises in all three cases, with Violet Grove being hit by the steepest increase (from 58 to 64 per cent).

Conclusions

The authors draw a number of conclusions from these findings. The deregulation results, they say, imply that as domestic oil prices approach world oil market levels, policy makers will need to ensure that economically viable projects are cushioned from the negative effects of deregulation. They also recommend a number of changes in the prevailing system of taxes and royalties, both to give a bigger boost to marginal projects and to handle fluctuations in economic rent more efficiently. The authors point out that it is in Canada's interest to encourage marginal projects, since the cost (before taxes and royalties) of their development is still less than the cost of imported oil. As well, they note, the province should take a larger share of the technological and economic risks of development, as well as the benefits, and should thus be receiving a larger slice of the revenue pie when returns are greater than expected and a smaller one when the reverse is the case.

"An Economic Analysis of Enhanced Oil Recovery in Conventional Light Oil Pools in Alberta," by Peter Eglington and James A. Nugent. Discussion Paper No. 260.

Electricity rates: a boon for consumers

Consumers of hydro-electricity in Canada have a super deal going for them.

They're paying much less for electricity than long-run production costs warrant, say Richard Zuker of the Economic Council and Glenn Jenkins of Harvard University, in a recent Economic Council publication.

Written as part of the Council's examination of federal-provincial fiscal relations – which culminated in a major report, entitled *Financing Confederation: Today and Tomorrow* (see *Au Courant*, vol. 2, no. 4) – the study measures the size and distribution of hydro-electricity benefits as they are reflected in above-normal profits or “economic rent.”

Authors' approach

These benefits are harder to determine for hydro-electricity than for oil and gas, the authors note, since generally speaking they are not collected as revenue by provincial governments, but instead are passed on to consumers in the form of lower electricity rates. So Zuker and Jenkins develop a method of calculating these gains, by comparing the 1979 cost of the current systems including hydro, with the cost of the least expensive all-thermal alternative – a mainly coal or nuclear system.

The authors include in their estimates such elements as operating and maintenance expenses for hydro generation, transmission, and distribution; the cost of purchased electricity; and, most important, the cost of capital. They look at similar aspects of the all-thermal system.

They focus their analysis on Quebec, Ontario, Manitoba, and British Columbia, since these provinces generated 93 per cent of Canada's utility-produced hydro-electricity in 1979. But since they sell their electricity to other provinces as well, the authors also determine the benefits of low-cost hydro for electricity users throughout the country.

Results

Their research led Zuker and Jenkins to reach the following conclusions:

- The “rent” generated by utilities in the four provinces studied – as evi-

denced by the difference in costs between the hydro and all-thermal systems – amounted to almost \$4 billion in 1979. Quebec accounted for \$1.8 billion; Ontario, for \$753 million; Manitoba, for \$522 million; and British Columbia, for \$819 million.

- When these amounts are broken down into unit costs, the benefits of low hydro prices to individual consumers become very clear. The authors' calculations indicate that transforming benefits into unit costs and adding them to 1979 hydro revenues would more than double the power bills of consumers in British Columbia and Manitoba, and almost double them in Quebec. Rates in Ontario, on the other hand, would rise by only 27 per cent, because hydro accounts for a much lower proportion of total power there than in the other three provinces.

