Industry Canada
Research Publications

PERSPECTIVES ON NORTH AMERICAN FREE TRADE

EFFECTS OF THE CANADA–UNITED STATES FREE TRADE AGREEMENT ON INTERPROVINCIAL TRADE

Paper Number 5
April 1999

Industry Canada Research Publications Program

The Industry Canada Research Publications Program provides a forum for the analysis of key micro-economic challenges in the Canadian economy and contributes to an informed public debate on these issues. Under the direction of the Micro-Economic Policy Analysis Branch, the Program's research paper series features peer-reviewed analytical working papers and policy-related discussion papers written by specialists on micro-economic issues of broad importance.

The views expressed in these papers do not necessarily reflect the views of Industry Canada or of the federal government.

Industry Canada
Research Publications Program

PERSPECTIVES ON NORTH AMERICAN FREE TRADE

EFFECTS OF THE CANADA–UNITED STATES FREE TRADE AGREEMENT ON INTERPROVINCIAL TRADE

By John F. Helliwell, University of British Columbia,
Frank C. Lee, Industry Canada, and Hans Messinger, Statistics Canada

Aussi disponible en français

Canadian Cataloguing in Publication Data

Helliwell, John F., 1937-

Effects of the Canada-United States free trade agreement on interprovincial trade

(Perspectives on North American free trade)
Text in English and French on inverted pages.
Title on added t.p.: Incidence de l'accord de libre-échange entre le Canada et les États-Unis sur le commerce interprovincial.
ISBN 0-662-64197-3
Cat. no. C21-28/5-1999

1. Free trade – Canada.
2. Interprovincial commerce – Canada.
3. Free trade – United States.
I. Lee, Frank C. (Frank Chung)
II. Canada. Industry Canada.
III. Title.
IV. Series.

HF1766.H44 1999 381'.5'0971 C99-980158-9E

The list of titles available in the Research Publications Program and details on how to obtain copies can be found at the end of this document. Abstracts of research volumes and papers published in Industry Canada's various series, and the full text of our quarterly newsletter, *MICRO*, are available on *STRATEGIS*, the Department's online business information site, at http://strategis.ic.gc.ca.

Comments should be addressed to:

Someshwar Rao
Director
Strategic Investment Analysis
Micro-Economic Policy Analysis
Industry Canada
5th Floor, West Tower
235 Queen Street
Ottawa, Ontario
K1A 0H5

Tel.: (613) 941-8187
Fax: (613) 991-1261
E-mail: rao.someshwar@ic.gc.ca

Acknowledgments

The authors are grateful to two anonymous referees for very helpful suggestions.

TABLE OF CONTENTS

PREFACE

Toward the mid-1980s, as international markets and production were becoming more global in scope and outlook, Canada was in danger of being pushed to the margin of the world economy. We were not equipped to expand our participation in global markets, and we were in danger of losing our own markets. Moreover, with over two-thirds of our exports destined for the United States and the share steadily climbing, we were highly exposed to rising U.S. protectionist sentiments. In essence, our past prosperity had made us complacent about the precarious position we faced as a trading nation.

It was in such a climate that the government undertook the steps necessary to renew and strengthen the economy, rather than resist the forces of global change. The government's approach was to make the private sector the driving force of this economic renewal. Policies were adopted to encourage and reward entrepreneurship and facilitate adaptation to the changing economic environment.

As a trading nation, getting our trade relations with the United States right was an obvious goal. It was decided that a free trade agreement was needed in order to forestall protectionist tendencies in the United States, enhance Canada's security of access to the American market and improve the predictability of trade relations with our neighbour to the south.

The Canada-United States Free Trade Agreement (FTA) was implemented in 1989. Five years later, in 1994, the North American Free Trade Agreement (NAFTA) came into effect and basically extended the FTA to the fast-growing Mexican market.

These free trade agreements were expected to increase prosperity in Canada by raising the efficiency and productivity of Canadian businesses. Such agreements are known to be mutually beneficial to the economies of the parties involved, and are particularly beneficial to the relatively small economies, such as that of Canada. They first expose domestically protected firms to international competition. Second, they reward innovative and productive firms by giving them access to larger markets. This increases trade flows between participating countries and improves the overall efficiency of their economies. The FTA and NAFTA were no exception; they were signed in the hope of obtaining those benefits for the Canadian economy after an initial adjustment period. Yet concomitantly, there were legitimate concerns about possible plant closures and job losses in Canada.

More than ten years have passed since the implementation of the FTA — enough time to reliably assess the implications of the agreement for the Canadian economy. In this context, the Micro-Economic Policy Analysis Branch has asked a group of experts to examine the Canadian economy in light of the FTA. The six papers coming out of this exercise are now being published under the general heading of *Perspectives on North American Free Trade*. These papers analyse a broad spectrum of issues ranging from the impact of the FTA on interprovincial trade flows to its impact on the productivity performance of the Canadian economy. In addition, the viability of the Canadian manufacturing sector is assessed, as is the relationship between outward foreign direct investment and trade flows. The papers also explore the implications of trade for the evolution of Canada's industrial structure and skill mix along with an assessment of Canada's migration patterns with the United States.

The paper by John Helliwell, Frank Lee and Hans Messinger assesses the impact of the FTA on interprovincial trade. More specifically, it examines the possibility that the FTA may have created more

trade between Canada and the United States, in part by diverting trade away from interprovincial channels. The authors use two types of evidence in their approach. First, they develop a gravity model to explain interprovincial and province-state trade flows. Then, they analyse new industry-level data to estimate the extent to which tariff changes in Canada and the United States help explain inter-industry differences in the growth of interprovincial trade.

At the aggregate level, their results show that the FTA increased north-south trade relative to east-west trade. After adjusting for appropriate factors, the gravity model suggests that in 1996, interprovincial trade would have been 13 percent higher than it actually was if the 1988 trade structure had remained unchanged. However, because the FTA also affected the provinces general economic growth, it is hard to calculate the FTA's net effect on the overall 15 percent increase in interprovincial trade between 1988 and 1996.

The disaggregated results suggest that the FTA-related reduction in Canadian tariffs led to increases in imports from the United States and to reductions in interprovincial trade. On the other hand, reductions in U.S. tariffs led to increases in exports to the United States and to increases in interprovincial trade. Overall, the authors calculate that FTA-induced tariff cuts led to reductions in interprovincial trade by about 7 percent, only about half of the total reduction previously calculated with aggregate data.

