C.D. Howe Institute
Institut C.D. Howe

Communiqué

Embargo: For release *Tuesday*, February 9, 1999

Pace of technological change in telecommunications a challenge for regulators, says C.D. Howe Institute study

Fast-paced technological change in the global market for telecommunication services is challenging the ability of government to keep its regulatory system up to speed, says a study released today by the C.D. Howe Institute.

The study, a collection of essays called *The Electronic Village: Policy Issues of the Information Economy*, was edited by Dale Orr, Senior Vice President and Chief Economist, Canadian Services, WEFA Inc., and Thomas A. Wilson, Professor of Economics and Director of the Policy and Economic Analysis Program at the Institute for Policy Analysis, University of Toronto.

Deregulation of many aspects of the telecom marketplace has been the prevailing trend in Canada and elsewhere over the course of the past two decades and, in combination with changing technologies, this has meant a new landscape to which governments have yet to adapt.

In one essay, Richard J. Schultz of McGill University argues that deregulation of telecom markets has caused difficulties for the Canadian Radio-television and Telecommunications Commission (CRTC) because of its competing responsibilities for communications regulation and broadcast-content regulation. Further, technological convergence among content-delivery mechanisms has made cultural protection, the *raison d'être* for content regulation, difficult to implement through the old regulatory processes.

Competition in local and long-distance telephone markets has developed very differently in Canada and the United States, according to Robert W. Crandall of the Brookings Institution and Leonard Waverman, an economics professor at the London School of Business. In their contribution to the study, they argue that complex rules put in place by the 1996 US *Telecommunications Act* and recently affirmed by the US Supreme Court have hindered the development of local competition in that country. In Canada, however, a competitive market in telephone services has developed relatively quickly despite its late start.

International trade in telephone services is another area where federal regulation will quickly confront technological — and legal — challenges, argues Hudson Janisch, a law professor at the University of Toronto. The global legal environment for trade in services is now based on nondiscriminatory telecom market access, and decisions made privately by the federal cabinet and the CRTC likely will not meet the expected standards for openness or imparti-

ality. As a result, traditional Canadian decisionmaking processes will come under fire once again.

Technological change will also sorely challenge rules on foreign ownership, according to Steven Globerman and Daniel A. Hagen of Western Washington University. Wireless telephone networks, whether terrestrial or satellite based, will find ways to reach their customers, and Canadian rules limiting foreign ownership of domestic facilities may serve little purpose in the future other than to impose unnecessary costs on Canadians and limit technological development at home, the authors argue.

In his essay, Lester D. Taylor of the University of Arizona probes the links between improvements in telecom infrastructure and broad economic development. Investment in telecom infrastructure helps the economy, but if the technological spillovers from this investment are not well understood, we may end up not investing enough, Taylor warns.

It is common to hear worries about the distribution of access to modern information technology. These worries are, however, mostly misplaced, according to Shane M. Greenstein of Northwestern University and Mercedes M. Lizardo of the Technological Institute of Santo Domingo, Dominican Republic. The authors write that, in the United States, the regional distribution of advanced communications and computing infrastructure are well explained by population density, city size, and patterns of employment growth. In other words, only a few relatively sparsely populated areas in that country are currently without good access to modern telecom and computing infrastructure, implying that the market delivers technology faster than governments can analyze or direct it.

Broadcast regulation and control over Canadian content are under siege by rapidly changing information technology and, in the two essays that conclude the study, William T. Stanbury of the University of British Columbia takes aim at both. Broadcast regulation, which was originally intended to manage a limited public radio spectrum, has been turned into a protective mechanism for domestic broadcast firms, according to Stanbury. Likewise, Canadian-content regulation was conceived as necessary to the defense of tender Canadian culture but has been transformed into an income-protection scheme for the producers and purveyors of Canadian programming. As in other areas, defense of the traditional agenda will become more difficult as multiplying channels of product creation and distribution find their ways to market, Stanbury says.

* * * * *

— 30 —

For further information, contact: Dale Orr (613) 233-0236; Tom Wilson (416) 978-4458;
Maxine King (media relations), C.D. Howe Institute
phone: (416) 865-1904; fax: (416) 865-1866;
e-mail: cdhowe@cdhowe.org; Internet: www.cdhowe.org

The Electronic Village: Policy Issues of the Information Economy, Policy Study 32, edited by Dale Orr and Thomas A. Wilson (C.D. Howe Institute, Toronto, February 1999). 296 pp.; $21.95 (prepaid, plus postage & handling and GST — please contact the Institute for details). ISBN 0-88806-444-6.