- Nearly \$500 million in hydro

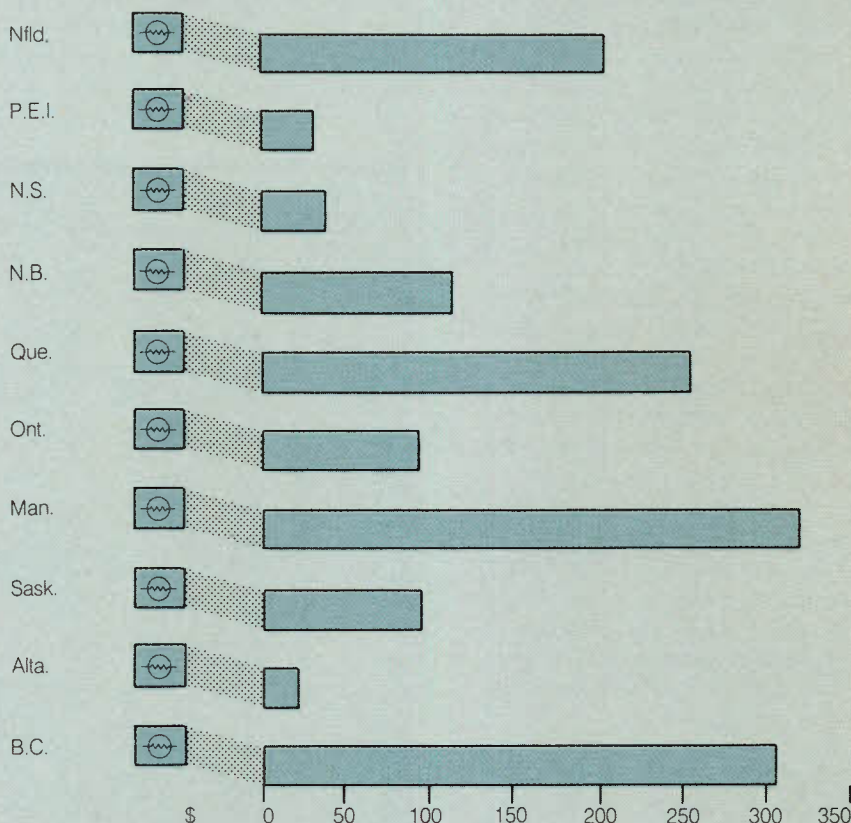
“rent” is lost through exports to the United States.

- Electricity users everywhere benefit from low-cost hydro power through electricity trade. The gain to consumers averages about \$165 per person across the ten provinces, but as the chart shows, consumers do considerably better in some provinces than in others. The authors make the point that these differences in benefits received are not reflected in calculations of equalization payments. Some economists have argued that hydro-electricity rents should be included, along with other natural resource rents, in an equalization program, at least to some extent.

Blue Gold: Hydro-Electric Rent in Canada, by Richard C. Zuker and Glenn P. Jenkins (EC22-120/1984E; \$5.95 in Canada, \$7.15 elsewhere).

Consumers benefit from low electricity rates

Hydro-electric rent received by users on a per capita consumption basis, 1979



A brighter picture for manufacturing

Canadian manufacturing industries are much more lean and mean than hitherto thought, according to a new Economic Council paper.

At first glance, however, the published figures on manufacturing sales in Canada tell a somewhat different story. It frequently appears that relatively few firms produce the majority of an industry's output, enabling them, by virtue of their market power, to influence price and production levels, and perhaps to realize supra-normal returns.

The picture for Canada, then, seems far from encouraging, as competition – that bastion of free enterprise and arguably the key to economic health and efficiency – doesn't appear to be ubiquitous in the Canadian manufacturing sector.

But a recent Council paper using Statistics Canada data takes a closer look at the sales data that are used in calculating census concentration measures – from which the presence of market power and, ultimately, competitive conditions in the marketplace are often inferred. These measures, the paper concludes, “suffer from a number of potentially important shortcomings,” thereby fueling some distinctly negative impressions about the state of Canada's manufacturing sector. And because the measures are used in government competition policy to scrutinize corporate takeovers and mergers, their accuracy is most important.

What economists John Baldwin (of Queen's University), Paul Gorecki (of the Economic Council), and John McVey (of Statistics Canada) find is a cause of some concern. The conventional data fail to measure the impact of manufactured imports sold in Canada, which, in turn, distorts the degree of market power that may be exercised by Canadian firms. Today, these imports account for more than a quarter of all such sales in Canada, making conventional data “increasingly inappropriate” as international trade grows in importance.

Additional shortcomings

In addition, conventional measures don't accurately reflect a plant's manufacturing output. Despite the fact that

a firm may provide products to a number of industries, its total output is credited only to the one receiving the greatest proportion. In other words, what is called “secondary output” isn't properly classified – and because it constitutes some 10 per cent of manufactured output in Canada, conventional measures may suffer from additional shortcomings.

The authors adjust the data to account for these discrepancies and then rank industries according to their level of concentration (primarily by measuring the sales attributed to the four largest firms in each industry).

Using 1979 data as a case in point, the results, across some 140 industries, show that “Canadian manufacturing industries are much more competitive than indicated by the published census concentration ratios.” Under the new measurement, industry sales accounted for by the leading four firms dropped from 53 to 43 per cent on average. The adjustment for imports explains most of this decline in concentration, the authors found, although allowing for secondary output had a pronounced effect on a small number of industries. Adjustment for exports, on the other hand, had a negligible impact.