EXECUTIVE SUMMARY

In this paper, two types of evidence are used to assess the impact of the FTA on interprovincial trade. First we use a gravity model to explain interprovincial and province-state total flows of merchandise trade from 1988 through 1996. The results show clearly that the FTA increased province-state trade relative to interprovincial trade. However, even after adjustment to the FTA, interprovincial trade intensities remain twelve times higher than those of trade between provinces and states, down from around eighteen to twenty times higher before the FTA was introduced. The same model was used to predict what the 1996 interprovincial trade flows would have been had the trade structure remained the same as in 1988, but taking account of economic growth in both countries. After adjusting for economic growth, and for the increasing share of services in GDP, the model predicted that 1996 interprovincial trade would have been 13 percent higher than it actually was. This 13 percent reduction in interprovincial trade is one estimate of the effects of the FTA on interprovincial trade, since it took place at the same time as the FTA was bieng introduced.

We then used disaggregated data recently prepared by Statistics Canada to estimate the extent to which tariff changes in Canada and the United States help to explain inter-industry differences in the growth of interprovincial and international trade. The results suggest that the FTA-related reductions in Canadian tariffs led to increases in imports from the United States and to reductions in interprovincial trade, while the reductions in U.S. tariffs led to increases in exports to the United States and to increases in interprovincial trade. For the 47 commodity classes studied, the net FTA-related reductions in interprovincial trade were estimated to be 7 percent, or about half the total shortfall calculated previously using aggregate data.

Finally, we compared the post-FTA industry-by-industry changes in trade between Canada and the United States with those that were predicted by the general equilibrium model used to assess the FTA in the late 1980s. The industrial pattern of trade increases is correlated with the predicted pattern, but the actual increases are much greater than predicted, even after accounting for general economic growth.

1. INTRODUCTION

Ten years have passed since the signing of the Canada-United States Free Trade Agreement (FTA).[1] This accord was followed by the North American Free Trade Agreement (NAFTA), which has been in effect since January 1, 1994. These two free trade agreements were expected to create a more competitive economy in Canada through increased competition and open access to a larger export market. Canada was not alone in forming preferential trade agreements (PTAs). France, West Germany, Italy and the Benelux established the European Community (EC) in 1957. One objective of the EC was to form a common market within Europe, which was finally realized in 1993. Between 1957 and 1993, there were a series of developments, such as the formation European Free Trade Association (EFTA) in 1960, to facilitate and strengthen economic linkages within Europe.[2] Moreover, there are other regional trading blocs such as MERCOSUR ("Mercado Comun del Sur" or "Common Market of the South") formed by Argentina, Brazil, Paraguay and Uruguay, which has been in effect since November 29, 1991. As with other PTAs, one goal of this regional trading block is to facilitate movements of goods, services and factors of production within the region.

Aside from any political considerations, one objective common to all PTAs is to raise the economic welfare of participating countries. Therefore, it is natural for one to ask whether the FTA or NAFTA has indeed benefited Canada. Aggregate economic indicators appear to show that the U.S. economy has been the primary beneficiary of these agreements. The U.S. economy has been outperforming that of Canada despite improvements in "macro" fundamentals in Canada even after the implementation of the 1988 FTA. For instance, Canada's productivity gap with the United States has continued to widen in every major manufacturing industry since 1985. An unemployment gap between Canada and the United States opened up in the early 1980s and has persisted to the present discrepancy of over 4 percentage points. Canada's share of the world's foreign direct investment (FDI) inward stock has declined by roughly 50 percent over the 1985-96 period. At the same time, there is a concern that skilled Canadians may be migrating to the United States, attracted by lower taxes, higher wages and better weather. But these economic indicators cannot simply be used to assess the impact of the FTA on the Canadian economy since Canada had to face a number of problems at the same time. The recession of the early 1990s in Canada and the United States, coupled with the introduction of the GST and a tight monetary policy, left little room for the aggregate economy to expand in the early part of the 1990s. Another reason for the seemingly ineffective impact of the FTA may be that the U.S. and Canadian economies were already fairly integrated as a result of previous GATT rounds and the 1965 Auto Pact (Holland, 1994). In any case, it is risky to attempt to judge the effectiveness of the FTA on the basis of aggregate economic indicators. Wonnacott (1994) argues that the 1990-91 recession could have been worse had it not been for the FTA. In fact, one bright side of the Canadian economy since the implementation of FTA has been its export sector. For instance, Canadian exports to the United States increased to 79 percent of total exports in 1996 ($ 281 billion), from 73 percent ($ 144 billion) in 1988. At the same time, the share of Canada's imports coming from the United States increased from 69 percent in 1988 to 76 percent in 1996. A Statistics Canada study (1993) showed that trade flows between Canada and the United States increased in those industries most liberalized by the FTA.

Since the implementation of the FTA, interprovincial trade linkages appear to have weakened as evidenced by the relative decline of interprovincial trade. As shown in the next section, and in Table 1, interprovincial merchandise trade volumes grew at a rate of 2 percent per annum slower between 1988 and 1996 than would have been expected in light of the growth of provincial GDP over that period. The

unexplained shortfall drops to 1 percent per annum when account is taken of the increasing share of services in GDP, and this remaining gap needs explanation. One possibility is that the FTA may have created more trade between Canada and the United States in part by diverting trade away from interprovincial channels. If this is indeed what happened, and if the trade diversion effect of the FTA is greater than its trade creation effect, it could have a major influence on judgements about the net economic benefits of the FTA. The principal objective of this study is to examine the extent to which FTA-induced increases in Canada-U.S. trade were linked to changes in interprovincial trade. That is, to what extent were the post-FTA increases in Canada-United States merchandise trade due to the FTA itself? Did the extra trade between Canada and the United States induce additional interprovincial trade, or was interprovincial trade diverted to the United States? Alternatively, was interprovincial trade largely unaffected by the FTA-induced increases in North-South trade?

The study first reviews some previous work on the effects of trading blocs on trade volumes. Section 3 contains aggregate evidence about the links between post-FTA movements in interprovincial trade and province-state trade. Section 4 presents and analyzes new industry-level data designed to show whether the post-FTA changes in trade mix are consistent with interprovincial trade creation, trade diversion, or neither. Finally, Section 5 summarizes the two strands of evidence and sets some objectives for future research. While the initial results from the industry-based data are interesting, they also suggest that to fully explain the linkages between tariff changes and interprovincial trade it will be necessary to move to a finer level of classification, since the level of aggregation used here may involve too much averaging of commodity groups with quite different pre-FTA tariff rates.

2. LITERATURE REVIEW

There have been many studies analyzing the effects of trading blocs on trade among bloc members, and between bloc members and other countries. This has been an important focus of international trade theory as well, and of computable general equilibrium (CGE) models of international trade. The theoretical literature shows that the formation of free-trade areas, customs unions, or other preferential trading blocs has uncertain effects on economic welfare. While there is a general presumption of gains from increased trade, based on a fuller specialization to achieve economies of scale and to match comparative advantage, there is always the possibility that trade diversion may reduce trade with non-members in such a way as to offset the otherwise expected gains from increased trade among member countries.