Copies are available from: Renouf Publishing Company Limited, 5369 Canotek Road, Ottawa, Ontario K1J 9J3 (stores: 71½ Sparks Street, Ottawa, Ontario; 12 Adelaide Street West, Toronto, Ontario); or directly from the C.D. Howe Institute, 125 Adelaide Street East, Toronto, Ontario M5C 1L7. For college book orders, please contact: Prentice-Hall Canada Inc., 1870 Birchmount Road, Scarborough, Ontario M1P 2J7. A summary of this publication will also be available on the Internet.

C.D. Howe Institute
Institut C.D. Howe

Communiqué

Embargo : à diffuser le *mardi* 9 février 1999

Le rythme des changements technologiques en matière de télécommunications pose un défi aux organismes de réglementation, affirme une étude de l'Institut C.D. Howe

La rapidité des changements technologiques qui caractérise le marché mondial des services de télécommunications met à l'épreuve la capacité des gouvernements à maintenir leur régime de réglementation à jour, affirme une étude publiée aujourd'hui par l'Institut C.D. Howe.

L'étude, intitulée *The Electronic Village: Policy Issues of the Information Economy (Le village électronique : enjeux des politiques de l'économie de l'information)*, comprend une série de dissertations dirigées par Dale Orr, premier vice-président et économiste en chef, Services canadiens, WEFA Inc. et Thomas A. Wilson, professeur d'économie et directeur du programme d'analyse politique et économique auprès de l'Institute for Policy Analysis à l'Université de Toronto.

La déréglementation de nombreux volets du marché des télécommunications a été la pratique au Canada et ailleurs au cours des deux dernières décennies; elle s'assortit de technologies changeantes et le tout a créé un nouveau cadre auquel les gouvernements n'ont pas encore été en mesure de s'adapter.

Dans l'un des documents, Richard J. Schultz de l'Université McGill soutient que la déréglementation du marché des télécommunications a créé des problèmes pour le Conseil de la radiodiffusion et des télécommunications canadiennes (CRTC), en raison de ses responsabilités concurrentes de réglementation des télécommunications et du contenu des émissions. De plus, la convergence technologique des différents mécanismes de prestation du contenu a rendu difficile l'application de la protection culturelle, la raison d'être de la réglementation du contenu, par le biais des anciens procédés réglementaires.

La concurrence des marchés téléphoniques locaux et interurbains a subi une évolution bien différente au Canada par rapport aux États-Unis, notent Robert W. Crandall de la Brookings Institution et Leonard Waverman, professeur d'économie à la London School of Business. Dans leur contribution à l'étude, ils soutiennent que les règles complexes qui ont été mises en place aux États-Unis par la *Telecommunications Act* de 1996 et qui ont récemment été confirmées par la Cour suprême de ce pays ont entravé les progrès de la concurrence locale dans ce pays. Au Canada cependant, un marché concurrentiel des services téléphoniques s'est établi assez rapidement, et ce malgré un départ tardif.

Le commerce international des services téléphoniques représente un autre domaine où la réglementation fédérale se butera rapidement à des défis technologiques et juridiques, soutient Hudson Janisch, professeur de droit à l'Université de Toronto. Le milieu juridique mondial afférent au commerce des services se fonde maintenant sur un accès égal au marché des télécommunications et les décisions prises officieusement par le cabinet fédéral et le CRTC ne répondront pas aux normes attendues d'ouverture et d'impartialité. Par conséquent, les procédés traditionnels de prise de décision au Canada seront, une fois de plus, vivement critiqués.

Selon Steven Globerman et Daniel A. Hagen de l'Université Western Washington, les changements technologiques mettront également à rude épreuve les règles en matière d'intérêts étrangers. Les réseaux téléphoniques sans fil, qu'ils soient terrestres ou relayés par satellite, trouveront le moyen de parvenir à leur clientèle et les règles canadiennes qui limitent la propriété étrangère des installations au pays ne serviront pas à grand-chose dans l'avenir, à part imposer des coûts inutiles aux Canadiens et limiter les créations techniques au pays, soutiennent les auteurs.

Dans son compte rendu, Lester D. Taylor de l'Université de l'Arizona se penche sur les liens entre les améliorations de l'infrastructure des télécommunications et le développement économique en général. Les investissements dans l'infrastructure des télécommunications favorisent l'économie, mais si l'on ne saisit pas bien les retombées technologiques de ces investissements, on pourrait bien ne pas investir suffisamment, prévient M. Taylor.