Further, the authors' analysis reveals

an across-the-board decline in concentration from the beginning of the 1970s, indicating an increasing level of competitiveness by the decade's end.

The industries where conventional data paint the most misleading picture are food and beverages, machinery, textiles, and electrical products, all of which prove to be more competitive under the new measurement. Conversely, conventional measures are not as distorting for regional industries, which are much less affected by import adjustments than industries of national scope.

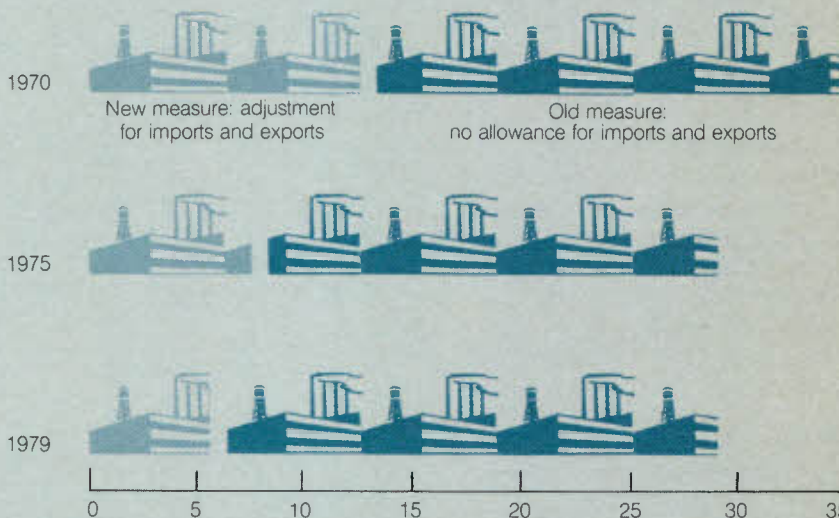
Also misleading is the difference in concentration between manufacturing sectors in Canada and those in the United States, reportedly averaging about 20 per cent overall. That gap narrows to 13 points when data from both countries are adjusted for imports.

In essence, then, increased international trade is probably netting healthy returns for Canada by stimulating competition in the marketplace.

“Imports, Secondary Output, Price-Cost Margins and Measures of Concentration: Evidence for Canada, 1979,” by J. R. Baldwin, P. Gorecki, and J. S. McVey. Discussion Paper No. 263.

Trade boosts competition in Canadian industry

No. industries with 75% of sales in top 4 firms



Reforms needed in grain regulation

Western farmers, who produce the bulk of Canada's wheat and other grains, can expect a continued decline in real (inflation-adjusted) prices. Worse yet is the anticipated slowdown in international trade, which accounts for the largest chunk of Canadian grain sales.

What's needed under these conditions, among other things, is solid growth in productivity, greater economic efficiency, and an aggressive sales policy to reverse the downward slide in Canada's share of world grain exports. But because the industry is so heavily regulated, the challenges facing western grain farmers are in large part the government's responsibility.

In fact, a recent Council paper looking at the industry's prospects to 1990 concludes that the existing regulatory environment is putting a damper on western grain development. Economists R.M.A. Loyns and Colin A. Carter of the University of Manitoba – in research conducted for the Council's recent study of the western Canadian economy (*Au Courant*, vol. 5, no. 2) – propose a number of major reforms, many of them linked to recent changes in federal transportation policy – specifically, changes in railway freight rates.

Transportation impact

Since about 1950, these fixed statutory rates – part of the historic Crow's Nest Pass Agreement of 1897 – have been insufficient to cover railway costs. The grain transport system has thus deteriorated, and a massive regulatory framework has evolved to accommodate the ensuing transportation problems. Legislation passed in 1983 was designed to move these rates upward. Provided, therefore, that the extra revenue is sufficient to encourage a continuation of improvements in the railway infrastructure, much of the Crow-built regulatory framework can be modified – even dismantled.

For example, quotas on grain production, imposed by the Canadian Wheat Board (CWB) to ration scarce handling and transportation capacity, would be much less warranted, the authors argue. Where needed, quotas should be assigned on the basis of land

productivity rather than the number of acres cropped. The authors also recommend giving complete control of rail car allocation to the Grain Transportation Authority, as "it has and is seen to have a favourable record of improving transportation."