Empirically-based CGE models have been used frequently to resolve the theoretically ambiguous effects of trading blocs, and to assess their likely net costs and benefits, usually from the perspective of potential members, but sometimes from a global perspective as well. There were several such studies before the FTA was passed, followed by several applications to the subsequent North American Free Trade Agreement (NAFTA). Most of the *ex-ante* CGE studies of the FTA showed net gains, although there were substantial differences depending on the assumptions made about the nature of competition and the degree of unexploited economies of scale.[3] Although most CGE models are static in nature, researchers are beginning to consider the dynamic effects of trade. For instance, McKibbin (1994) considers dynamic gains through capital accumulation in his study. His results suggest that higher productivity in participating countries will dominate trade diversion effects thereby increasing income for all countries in the long run.

There have been several *ex post* studies of the effects of the FTA. Gaston and Trefler (1997) examine the impact of the FTA on *ex post* earnings and employment in Canada using reduced form employment and earnings equations. While they find the net employment effects of the FTA to be negative, they estimate that FTA tariff cuts account for no more than 15 percent of the 390,600 jobs lost over the 1989-93 period in the Canadian tradables sector. Moreover, tariff reductions are estimated to have a smaller impact on real earnings, a reduction of no more than 1.7 percent. They conclude that the effects of the FTA on employment and earnings in Canadian manufacturing were negative, but modest in scale.

Head and Ries (1997) studied a matched sample of manufacturing industries in Canada and the United States and found that post-FTA declines in production and employment were greater in Canadian than in U.S. industries. What was more surprising to them and to others was the failure to find increased output per worker in the wake of these rationalization efforts. Their data sample shows that falling Canadian tariff rates led to drops in relative employment in Canadian industries that had previously operated with higher tariff protection, but shows no parallel increases in output per worker. These results are based on a cross-section analysis of cumulative changes in relative output, employment, and output per worker among more than 100 Canadian manufacturing industries, with all variables measured relative to what was happening at the same time in matching U.S. industries. These studies, however, do not deal with the trade creation and diversion effects of the FTA, which are the focus of this study.

One popular model used to assess the impact of PTAs on trade creation and diversion is the import demand model. For example, Balassa (1989) assesses the impact of the formation of the European Economic Community on trade flows by comparing intra-area and extra-area *ex-post* import demand elasticities between the pre-integration and post-integration periods. He finds that the income elasticities of import demand for members increased while it did not change significantly for non-members between the

two periods. Thus, he interprets this as evidence that the Common Market created trade without much indication of trade diversion. Likewise, Gondwe and Griffith (1989) estimate income elasticities of import demand to assess the effects of the Caribbean Free Trade Association (CARIFTA). They find net trade creation as a consequence of the CARIFTA. In a similar fashion, Wylie (1995) studies the implications of the NAFTA for trade creation between NAFTA partners and trade diversion between North America and the rest of the world. His findings suggest that exports from non-NAFTA members are likely to be diverted away from NAFTA members. But NAFTA-induced growth effects on trade are likely to dampen the static effect.

Another model that has been used widely to assess the impact of trading blocs is the gravity model. It assumes that trade (attraction) flows depend on physical distance and the product of economic size (mass), proxied by real GDP, similar to the gravity equation used in physics (Bayoumi and Eichengreen, 1995). The gravity model has always been the most empirically successful framework for explaining bilateral trade flows (for instance, Tinbergen, 1962; Pöyhönen, 1963, and Aitken, 1973). However, the model was initially treated as suspect because of a lack of well-understood links to the various theoretical models of trade flows. The earliest tight derivations from theoretical models were for trade in differentiated products, as by Anderson (1979), Helpman (1984) and Bergstrand (1989), but subsequent research has shown the gravity form to be consistent with the classical Heckscher-Ohlin model as well, as illustrated by Deardorff (1995). The theoretical ubiquity and empirical robustness of the gravity equation combine to make it the natural choice for evaluating the trade volume effects of preferential trading arrangements.

There are a number of empirical papers that assess the impact of PTAs in Europe on trade flows based on the gravity model. Aitken (1973) finds that both the European Economic Community (EEC) and European Free Trade Agreement (EFTA) have experienced a cumulative growth in gross trade creation although the trade creation effect of the EEC was substantially greater than that of the EFTA. Similarly, Bikker (1987) finds that preference to trade among EEC members increased by 76 percent between 1959 and 1974 based on the gravity model. Bayoumi and Eichengreen (1995) use a modified gravity model to examine the formation of the EEC and of the EFTA. They find that both arrangements increased trade among members. In the case of the EEC, this appears to be accompanied by trade diversion, whereas it is less clear for the EFTA. Frankel and Wei (1993) find evidence of trading blocs in Europe, the Western Hemisphere, East Asia and Pacific based on the estimated results of the gravity model. These empirical findings suggest that PTAs do affect trade flows between countries. However, after controlling for distance and other relevant factors, home country residents still prefer to purchase goods produced at home. For instance, Wei (1996) extends a simple gravity model to examine the home country bias in purchasing goods among OECD countries. He finds that an average OECD country prefers to purchase more than twice as much goods produced at home even when the international trade is between two EC countries sharing a common language and a common border. Helliwell (1997, 1998) applies a similar approach with extended and revised data, and finds that within-country trade in OECD countries is ten times denser than between OECD countries who do not share a common language and border, even after adjusting for the generally greater distances of international trade.

De Grauwe (1988) considers exchange rate variability as another determinant of the long-run growth rates of international trade in addition to real income growth, relative price change and trade arrangements. He finds that the existence of the EC increased the growth rate of members' trade. However, during the flexible exchange rate period (1973-84), exchange rate variability was negatively associated with the growth rate of trade. Frankel and Wei (1993) also find a weak negative relationship between real exchange rate variability and trade volume. Kumar and Whitt (1992) review a number of empirical papers dealing with exchange rate variability and international trade. They conclude that there is evidence that

exchange rate fluctuations tend to have a negative effect on international trade, but argue that these effects may not be large enough to offset the benefits of the flexible exchange rate regime.