On entend souvent parler des inquiétudes que soulève la distribution de l'accès à la technologie de l'information moderne. Ces inquiétudes sont pour la plupart non fondées, affirment Shane M. Greenstein de l'Université Northwestern et Mercedes M. Lizardo, de l'Institut technologique de Saint-Domingue en République dominicaine. Les auteurs indiquent qu'aux États-Unis, la distribution régionale de l'infrastructure informatique et des communications de pointe s'explique aisément en fonction de la densité de population, de la taille des villes et de la répartition de la croissance de l'emploi. Autrement dit, seules quelques régions peu densément peuplées au pays ne disposent pas d'un bon accès à l'infrastructure moderne des télécommunications et de l'informatique, ce qui laisse entendre que le marché fournit la technologie plus rapidement que les gouvernements ne sont en mesure de l'analyser ou de la diriger.

Les règlements relatifs à la radiodiffusion et le contrôle de la teneur canadienne sont assiégés par l'évolution rapide de la technologie de l'information. Dans les deux dernières dissertations de l'étude, William T. Stanbury de l'Université de la Colombie-Britannique s'attaque à ces deux sujets. Les règlements relatifs à la radiodiffusion, écrit-il, qui visaient à l'origine à gérer un champ limité d'activités radiophoniques publiques, sont devenus un mécanisme de protection pour les sociétés de radiodiffusion nationales. De même, les règlements afférents à la teneur canadienne étaient perçus comme un élément nécessaire pour défendre la nature délicate de la culture canadienne, mais ils sont devenus un système de protection des revenus des producteurs et fournisseurs de programmes canadiens. Comme c'est le cas dans d'autres domaines, la défense du programme traditionnel s'avérera plus difficile, maintenant que les multiples canaux de création et de distribution des produits se frayent un chemin sur le marché, de conclure M. Stanbury.

* * * * *

L'Institut C.D. Howe est un organisme indépendant, non-partisan et à but non lucratif, qui joue un rôle prépondérant au Canada en matière de recherche sur la politique économique. Ses membres, individuels et sociétaires, proviennent du milieu des affaires, syndical, agricole, universitaire et professionnel.

- 30 -

Renseignements : Dale Orr, 613 233-0236; Tom Wilson, 416 978-4458;
Maxine King (relations avec les médias), Institut C.D. Howe
téléphone : 416 865-1904, télécopieur : 416 865-1866
courrier électronique : cdhowe@cdhowe.org, Internet : www.cdhowe.org

The Electronic Village: Policy Issues of the Information Economy, Étude de politique n^{o} 32 dirigée par Dale Orr et Thomas A. Wilson, Toronto, Institut C.D. Howe, février 1999, 296 p., 21,95 $ (les commandes sont payables d'avance, et doivent comprendre les frais d'envoi, ainsi que la TPS — prière de communiquer avec l'Institut à cet effet). ISBN 0-88806-444-6.

On peut se procurer des exemplaires de cet ouvrage auprès des : Éditions Renouf ltée, 5369, chemin Canotek, Ottawa ON K1J 9J3 (librairies : 71½, rue Sparks, Ottawa ON, et 12, rue Adelaide Ouest, Toronto ON) ou encore en s'adressant directement à l'Institut C. D. Howe, 125, rue Adelaide est, Toronto (Ontario) M5C 1L7. Pour les commandes commerciales, prière de communiquer avec Prentice-Hall Canada Inc., 1870, chemin Birchmount, Scarborough (Ontario) M1P 2J7. On peut également consulter un sommaire de cet ouvrage au site Web de l'Institut.

The Electronic Village

Policy Issues of the Information Economy

Dale Orr and
Thomas A. Wilson,
editors

Policy Study 32

C.D. Howe Institute

Contents

Foreword

One of the most remarkable aspects of our altogether extraordinary age is the revolution being wrought by rapidly advancing computer and telecommunications technology. The resulting changes to our society and the economy are likely to be as profound as those brought about by the Industrial Revolution itself. And the challenges posed by the telecommunications revolution are already testing the ingenuity of analysts, industry experts, regulators, and legal minds, and suggesting that there are limits to the ability of the nation-state to keep on top of it all.

This volume presents papers that, for the most part, were originally presented at a conference on "Economic and Public Policy Issues of the Information Economy," held October 17–18, 1997, at the University of Toronto. The subjects of the papers run the gamut from regulatory issues, through competition, international policy comparisons, foreign investment, and infrastructure investment and distribution, to the always-controversial Canadian-content requirements in broadcasting.

The papers in this volume were ably edited by Dale Orr, Senior Vice President and Chief Economist, Canadian Services, WEFA Inc.; and Thomas A. Wilson, Professor of Economics and Director of the Policy and Economic Analysis Program at the Institute for Policy Analysis, University of Toronto.

As with all C.D. Howe Institute publications, the analysis and opinions presented here are the responsibility of the authors and do not necessarily reflect the views of the Institute's members or Board of Directors.