Increasing efficiency

The CWB's current pooling and pricing techniques create serious market distortions, the authors find. Under new freight rates, grains should be priced regionally instead of nationally, they say, as this would encourage production according to comparative advantage. More incentives to enhance the protein quality of wheat should be considered, and a time-scaled payment scheme would better reflect management practices among individual grain producers.

Generally, the CWB must improve information flows to farmers to enable more effective production decisions. In some cases, for example, the CWB's year-end prices are not released until after planting time the following year.

Export standards administered by the Canadian Grain Commission are found to impede productivity. "If changes in these regulations are unwarranted, they should be shown to be so by credible research information," the authors conclude.

In addition, the Commission's role in regulating the grain-handling industry limits price competition and undermines economic efficiency, the authors find. They suggest opening the market up, either to small specialized firms or to the grain producers themselves. A wider Canadian effort to develop an effective competition policy must also be undertaken.

Excessive regulation in carrying out domestic feed grain policy is causing a number of problems, many of them spilling over to the livestock sector. Several reforms are needed, including the removal of various import/export restrictions, the opening up of the market to private traders, and changes in pricing policies that at present effectively subsidize eastern Canadian buyers. (New pricing policies are currently being developed.)

Overall, Canadian trade policy must

become increasingly aggressive to improve performance in the years ahead. Better market research, promotion, and sales efforts are required, and a co-operative approach involving all elements of the industry is vital. The authors also express concern over growing trade with communist-bloc countries, as these markets are seen to offer limited long-term stability. Efforts should focus on winning back traditional customers and pursuing new opportunities. As such, it is essential to develop new international trade agreements, particularly with major grain exporters like the United States.

"Grains in Western Canadian Economic Development to 1990," by R.M.A. Loyns and Colin A. Carter. Discussion Paper No. 272.



Reforms in grain policy would improve industry outlook

Potash needs careful marketing

Saskatchewan has the world's largest and highest-quality potash reserves. And these huge deposits, despite being located at great depths, are also among the cheapest to extract.

Yet continued attempts to promote rapid industry growth could seriously erode the province's standing as a world leader in potash production. Instead, public policy should focus on determining the industry's optimum production capacity and developing an effective marketing scheme to avoid what is termed "destructive competition," says a recent Council paper by economist David Anderson (presently with the Centre for Resource Studies at Queen's University and formerly with the University of Regina). The paper was written for the Council's recent study of the western Canadian economy (*Au Courant*, vol. 5, no. 2).

This kind of competition can arise as the result of the industry's underlying market structure, the author says. Worldwide, only a small number of producers control the market. Demand is relatively unaffected by price, mainly because potash is an essential crop fertilizer with no close substitute. Thus a rapid expansion of supply would force prices down and reduce not only profits throughout the industry but revenue to Saskatchewan.

In the light of this possibility, recent government initiatives encouraging industry growth are "highly questionable," Anderson says. Nor would these drawbacks be offset by the creation of many new jobs, since the industry is highly capital-intensive, employing a total of just over 4,000 people. Also, because it is 60 per cent foreign-owned, a good portion of total industry profits are probably reinvested outside the province. In actual fact, the industry's prime benefit to Saskatchewan is the tax revenue it generates. The author concludes that incentives for expansion would, in effect, produce less overall revenue for the province because of the impact of destructive competition.

Marketing schemes

Indeed, the amount of tax revenue available to the province is largely determined by how potash is marketed. According to Anderson, it is in the province's interest to "restrict supply

and exploit its market power" in the United States, where some two-thirds of Saskatchewan potash exports are sold.

At the same time, he warns against the consequences of overdoing the restriction in supply, since that could bring new competitors onto the scene. The industry's cost structure is such that "once a mine is constructed, it will be extremely difficult to drive out of operation, even by means of sustained predatory pricing," he concludes. Rather than simple-minded expansion, a delicate balancing act is needed, Anderson argues.

With that in mind, he suggests that consideration be given to using an industrywide marketing agency south of the border. The Canadian Potash Export Association (Canoptex) is one possibility. Such an arrangement could, however, bring U.S. anti-trust action and dampen relations between the two countries. At the same time, the economic cost of failing to exploit the industry's market power falls disproportionately on the residents of Saskatchewan, he says.

Expansion through the sale of potash to offshore customers has been suggested as an alternative strategy. Third World countries represent "significant long-term growth potential," Anderson observes, noting that potash consumption in those nations grew almost 10 times faster than in developed countries between 1976 and 1981. But there are

complications with this approach as well.