The gravity model has also been applied to the Canadian economy. McCallum (1995) estimates a simple gravity model using 1988 interprovincial trade flows and Canadian provinces-U.S. states trade flows to analyze the importance of the border on trade between the two countries. Based on his estimates, he finds that in 1988 a Canadian province traded 20 times as much with another province than with a U.S. state of equal size and distance. Helliwell (1996) uses data for 1988, 1989 and 1990 and confirms McCallum's (1995) results.[4] Helliwell, however, finds that the border effect in fact rose from 1989 to 1990 for all provinces except New Brunswick. Engel and Rogers (1996) test the importance of border and distance for price dispersion across 14 North American cities. They confirm that distance and border are important in explaining price differences in North America, and estimate the implicit width of the Canada-United States border to be 2,000 miles. Furthermore, the estimated border effect is shown to be larger in the 1989-94 period than in the 1978-88 period.

So far, there have been only a few studies that attempted to link the FTA with interprovincial trade. One of them is Helliwell (1997), which uses OECD trade data to examine whether trade linkages in 1990 between Canada and the United States were stronger than those between other pairs of countries. The results[5] show that trade between the United States and Canada in 1990 was no greater than would be expected between any two countries of the same size and distance, sharing a common language but not in any special trading relation with one another. Thus, after adjusting for differences in size and distance, trade between two EU countries sharing a common language, such as France and Belgium, is found to be greater, by the amount of the EU effect, than is trade between Canada and the United States. Despite the importance of the Auto Pact, and the low average tariffs between the two countries, even before the implementation of the FTA tariff reductions, the large 1990 trade flows between the two countries are no greater than would be expected on the basis of the large size and close proximity of the two countries. Thus the large post-1990 increases in trade between the two countries, to be studied in the remainder of this paper, started from a base where trade flows between the two countries were typical of those between any two countries sharing a common language.

Most empirical studies mentioned above rely on aggregate trade data. These studies may not be adequate in assessing the implications of PTAs in that trade agreements often do not treat all industries or commodities equally (for example, special exemption clauses). Therefore, it is necessary to analyze the impact by detailed commodity category (or industry) to reflect the reality accurately. Clausing (1996) analyzes the consequences of the FTA for Canada- U.S. trade by examining Canada-U.S. commodity trade flows from the late 1980s to the early 1990s, at the level of detail of approximately 1700 commodities.[6] She found that the commodities with the largest tariff reductions also had the largest post-FTA increases in value of shipments. By aggregating her results, Clausing concludes that a substantial fraction of the post-1988 increases in trade between Canada and the United States was due to tariff changes under the FTA. She also attempted to assess the extent to which the increased trade with the United States represented diversion of trade with other countries, finding only modest trade diversion effects.

Clausing's estimates of the trade-creating effects of the FTA are obtained by using the results of equations estimating, separately for the United States and Canada, the extent to which imports grew faster in industries with the largest reductions in import tariffs. Her U.S. import equation showed an approximate 11 percent increase in imports for each drop of 1 percentage point in the average tariff rate. In the Canadian import equation, the estimated effect was almost exactly half as large. In both cases, the effects were estimated with some precision, having *t*-values of about 6.0. Since the reductions in Canadian tariffs

were about twice as large as those in U.S. tariffs, the results seem to be suggesting that the post-FTA adjustments in trade volumes were about the same for U.S. imports from Canada as for Canadian imports from the United States. One might therefore be tempted to conclude that the changes were in response to the FTA itself, and not particularly related to the size of the tariff reductions. However, that inference would probably be false, as the estimates in both cases are mainly cross-sectional, explaining the relative growth of imports of different commodities in terms of their tariff reductions. Thus, in both countries, there is evidence that growth of imports was markedly larger in commodities whose tariffs have been reduced the most. We still need to explain what appears to be a much larger response elasticity for U.S. imports than for Canadian imports. It is probably more than coincidental that the country with the lowest import tariffs had the largest proportionate import increase per percentage point decrease in tariff rates. One simple way of reconciling the two results would be to hypothesize that both countries had the same proportionate response to the same proportionate (rather than absolute, as assumed by the Clausing estimates) reduction in tariffs, although this would still imply quite different price elasticities in terms of tariff-inclusive prices, since the elimination of tariffs in both countries cuts the U.S. consumer price by a smaller proportion than the elimination of Canadian tariffs reduces Canadian consumer prices, given the higher average rate of Canadian tariffs.

Whether one looks at the Canadian or the U.S. import equation, the price elasticities of import demand implied by the coefficients on the tariff variables are strikingly higher than is usually found in time series estimates — 11 for the United States and 5.5 for Canada. One must regard these effects, as does Clausing, as reduced-form estimates involving a large element of supply response. One possible way of thinking about these very large responses is to view the FTA as triggering a rationalization of production facilities, with increased concentration on one side of the border than the other. Alternatively, or additionally, the FTA might have triggered more cross-border intra-firm trading at intermediate stages of production, as was seen during the adjustment of the auto industry to the 1964 Auto Pact.

There are other empirical studies that indicate that the FTA may have affected the North American economy. Ensign (1997) shows that there was a significant increase in Canadian acquisitions in the United States during the 1989-96 period, compared to a general decline from 1981-88. In addition, Hanson (1994) argues that trade liberalization affects various regions differently. His analysis of the Mexican economy indicates that Mexican manufacturing activities have been shifting towards the Mexico-United States border since the implementation of the NAFTA.

3. AGGREGATE EMPIRICAL RESULTS

Our aggregate assessment of the impact of the FTA on interprovincial trade makes use of the gravity model of trade flows. More specifically, the volume of trade depends in a log-linear fashion on the GDPs of the two trading partners, on the distance between them, and on whether they are in the same trading bloc:

$$(1) \qquad \ln S_{ij} = \alpha_0 + \alpha_1 \ln(GDP_i) + \alpha_2 \ln(GDP_j) + \alpha_3 \ln(DIST_{ij}) + \alpha_4 (BLOC) + \epsilon_{ij}$$

where S_{ij} is bilateral merchandise trade flowing from i to j; GDP_i and GDP_j are the gross domestic products of countries i and j; $DIST_{ij}$ is the distance between them; *BLOC* is a variable that takes the value 1.0 for pairs of i and j that are in the same trading bloc, and ϵ_{ij} is a random error term usually taken to be normally distributed.