Thomas E. Kierans
President and
Chief Executive Officer

Acknowledgments

Most of the papers included in this volume were originally presented at the Conference on Economic and Public Policy Issues of the Information Economy, held October 17–18, 1997, at the Joseph L. Rotman Centre for Management, University of Toronto. One paper included here ("Governing in a Gale: Overview of Regulatory and Policy Setting for Canadian Telecommunications," by Richard J. Schultz) was not presented at the conference.

In addition to the papers, the conference featured two panel sessions. The first, on practitioners' perspectives, was chaired by Carl Beigie; the panelists were Bernard Courtois of Bell Canada, Mark Wallace of AT&T Canada, and David Watt of the Canadian Cable-Television Association (CCTA). The second panel, chaired by Roger Tassé, offered the views of industry leaders, with panelists Nick Mulder of Stentor Telecom Policy Inc., Richard Stursberg of the CCTA, and Janet Yale of AT&T Canada. Lorne Abugov made a presentation on "Decision in December: Is Canada's Long-Distance Market Ready for Forbearance?" Finally, David Colville of the Canadian Radio-television and Telecommunications Commission (CRTC) provided his perspective in an informal discussion session following the conference dinner. We gratefully acknowledge their contributions to the conference.

Most of the papers presented at the conference were reviewed by discussants. We thank Liz Angus of Angus Telemanagement, Michael Ryan of Coudert Brothers, Richard Harris of Simon Fraser University, Susan Baldwin of the CRTC, and Albert Breton of the University of Toronto for providing insightful comments, many of which have been incorporated into the final text of the papers they discussed.

We also thank Thomas E. Kierans of the C.D. Howe Institute, Lawson Hunter of Stikeman-Elliot, Sylvia Ostry and Frank Mathewson of the University of Toronto, and Loren Mawhinney of Global

Television for chairing the various sessions and contributing to the discussion of the papers.

Sponsors of the conference include AT&T Canada, the Canadian Association of Broadcasters, the Canadian Cable-Television Association, the C.D. Howe Institute, the federal Department of Industry, and Stentor Telecom Policy Inc. We thank all of these organizations for their financial support and for their participation in the conference. The conference was organized by the editors and was hosted by the Institute for Policy Analysis at the University of Toronto. Erin Foster of the Institute provided indispensable administrative support.

The preparation of the papers for this volume and the related editorial and publishing costs were fully supported by the C.D. Howe Institute. Institute staff also provided editorial support: Finn Poschmann and Daniel Schwanen provided comments on most of the papers; copy editing and related tasks were undertaken by Barry A. Norris, Elizabeth d'Anjou, Lenore d'Anjou, and Riça Night; Maxine King acted as coordinator of the editorial work. We gratefully acknowledge the financial and editorial support provided by the Institute and its staff.

Dale Orr and
Thomas A. Wilson
November 1998

List of Abbreviations

BDU: Broadcasting distribution undertaking.
CLEC: Competitive local exchange carrier.
CPE: Customer premises equipment.
CPU: Central processing unit.
CRTC: Canadian Radio-television and Telecommunications Commission.
DTH: Direct-to-home (satellite broadcasting).
FCC: Federal Communications Commission (United States).
FDI: Foreign direct investment.
GATS: General Agreement on Trade in Services.
GATT: General Agreement on Tariffs and Trade.
ILEC: Incumbent local exchange carrier.
IPL: International private line.
ISR: International simple resale (restrictions).
IT: Information technology.
ITU: International Telecommunications Union.
LAN: Local area network.
LATA: Local access and transport area.
LEC: Local exchange carrier.
LEOS: Low-earth-orbit satellite.
LMCS: Local multipoint communications system.
MFN: Most-favored-nation (treatment).
Mips: millions of instructions per second.
MMDS: Microwave multipoint distribution system.
OTA: Over the air (broadcasting).
PC: Personal computer.
PCS: Personal communications services.
RBOC: Regional Bell operating company.

TELRIC: Total element long-run incremental cost.

VOD: Video on demand.

WAN: Wide area network.

WTO: World Trade Organization.

The Contributors

Robert W. Crandall is a Senior Fellow in the Economic Studies Program at the Brookings Institution, Washington DC. He has specialized in industrial organization, antitrust policy, and the economics of government regulation. His current research focuses on regulatory policy in the telecommunications sector. He is the author or coauthor of numerous studies, and prior to assuming his current position at Brookings, he was Acting Director, Deputy Director, and Assistant Director of the Council on Wage and Price Stability.

Steven Globerman is the Ross Distinguished Professor of Canada-US Business and Economic Relations at Western Washington University, Bellingham. He has taught at several universities, including York University, the University of British Columbia, and Simon Fraser University. He has been a visiting faculty member at the University of California, Irvine, the Helsinki School of Economics, and the Stockholm School of Economics. He has also done extensive public and private sector consulting. His research interests include international business and multinational corporations, trade and investment policies, industrial organization, and health economics.