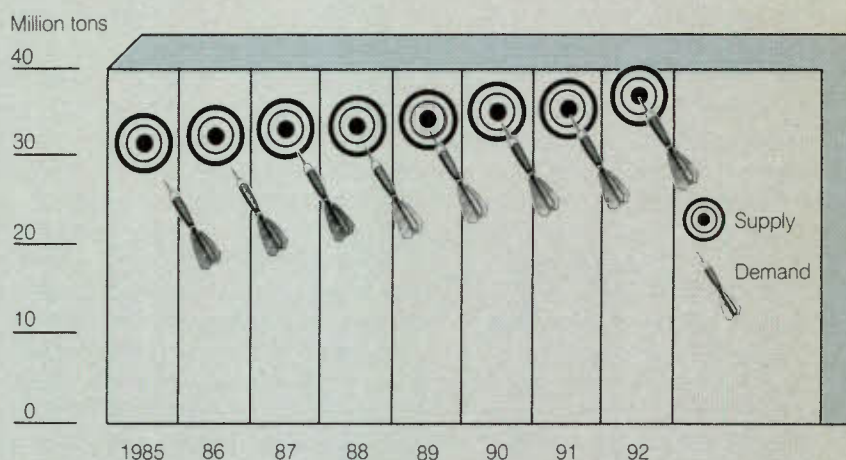
For example, the most practical method of attracting new offshore customers would be aggressive price competition. But U.S. reaction to cheaper offshore prices might force Canadian producers to lower their U.S. prices; then, both they and the province would lose revenue from that market.

A partial solution might lie in giving total responsibility for offshore sales to a uniform selling agency such as Canoptex, which already controls a good portion of this business. But because membership in Canoptex is currently voluntary and several new operators in New Brunswick are not members, alternative marketing arrangements may be required. Given that export powers reside in Ottawa, such action would probably require federal government participation, Anderson points out.

"Among the longer term arrangements which should be considered is an export permit system along the lines used by the National Energy Board or the Uranium Export Review Panel," he suggests.

"The Saskatchewan Potash Industry: Alternative Strategies for Future Development," by David L. Anderson. Discussion Paper No. 264.

Potash supply outstrips demand till 1990s



New appointments to the Economic Council



Miller H. Ayre is the President and Chief Executive Officer of Ayre's Limited of St. John's, Newfoundland.

Mr. Ayre is Vice-Chairman of the Retail Council of Canada and a member of the board of directors of a number of organizations, including Newfoundland Mining and Exploration Ltd., Clarendville Ocean Products Ltd., and J. Michaels Fashions Ltd.



Jalynn H. Bennett is the Investment Vice-President, Canadian Equities, for Manufacturers Life Insurance Company, a firm which she first joined in 1965 and has subsequently served in numerous capacities.

Ms. Bennett is a member of the Ontario Manpower Commission and the Ontario Government Task Force on Employment and Technology.



James Andrew Coombs is Vice-President (Operations) of the New Brunswick Telephone Company Limited. Prior to joining that company in 1976, he held a variety of positions at Bell Canada.

Mr. Coombs is a Director of Bruntel Holdings Ltd. and Brunswick Square Ltd. He serves on numerous boards and committees, including the Board of Governors of the University of New Brunswick and the Maritime Chapter of the Financial Executives Institute.



Pierre Fortin is a Professor of Economics at Laval University in Quebec City. He has a Bachelor of Sciences degree in mathematics from Laval University, a Masters degree from the University of Montreal, and a doctorate degree from the University of California (Berkeley).

Professor Fortin is author of several books and is a freelance columnist for *Le Devoir* and *The Financial Post*.



Kalmen Kaplansky is a labour consultant, a former member of the Economic Council of Canada and a former Canadian Director of the International Labour Office. He is currently serving in a part-time capacity as Senior Fellow of the Human Rights Centre at the University of Ottawa.

Mr. Kaplansky was the Chairman of the Special Staff Group on Economic and Employment Opportunities for Native Northerners and was the Director of the Department of International Affairs of the Canadian Labour Congress.



Susan A. Thompson is the President and General Manager of The Birt Saddlery Company of Winnipeg, a retail firm specializing in western leather products.

In the past, Ms. Thompson held positions at both the T. Eaton Company and The Bay Company. She is currently Director of the University of Winnipeg's Interfaith Pastoral Institute and an executive member of the Winnipeg Chamber of Commerce.

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