To get some idea of the possible aggregate effects of the FTA on interprovincial and province-state trade, we use extended and revised versions of the data for interprovincial and province-state trade used in earlier studies by McCallum (1995) and Helliwell (1996), using a slightly extended form of equation (1). The main extension considered here, and also in Helliwell (1998), is the addition of variables designed to measure the economic remoteness of both the importer and the exporter from other states and provinces. The remoteness variable measures trade opportunities available for state or province j with states and provinces other than the bilateral trading partner being directly considered. Thus, the summation covers all of j's n trading partners excluding i:

$$(2) \qquad REM_{jit} = \sum_{k = 1..n,\, n \neq i} (DIST_{kj} / GDP_{kt})$$

The gravity model is fitted to merchandise trade for the period 1988 through 1996 among the ten Canadian provinces and between each province and each of thirty states, comprising all the border states plus other states in the lower forty-eight with the largest trade links to Canada. If intra provincial trade is excluded from the data, as it is for the equations reported here, then the maximum possible number of annual observations is 690, comprising 90 interprovincial flows[7] and 600 (= 2 x 10 x 30) trade flows between provinces and the thirty states with the strongest trading links to Canada.[8] The sample size is further reduced to 676 observations per year by eliminating those trading pairs with zero trade flows in one or more years between 1988 and 1996.[9] The equations are fitted in two ways, first as separate equations for each year, and second as a system of equations with income, distance, and remoteness effects constrained to have the same values for each year, with the constant term replaced by separate variables covering interprovincial and province-state trade.[10] The variable *HOME* takes the value 1.0 for all trade flows from one province to another, and zero elsewhere, The variable *CUS* takes the value 1.0 for all trade flows between provinces and states, i.e. between Canada and the United States, and zero elsewhere. The results of the first estimation are reported for most years in Tables 2.1 and 2.2 of Helliwell (1998). The coefficients and t-values (in parentheses) for the second estimation are shown below for the constrained coefficients:

$$(3) \qquad \ln S_{ij} = \underset{(42.2)}{1.18} (\ln GDP_i) + \underset{(33.7)}{0.957} (\ln GDP_j) - \underset{(23.6)}{1.35} (\ln DIST_{ij}) + \underset{(3.2)}{0.219} \ln(REM_i)$$

$$+ \underset{(2.6)}{0.179} (\ln REM_j) + \alpha_{4t} (HOME) + \alpha_{5t} (CUS)$$

The results of the constrained and unconstrained estimates are very similar in terms of their implications for the implied levels and trends of interprovincial and province-state trade. This can be seen most easily by comparing the first two columns of Table 1, which show the border effects implied by the two versions of the model. The first column is calculated as the antilog of the coefficients of the *HOME* variable (α_{4t}) in the equations with unconstrained coefficients.[11] The second column shows the antilog of the differences between the coefficients of *HOME* and *CUS* in equation (3) above, i.e. $exp(\alpha_{4t} - \alpha_{5t})$. Thus both columns show, from different versions of the same gravity model, how large are interprovincial merchandise trade flows as a multiple of province-state trade flows, after adjusting for differences in the economic size, distance, and remoteness of the trading partners. Both estimates show interprovincial trade flows to have been about 19 times larger than province-state trade flows in 1990, when the FTA was coming into effect. Both estimates show a substantial drop between 1990 and 1993, followed by a subsequent period of approximate constancy (1993-1996) at a level of about 12, punctuated by a rise to 14 in 1995.

Since the relevant parameters are estimated with considerable precision, statistical tests show than the average value of the border effect from 1993 through 1996 is very significantly below that applicable from 1988 through 1990. These results suggest very strongly that the FTA, or something else that occurred at just the same time, was responsible for a significant increase in the provinces' trade with U.S. states relative to their trade with each other.

Three other features of these results are noteworthy. First, the adjustment appeared to have been concentrated in the period from 1991 through 1993, with little or no subsequent trend appearing, at least through 1996. Second, the relatively small tariff reductions contained in the FTA appear to have increased bilateral merchandise trade between Canada and the United States by more than the accumulated effects over many years of the much larger tariff reductions among the EU countries. Finally, even after a substantial increase in province-state trade, interprovincial trade linkages remain twelve times as dense as those between provinces and states.

These results can be pushed slightly further, even in the context of the aggregate data for merchandise trade, by trying to assess whether the increase in province-state trade relative to interprovincial trade was obtained by pure expansion of province-state trade, by diversion of interprovincial trade, or by some combination of both. This question is easier to ask than to answer. A starting point is to compute how fast interprovincial trade and province-state trade each grew from 1988 to 1996, relative to what could have been expected given the growth of GDP over the same period.

The results are shown in the third and fourth columns of Table 1. The column labelled *IPROV* is calculated by taking the antilogs of the coefficients of the *HOME* variable (α_{4t}) in equation (3) for each year, and then dividing each value by the 1988 value to get an index equal to 1.0 in 1988. The column labelled *CUS* is calculated as the antilogs of the coefficients of *CUS*, (α_{5t}), the dummy variable covering all province-state trading pairs, and then multiplying the resulting series by 10.0 and dividing by the 1988 value for *IPROV*. The *IPROV* series shows that interprovincial trade actually fell, on average over the 1988-96 period, while some increase should have been expected given the growth of GDP over the same period. The *CUS* series shows that province-state trade showed little evident trend, although it fell to a low point at the beginning of the 1990s and rose thereafter by about 25 percent. Why does the series for province-state trade show so little increase, given the much larger proportionate increase in the measured values of merchandise trade between Canada and the United States? The simple answer is that nominal GDP was growing fairly fast in the first half of the 1990s, especially in the United States, and the equation estimates that trade flows grew on average 20 percent faster than the exporter's GDP, and almost as fast as the importer's GDP. The same reasoning explains why interprovincial trade, which was in nominal terms fairly stagnant during the first half of the 1990s, is shown to be falling by the *IPROV* series.

Table 1
Trends in Interprovincial and Canada-U.S. Merchandise Trade

YEAR	*B*	*BSYS*	*IPROV*	*CUS*	*IPROR*	*CUSR*	*M*
1988	16.91	17.02	1.00	0.59	1.00	0.59	0.43
1989	16.82	17.31	0.97	0.56	0.98	0.57	0.43
1990	19.52	18.92	0.89	0.47	0.92	0.49	0.42
1991	17.07	17.18	0.85	0.50	0.94	0.55	0.39
1992	15.24	16.09	0.83	0.51	0.96	0.60	0.37
1993	12.26	12.29	0.77	0.63	0.89	0.72	0.38
1994	11.43	12.13	0.82	0.67	0.90	0.75	0.39
1995	14.02	14.00	0.80	0.57	0.89	0.64	0.39
1996	11.93	12.24	0.78	0.63	0.87	0.71	0.39

B Border effect estimated with all coefficients allowed to vary from year to year.
BSYS Border effect estimated from a set of nine equations estimated by Zellner SUR with all coefficients except the border effect constrained to be the same in each year.
IPROV Interprovincial trade volume relative to 1988 level, after adjusting for all growth due to changes in GDP and remoteness.
CUS Canada-U.S. trade, multiplied by 10, relative to 1988 interprovincial trade, after adjusting for the effects of GDP, distance and remoteness.
IPROR Interprovincial trade volume relative to 1988 level, after adjusting for the increasing share of services in GDP, i.e. *IPROR* = *IPROV*/(M/M88).
CUSR Same as *CUS*, after adjusting for the increasing share of services in GDP in the same manner as for *IPROR*.
M The year's average across provinces in the ratio of intra provincial sales of goods to provincial GDP.