Shane M. Greenstein is Associate Professor in the Management and Strategy Department of the Kellogg Graduate School of Management at Northwestern University, where he teaches courses on strategy in technology-intensive industries and markets. He is also a Research Associate with the productivity group at the National Bureau of Economic Research, Cambridge, Mass. He is a regular columnist on the computer market for *Micro*, published by the Institute of Electronic and Electrical Engineers. His research interests cover a wide variety of topics in the economics of high technology. He has studied buyer benefits from advances in computing and communication technology, structural change in information technology mar-

kets, standardization in electronics markets, investment in digital infrastructure, and government procurement of computing hardware.

Daniel A. Hagen received his PhD from the University of California, Berkeley, in 1983. He joined the faculty of Western Washington University, Bellingham, in 1988 after having previously been on the faculty of the University of Colorado at Denver. His teaching and research interests include environmental economics, international trade, labor, and micro- and macroeconomics. His research on old-growth forests and the spotted owl and other environmental topics has attracted wide attention. He is known as a witty and incisive lecturer and is much sought after as a speaker.

Hudson N. Janisch was born and brought up in Cape Town, South Africa, and was educated at Rhodes University, Cambridge University, and the University of Chicago, from which he received his doctorate in 1971. He taught initially at the University of Western Ontario and Dalhousie University, and has been a professor at the Faculty of Law, University of Toronto, since 1978. He teaches Administrative and Communications Law and his research and writing is largely concerned with telecommunications law and regulation.

Mercedes M. Lizardo works as economic advisor to the National Planning Office of the Dominican Republic and is a faculty member of the Technological Institute of Santo Domingo. She received a PhD in Economics from the University of Illinois at Urbana-Champaign in 1997, and has worked on the analysis of the regional distribution of telecommunications infrastructure in the United States, as well as on the analysis of the complementarities between telecommunications infrastructure and investment in computer capacity.

Dale Orr is Senior Vice President and Chief Economist, Canadian Services, at WEFA Inc. After finishing his PhD at Northwestern University, he was an assistant professor at the University of British Columbia. From there he moved to the Canadian federal government, where he advanced to the position of Senior Executive, Department

of Industry, Trade and Commerce. In 1982 he became Chief Economist at Bell Canada. Immediately before joining WEFA in June 1998, he was President of Economic Analysis Associates, an Ottawa-based economic consulting company.

Richard J. Schultz is Professor of Political Science, Senior Associate in the Institute for the Study of Canada and former director of the Centre for the Study of Regulated Industries at McGill University. He served on the General Services Sectoral Advisory Group for the Minister of International Trade for the Canada-US free trade negotiations and the Uruguay Round of the GATT. Over the past five years, he has organized training programs in telecommunications regulation for the Commonwealth Telecommunications Organization in Ghana, the Seychelles, and Malaysia. He is currently engaged in a comparative study of the role and impact of political institutions in shaping telecommunications regulatory and policy restructuring in Canada, the United Kingdom, and the United States.

W.T. Stanbury is UPS Foundation Professor of Regulation and Competition Policy in the Faculty of Commerce and Business Administration at the University of British Columbia. His research has ranged quite widely — from the problems of native peoples, to competition policy, government regulation, interest group behavior, and the social and political effects of new communications and information technologies. Professor Stanbury is the author or editor of more than 300 publications. In 1989, he won a Killam Research Prize and the Professor Jacob Biely Faculty Research Prize for his research and publications in university-wide competitions.

Lester D. Taylor is Professor of Economics and of Agricultural and Natural Resource Economics at the University of Arizona. He has a PhD in economics from Harvard University, and taught at Harvard and the University of Michigan before taking up residence in Arizona in 1972. His research in telecommunications covers more than 20 years, and he has published extensively on telecommunications

demand, pricing, and costing. He is the author of *Telecommunications Demand in Theory and Practice* (1994).

Leonard Waverman is currently Professor of Economics at the London School of Business. He has a PhD from the Massachusetts Institute of Technology, and has held positions at the University of Toronto and the Brookings Institution in Washington, DC. His research interests include telecommunications and satellite deregulation, boundaries between competition policy and regulation, and multimedia markets. He is Chair of a Canadian federal government Advisory Group on Telecommunications, and Director of the Global Forum on Competition and Trade Policy.

Thomas A. Wilson is Professor of Economics and Director of the Policy and Economic Analysis Program at the Institute for Policy Analysis, University of Toronto. His research interests include fiscal and tax policy, applied macroeconomic modeling, and industrial organization. He has published widely in each of these areas, and is the author of *The Future of Telecommunications Policy in Canada* (1995).

Introduction

Dale Orr and
Thomas A. Wilson

As we near the new millennium, the revolution in telecommunications continues to have profound effects. It is perhaps especially important to Canadians, residents of a large trading nation inextricably tied to the global economy in which information processing and communication are becoming increasingly important.

Like all technological revolutions, this one is providing challenges on a variety of fronts, from competition policy to the spread of infrastructure to international law. The object of this publication is to provide analysis and discussion of some of the economic and public policy issues over the medium term. We hope it will be useful to — and perhaps thought provoking for — those involved in the communications industry, major users of communications services, and decisionmakers and analysts in public policy.

A single volume cannot, of course, cover all the relevant issues. We and the authors have focused on a set of issues about which we feel we can add value to the public debate.

In the remainder of this introduction, we briefly comment on each of the papers included in this book.

Deregulation

Richard J. Schultz examines the impacts that changing technologies in communication and information processing are having on regulatory and other government policies. He identifies the 1992 decision of the Canadian Radio-television and Telecommunications Commission (CRTC) approving interconnection for long-distance competitors as a

major turning point in the agency's approach to telecommunications regulation. In this landmark decision, the CRTC basically adopted an open-entry framework (preserving cross-subsidies to local service by requiring "contribution payments" from the entrants).

Following the 1992 decision, the CRTC moved rapidly. In its 1994 decision on the Regulatory Framework, the Commission put competition at the forefront of its deliberations. Regulation was to be focused on monopoly services (the "utility" segment), and price caps were to replace rate-of-return regulation.

Cross-subsides to local service were to be reduced in gradual steps, and even local service was to be opened to potential entrants. The CRTC would increasingly forbear from regulation of those services where market conditions were sufficiently competitive.

Schultz focuses on two problem areas in this evolving deregulatory environment: cross-subsidies and convergence. The CRTC has so far been unwilling to move beyond the reduction of cross-subsidies it accomplished by permitting increases in local rates during the 1995–98 period. The main risk here is the possible extension of the complex cross-subsidy system to encompass additional services. Some disturbing precedents come from the United States, where subsidies have been extended to include Internet access for schools and libraries and, in California, for nonprofit "community-based organizations." Another possible extension of the cross-subsidy system involves special subsidies for high-cost service areas, where unfortunate US precedents also exist.

Schultz fears, however, that the more serious threat to liberalization of telecommunications regulation arises from the growing convergence of broadcasting and telecommunications. The CRTC's regulation of broadcasting focuses on cultural protection, which is by its very nature anticompetitive, and he concludes, "the CRTC's convergence report and its vision statement represent not so much a collision between the two regulatory regimes as the potential hijacking of the telecommunication regimes to serve the traditional anti-competitive, regulator-as-manager, broadcasting mindset."

In Schultz's view, the major liberalizing changes in Canada's regulatory regime have been driven by changing technologies in

communications and information processing. As the transition to the information economy continues, "governments should renounce any ambition to be in control."

Canadian and US Regulation of Telecommunications

Robert W. Crandall and Leonard Waverman address the regulatory environment in telecommunications by contrasting the different approaches taken in Canada and the United States.

The US history of deregulation of long-distance services ran from the first offering of competitive services in the 1970s through the divestiture of AT&T in 1984 and culminated with the 1996 *Telecommunications Act*. The authors characterize this process, especially before the 1996 act, as "at best haphazard, reflecting a complex tug of war among the states, the Federal Communications Commission..., and the courts."

Canada lagged almost a decade behind the United States in introducing competition into the long-distance market, but it then developed much more quickly than either industry or regulatory experts had predicted. By 1997, just five years after the 1992 interconnection decision, the combined market share of long-distance entrants had reached 34 percent. Also, in contrast to the situation in the United States, long-distance competition in Canada has been dominated by facilities-based competitors. The combined market share of resellers in Canada was only 5 percent in 1997, about a third of the combined market share achieved by US resellers.

The current major issue in both countries is the introduction of competition into the local exchange market. The 1996 US *Telecommunications Act* established a complex set of criteria for establishing effective competition there. Local operating companies, once established, would be granted entry into the inter-LATA[1] long-distance market, and state regulatory commissions would have to open

1 LATA is the much-used acronym for a "local access and transportation area," which is typically the territory covered by a single area code.

intra-LATA markets to effective competition. Local exchange companies in the United States are also required to lease facilities to competitors at generous discounts. The result, as the authors note, is to provide "a strong disincentive for facilities-based entry." So far, the new US regulatory system has failed to generate much local competition.

In Canada, the structure of the industry and the regulatory approach are quite different. In its key decision to open local telephone markets to competition, the CRTC did not require the telephone companies to lease all facilities at wholesale rates. The commission's position is that facilities-based competition is the best assurance of "efficient and effective competition."