Notes: The values of *B* are for 1991 through 1996 and are identical to those reported in Table 2.2 of Helliwell (1998). The value for 1990 is the same as that in column (v) of Table 2. Values for 1988 and 1989 are obtained from regressions using the 1990 adjustment factors for province-state trade, as explained in Helliwell (1998). The values of *BSYS* are from the same data and specification as *B*, but with all coefficients except those on the border effect variable constrained to have the same value in all years. *IPROV* and *CUS* are obtained from the same data, but with the specification changed to exclude a constant term, and to include instead two variables that sum to 1.0. The first is *HOME*, covering all observations relating to trade from one province to another, and the other, *CUS* = 1.0-*HOME*, covering all observations of trade between provinces and states. The antilogs of the coefficients of these variables are shown above as *IPROV* and *CUS*, respectively, except that *IPROV* is divided by its own 1988 value, to give an index with a base of 1.0 in that year, and *CUS* is multiplied by 10.0 and divided by the 1988 value of *IPROV*. The 1990 value of *CUS* of 0.47 thus means that province-state trade flows were .*i* x 0.47 = 0.047 as large as interprovincial flows, after adjusting for the effects of economic size, distance, and remoteness. *IPROR* and *CUSR* are adjusted for increases in the share of services in GDP, as described above.

A first look at these results suggests that whatever trade was induced by the FTA only served to offset what otherwise would have been a drop in trade intensity between Canada and the United States, and either left untouched or exacerbated the falling ratio of interprovincial trade to provincial GDP. However, there is at least one adjustment that must be made before such a conclusion would be appropriate. It must be remembered that the parameters used to estimate the relation between GDP and trade are based on

cross-sectional variation among states and provinces, all of which have roughly similar per capita incomes and economic structures. However, there have been changes over time in the structure of both the U.S. and Canadian economies that affect the relation between GDP and merchandise trade. In particular, merchandise trade by definition excludes services, while GDP includes services, which have been increasing as a share of GDP. We would therefore expect, for a given degree of international economic integration, that merchandise trade would grow at the same rate as total goods production, and hence at a lower rate than GDP if services were becoming a larger share of total GDP.

To give some idea of the possible size of this service-growth effect, the seventh column of Table 1, labelled *M*, shows the average across provinces, for each year separately, of the ratio of within-province goods sales to provincial GDP. This series has been falling, reflecting the increasing share of services in GDP. To adjust the trade growth series for this change in economic structure, the columns labelled *IPROR* and *CUSR* show the original series divided by an index of service intensity.[12] The adjusted series for interprovincial trade still shows some reduction, about 10 percent, rather than 20 percent for the unadjusted series, over the period from 1988-96. For the province-state trade series, the adjustment converts the trendless unadjusted series into one with an early slump followed by an increase of about 40 percent from 1990 through 1996.

One preliminary inference from the adjusted series derived from the aggregate merchandise trade data would be that the post-FTA period was marked by some increase in the intensity of province-state trade, coupled with a reduction in the intensity of interprovincial trade. Whether these offsetting movements reveal some combination of FTA-related trade creation and diversion or reflect the influence of some other phenomena cannot yet be determined. The aggregate data may perhaps be further refined by attempting to include some measures of cyclical variation in the constrained equations, since it is well-established that merchandise trade is more cyclical than is GDP, and the first half of the 1990s displayed substantial cyclical variance. However, the most promising avenue for an investigation of the existence of FTA-induced trade creation and trade diversion effects involves the use of trade data disaggregated by industry. The big advantage of using data disaggregated by commodity is that they offer at least the possibility of enough cross-commodity variation in tariff reductions to show, for both province-state trade and interprovincial trade, that sort of tariff-induced changes in growth patterns that were identified by Clausing (1996) for province-state trade.

4. EVIDENCE FROM INDUSTRY-LEVEL DATA

This section employs newly developed matched disaggregated commodity detail for interprovincial, Canada-United States and Canada-Rest of World (ROW) trade flows from 1989 through 1996. The new data series, at aggregation levels that initially cover 67 commodities, include nominal trade flows and average tariff rates. The tariff rates on Canadian imports have been compiled by Statistics Canada, and the data for U.S. tariffs on imports from Canada were prepared by U.S. agencies at the request of Statistics Canada. The industries and the tariff data are described in the Appendix. Initially, the data are split among 67 commodities, but not by individual provinces and states. Thus at this stage it is not possible to make direct use of the gravity model applied above for the analysis of trade between individual provinces and states. It may eventually be possible to disaggregate the data to include industry-level trade between individual provinces and states. However, this would require considerable work to adjust the international trade statistics to provide a more comparable distribution of trade to the provinces and states of origin and destination. It would also mean more limitations on the feasible degree of commodity disaggregation, which is limited by the need to protect the confidentiality of data sources when the number of firms involved in a trade flow is very small.

Our initial studies make use of a fairly high level of industrial aggregation. There are likely to be substantial benefits from disaggregating to a greater extent, since tariff variation within commodity groups at higher levels of aggregation can be considerable. This is probably a good part of the reason why our research does not reveal as much tariff-induced changes in trade as was discovered by Clausing (1996) using a much greater degree of commodity detail.

Table 2 shows the growth of trade from 1989 to 1996, as represented by the ratio of 1996 trade to 1989 trade. The averages are shown across two groupings of merchandise trade, first for all 67 commodity classes, and then for a sub-group of 42 commodity classes that exclude food, tobacco, alcoholic beverages and crude materials. The quantitative results reported in this paper make use of the sub-group of 42 commodities, since they include all of the manufacturing classes that were the primary focus of pre-FTA tariffs and of FTA-related tariff reductions. All equations were also run for the larger sample, but always produced weaker results. The chief reason for the weaker results, and for excluding primary and agricultural commodities from the main results reported here, is that the excluded categories were either tariff-free throughout the period (as with crude materials), or were and are subject to additional or alternative trade restrictions (as with most of the agricultural categories, tobacco and alcoholic beverages). In addition, several of the excluded categories were subject to very large changes between 1989 and 1996 (e.g. an eighty-fold increase in imports of natural gas from the United States, starting from a base close to zero).

Table 2 shows trade with the United States doubling between 1989 and 1996, compared to increases of about two-thirds for trade with the rest of the world, and almost no change for interprovincial trade, in terms of the averages of the increases in the various commodity classes. Looking at the total trade for the 42 commodity groups, exports to and imports from the United States were both about $83 billion in 1989. By 1996, exports were $163 billion and imports were $146 billion. Over the same period, for the same trade total, exports to the rest of the world grew from $22 billion to $30 billion, while imports from the rest of the world grew from $37 to $65 billion. Interprovincial trade in these same commodities actually fell slightly, from $592 billion to $560 billion.