On balance, Crandall and Waverman prefer Canada's approach to local competition "because it avoids the protracted legal and regulatory disputes and requires facilities-based competition *ab initio*."

International Trade Law and Telecommunications

Hudson N. Janisch considers the interactions between telecommunications and international trade law and related developments.

He notes the importance of the creation of global and cross-border alliances, pointing out that the three major Canadian long-distance competitors — Stentor, Sprint Canada, and AT&T Canada — are each allied with a major US telecommunications firm. The most important development in this arena, however, is the Fourth Protocol to the 1994 General Agreement on Trade in Services (GATS), which has fundamentally changed the international regulatory regime for telecommunications.

Formerly, international telecommunications were governed under a system that recognized "the sovereign right of each nation to organize and regulate its telecommunications system as it thought proper," with bilateral agreements governing exchange of telecommunications services.

Under the new system of the Fourth GATS Protocol, trade in telecommunications services will henceforth be subject to general trade principles, including:

- transparency of laws, regulations, and guidelines;
- national treatment of foreign entities;
- most-favored-nation treatment of service providers from signatory countries; and
- nondiscriminatory market access.

Janisch describes the protocol as providing "a set of procompetitive regulatory principles that amount to a rudimentary form of international competition law for telecommunications," with almost all signatories agreeing to regulatory principles that include safeguards to prevent anticompetitive practices by major suppliers that control essential facilities. (Nevertheless, signatories have the right to establish universal service policies, provided they are competitively neutral.)

Canada's participation in the Fourth GATS Protocol may raise problems for the cabinet appeal process for CRTC decisions. This long-established mechanism may be inconsistent with the protocol's requirements of impartiality and transparency. Routing and resale restrictions of international telecommunications traffic may also be inconsistent with the new international regime.

Janisch concludes "Canada is going to have to make substantial policy changes in its approach to international communications."

Foreign Investment in Telecommunications

Steven Globerman and Daniel A. Hagen assess the various policies that affect foreign direct investment (FDI) in telecommunications.

The Fourth GATS Protocol specifies liberalized policies toward both competition and FDI. Nevertheless, important restrictions on investment remain. Canada, for example, restricts foreign investment in facilities-based telecommunications providers to 20.0 percent of di-

rect equity and 46.7 percent of indirect ownership. Even in countries with more liberal rules, the existence of national carriers (as in much of Europe) and of special roles for designated companies (as in Japan) represent barriers to FDI. Even the United States has FDI limits for radio licenses and a list of exemptions from most-favored-nation treatment for certain broadcast services.

Globerman and Hagen review the welfare implications of these restrictions on investment. They find that the arguments against FDI "are not compelling." Its benefits arise from two sources: increased competition, which lowers prices and stimulates reductions in cost; and technology transfer from the parent firms. The latter may be realized in part through strategic alliances and joint ventures; however the advantage of these alternative forms of reorganization will attenuate over time, so that foreign firms will probably come to prefer controlled or wholly owned affiliates.

Globerman and Hagen argue that pending technological changes will likely alter the market for telecommunication services in the future. For example, terrestrial wireless networks and satellite networks represent two new technologies that promise to offer viable alternatives to conventional wireline services. Internet telephony, now in its infancy, also holds future promise. The authors "see these new technologies as intrinsically procompetitive." They argue that the effective net cost of maintaining protection of local producers will increase, stimulating more rapid liberalization in the future.

The emergence of these newer technologies, however, does not mean that existing restrictions on FDI should not be relaxed. Such restrictions have potentially high net costs. Globerman and Hagen conclude, therefore, that further liberalization of FDI rules for telecommunication is warranted.

Economic Development and Telecommunications Infrastructure

Lester D. Taylor explores the links between improvements in telecommunication infrastructure and economic growth. His framework of analysis focuses on the four externalities associated with the

expansion of telecommunications infrastructure. The first three — the network or subscriber externality, the call externality, and the dynamics of information exchange — are specific to telecommunications infrastructure and explain how a network can grow endogenously at given levels of real income and relative prices. For the analysis of economic growth, however, it is the fourth externality, which Taylor calls the "at-large externality," that is most important. This externality describes the interaction of improved telecommunications infrastructure with innovations in the economy at large. Lower cost and more effective communication can lead to the introduction of new products as well as the expansion of output for existing products.

These important innovations, in turn, require additional investments in physical and human capital, which generate an increase in aggregate demand while augmenting aggregate supply.

Taylor recognizes that the empirical implementation of his framework will be difficult. Input cost reductions associated with improved telecommunications infrastructure are measurable; so are their impacts on industries using these inputs. However, the potential spillover effects on innovation are not captured by reductions in input costs. What is required is an appraisal of the impact of telecommunication infrastructure on expected profits and on production facilities in major telecommunication using industries. These are the major modeling challenges for future research on these issues.