Table 2
Changes in Trade, 1989 to 1996

Growth of trade, 1996 trade/1989 trade, averages across 67 commodity classes

	Mean	Standard Deviation	Minimum	Maximum
Imports from US	3.20	10.37	0.30	86.58
Exports to US	2.75	2.03	0.35	13.71
Imports from ROW	2.68	7.24	0.00	59.43
Exports to ROW	1.65	0.96	0.00	4.19
Interprovincial trade	1.08	0.66	0.27	5.34

Growth of trade, 1996 trade/1989 trade, averages across 42 commodity classes (27 through 69)

	Mean	Standard Deviation	Minimum	Maximum
Imports from US	1.98	0.62	0.86	4.68
Exports to US	2.75	2.05	0.40	13.7
Imports from ROW	1.61	0.58	0.40	3.20
Exports to ROW	1.79	0.96	0.29	4.19
Interprovincial trade	0.91	0.32	0.27	1.74

Correlations of trade growth for 42 commodities

	Imports from US	Exports to US	Imports from ROW	Exports to ROW	Interprov.
Imports from US	1,00				
Exports to US	0.35	1.00			
Imports from ROW	0.45	0.30	1.00		
Exports to ROW	0.13	0.44	0.09	1.00	
Interprovincial	-0.22	0.12	0.05	0.09	1,00

As a prelude to assessing the effects of tariff changes on these growth differences, Table 3 shows the average tariff reductions between 1989 and 1996, and the level of the remaining tariffs. Across the 42 commodities, average tariffs on imports from the United States fell from under 5 percent in 1989 to less than 1 percent in 1996. For imports from the rest of the world, there were also substantial tariff reductions, from an average of just over 5 percent in 1989 to 3.5 percent in 1996. Average U.S. tariffs on exports from Canada to the United States, for the same 42 commodities, fell from 2.7 percent in 1989 to 0.6 percent in 1996. For all the averages, tariff levels were fairly low in 1989, and are much lower now. As shown by the minimum and maximum values, and the standard deviations, there were significant variations across industries in 1989, and these remain. However, the FTA has clearly reduced the dispersion as well as lowered the average value of tariffs, while imports from the rest of the world still have some high-tariff categories. The industry groupings that have had the largest tariff reductions under the FTA are the four commodity classes dealing with textiles and apparel, where Canadian tariffs on imports from the United States fell from the 12 to 20 percent range in 1989 to 4 percent or less in 1996. U.S. tariffs on the same categories fell from the 5 to 18 percent range in 1989 to under 5 percent in 1996. These are also industries with striking trade growth in both directions. For example, the value of trade each way for each of the four categories more than doubled between 1989 and 1996, with the faster growth of southbound trade going some way to making the 1996 flows of equal size in the two directions.

Table 3
Changes in Average Tariff Rates, 1989 to 1996

Average changes in tariffs as a percentage of trade, 67 commodity classes

	Mean	Standard Deviation	Minimum	Maximum
Canadian tariffs on imports from US	-2.71	6.97	-28.5	40.6
US tariffs on imports from Canada	-1.43	3.11	-13.7	14.4
Canadian tariffs on imports from ROW	-1.84	3.43	-23.5	0.9

Average changes in tariffs as a percentage of trade, 42 commodity classes

	Mean	Standard Deviation	Minimum	Maximum
Canadian tariffs on imports from US	-3.90	3.54	-15.60	0.00
US tariffs on imports from Canada	-2.06	2.51	-13.70	0.13
Canadian tariffs on imports from ROW	-1.66	1.67	-7.40	0.90

Average 1996 tariff levels as a percentage of trade, 42 commodity classes

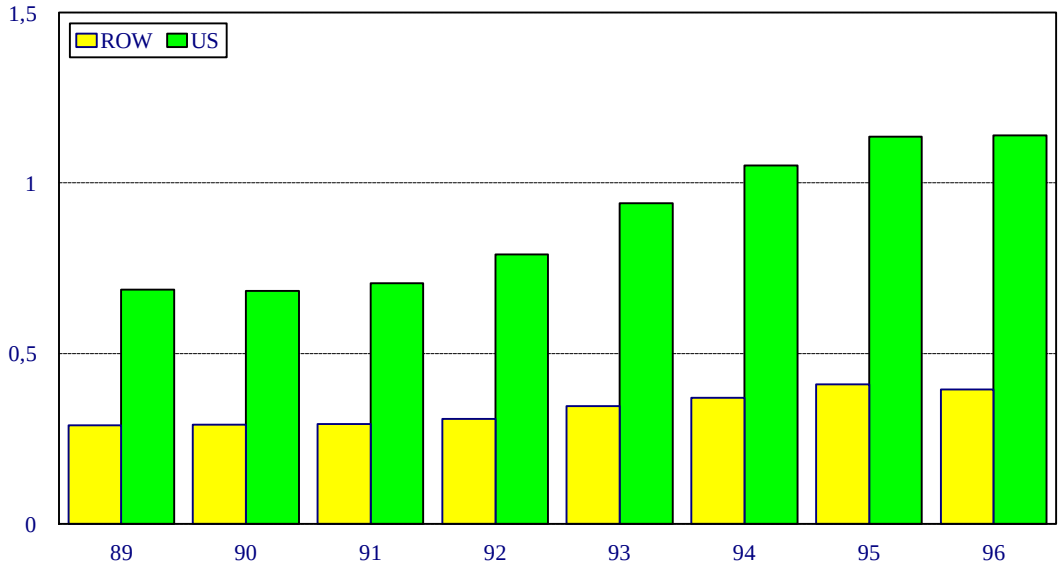
	Mean	Standard Deviation	Minimum	Maximum
Canadian tariffs on imports from US	0.75	0.93	0.00	4.04
US tariffs on imports from Canada	0.60	1.05	0.00	4.68
Canadian tariffs on imports from ROW	3.48	3.17	0.00	18.30

Correlation of Tariff Changes Across 42 Industries

	Canadian imports from US	US imports	Canadian imports from ROW
Canadian tariffs on imports from US	1.00		
US tariffs	0.83	1.00	
Canadian tariffs on imports from ROW	0.46	0.37	1.00

Figures 1 to 7 describe the extent to which international and interprovincial trade and tariffs changed from 1989 to 1996 based on the 67 commodities listed in the Appendix. By any measure, the Canadian economy has become more trade oriented. Figure 1 shows that Canada's trade (exports plus imports) with the United States and the rest of the world (ROW) in relation to interprovincial trade peaked in 1994. The ratio of Canada's trade with the United States to interprovincial trade increased from 0.7 in 1989 to 1.1 in 1996. At the same time, the ratio of Canada's trade with ROW to interprovincial trade increased from 0.3 to 0.4 over the same period. Figures 2, 3 and 4 show the growth rates of trade by commodity class in trade with the United States, ROW and other provinces, respectively. These figures also indicate that trade with the United States grew fastest followed by that with ROW, between 1989 and 1996. However, only one commodity category, pharmaceuticals, appears as one of the top ten fastest growing categories in trade with both the United States and ROW. Similarly, only one commodity category, cigarettes & tobacco manufacturing, appears as one of the top ten fastest growing commodity categories in trade with both ROW and other provinces. Thus, these figures suggest that trade is becoming more specialized geographically.