The Geographic Diffusion of Information Technology

Shane M. Greenstein and Mercedes M. Lizardo examine the determinants of the geographic distribution of information technology in the United States over the 1986–92 period. They measure information technology by a composite index comprising the density of fiber optic telephone cable and per capita computing capacity and use the county as the basic unit of observation.

Over the six-year period the authors examine, both components of information technology grew rapidly. Computing capacity

increased almost fivefold, and fiber optic capacity increased almost 24 times. The dispersion of both measures decreased over the six-year period, indicating that information technology was becoming less concentrated in these particular regions.

In their analysis, Greenstein and Lizardo divide the period into two subperiods. During the first, 1986–88, local exchange companies were adapting to the divestiture of AT&T and the new regulatory environment in the United States. During this period, the regional distribution of information technology is explained by population density, city size, and the relative importance of employment generation.

During the second subperiod, 1989–92, the authors find greater stability. Although population density continued to play a role, both real per capita income and the regional density of large-scale computer users were also relevant.

They conclude that, during this period of rapid growth of information technology, the geographical diffusion of its infrastructure increased. By the end of the period, only a small number of areas, concentrated in small, less densely populated regions, did not have access to advanced telecommunications and computing infrastructure.

Broadcasting in Canada

W.T. Stanbury prepared two papers dealing with broadcasting and its regulation in Canada.

Broadcasting Regulation

In "Regulation and Competition in Broadcasting in the Age of Convergence," Stanbury reviews the characteristics of broadcasting regulation and government policies in Canada. The CRTC's approach to the regulation of broadcasting focuses on increasing the supply of Canadian content. As technological changes have expanded the number of broadcast distribution undertakings, the regulatory response has been to extend Canadian-content requirements to the newer types of undertakings. Because CRTC licences

are granted for limited periods, it can enforce conditions such as quotas for Canadian content.

In contrast to Canada's treatment of telecommunications, its regulation of broadcasting limits prices for only a few services, and traditional rate-of-return regulation has not been applied. However, the foreign ownership rules — a limit of $33\frac{1}{3}$ percent for direct and indirect holdings of equity — are somewhat more stringent.

The original rationales for the regulation of broadcasting were provided by the limitations of the broadcast spectrum and by the public-goods characteristics of over-the-air broadcasts. Technological changes have since undermined both. Cable TV, available to the vast majority of Canadian households, has already expanded the number of channels, and consumers are offered various packages of services at different prices. Direct-to-home (DTH) service and the digitalization of cable will greatly increase the number of channels. Further competition will be provided in the future when the telephone companies enter the market.

So far, the regulatory response has been to extend Canadian-content regulations and related cross-subsidy arrangements as additional entry occurs, and to try to control competition — various policy statements use the phrase "fair and sustainable competition." Stanbury clearly feels that this phase should be interpreted as "managed competition" designed to protect incumbent firms.

This type of regulation may itself become unsustainable as a result of the bypassing of Canadian stations by the reception of DTH signals from the United States and, in the future, by media content offered on the Internet.

Canadian Content

In "Canadian-Content Requirements: Description, Rationale, Politics, and Critique," Stanbury examines the CRTC's complex set of Canadian-content requirements in more detail. After reviewing these requirements, he briefly considers other policies designed to increase Canadian content of the broadcast medium, including subsi-

dies, "voluntary" contributions by licensees, and policies of the Canadian Broadcasting Corporation.

He considers the stated rationale for such policies and finds it an inadequate justification for this type of protectionism. He points out that the existing regulations actually have little to do with Canadian content but are based on the nationality of the creators or producers of that content.

He also argues that these regulations reduce consumer choice. However, this is an area where there are grounds for disagreement. The subsidized expansion of Canadian content in the media could *increase* consumer choice where the limitations on the spectrum are no longer binding. In this case, the rapid expansion of alternative channels is altering the impact of these protectionist policies. With limitations on spectrum, increased Canadian content must displace non-Canadian content; without limitations, the Canadian content may be added to the non-Canadian content available elsewhere.

Stanbury argues that Canadian-content requirements, like many other types of protectionism, amount to a regressive tax-transfer system. The costs of the system are relatively heaviest for low-income households, and the benefits accrue mainly to the producers and conveyers of Canadian programing.

Some analysts have agued that technological change will limit these policies. But Stanbury points out that, even if Canadian quotas become unenforceable, subsidies could nevertheless be expanded. He concludes: "It is going to be a very difficult task even to scale back CanCon policies, let alone eliminate them: there are simply too many people supping deeply at the public trough these regulations have created."