Figure 1. Ratio of International to Interprovincial Trade



Although there was a tendency toward geographic specialization in trade, the process is not complete yet. Figures 5 and 6 show the extent of specialization in 1996. Five commodities (nickel products, pulp, scientific equipment, other industrial machinery, and lumber and timber) are actively traded with the United States and ROW in relation to interprovincial trade. In other words, those five commodities Canada trades actively with the United States are also actively traded with ROW. On the other hand, motor vehicle parts and motor vehicles were traded predominantly with the United States suggesting the effects of the Auto Pact.

Figure 7 illustrates that duties collected as a percentage of imports from ROW and the United States and exports to the United States declined steadily since 1989. However, the tariff rates remain highest for imports from ROW and lowest for exports to the United States. A comparison of Figures 8 and 9 shows that three commodities (alcoholic beverages; boilers, tanks and plates; fabrics) imported from the United States that experienced drastic tariff cuts also underwent tariff reductions for imports from ROW. However, when we compare tariff changes for U.S. imports and U.S. exports, the impact of the FTA stands out in that there are five commodities (hosiery and knitted wear; fabrics; clothing and accessories; leather; boilers, tanks and plates) that experienced the largest tariff cuts by Canada and the United States.

Table 4 shows the results from regressions attempting a more systematic assessment of the influence of tariff changes on the inter-industry differences in the growth of trade flows. The regressions are cross-sectional, with each observation being the growth of trade from 1989 to 1996 in one of the 42 commodity groups, and the independent variable being change in average tariff rates for the same commodity group. For each trade flow, the primary explanatory variable is the average tariff on that trade flow, except for interprovincial trade, for which the explanatory tariffs are those applicable to trade with the United States and the rest of the world.

Figure 2. Ratio of 1996 U.S. Trade to 1989 U.S. Trade

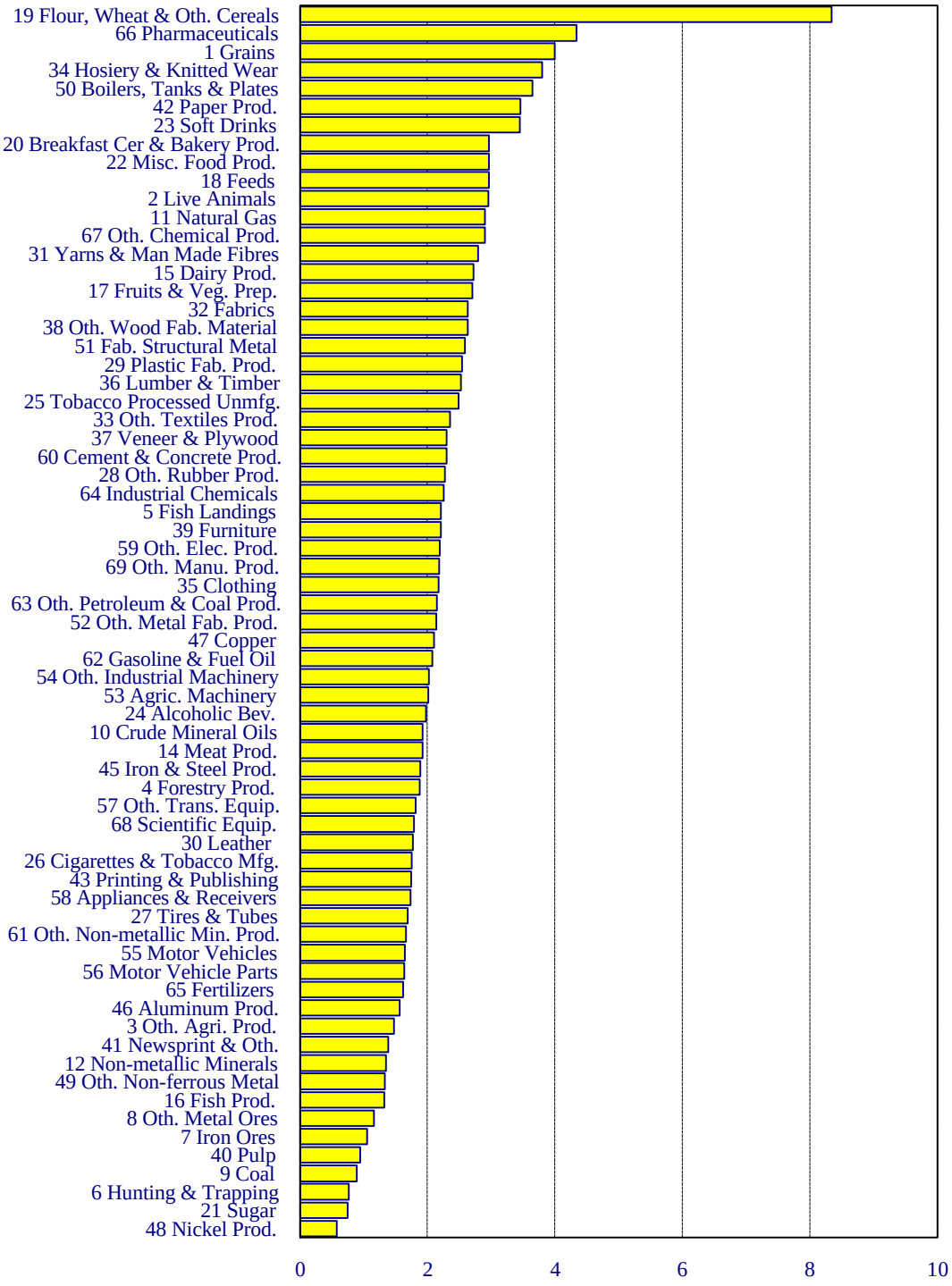


Figure 3. Ratio of 1996 ROW Trade to 1989 ROW Trade

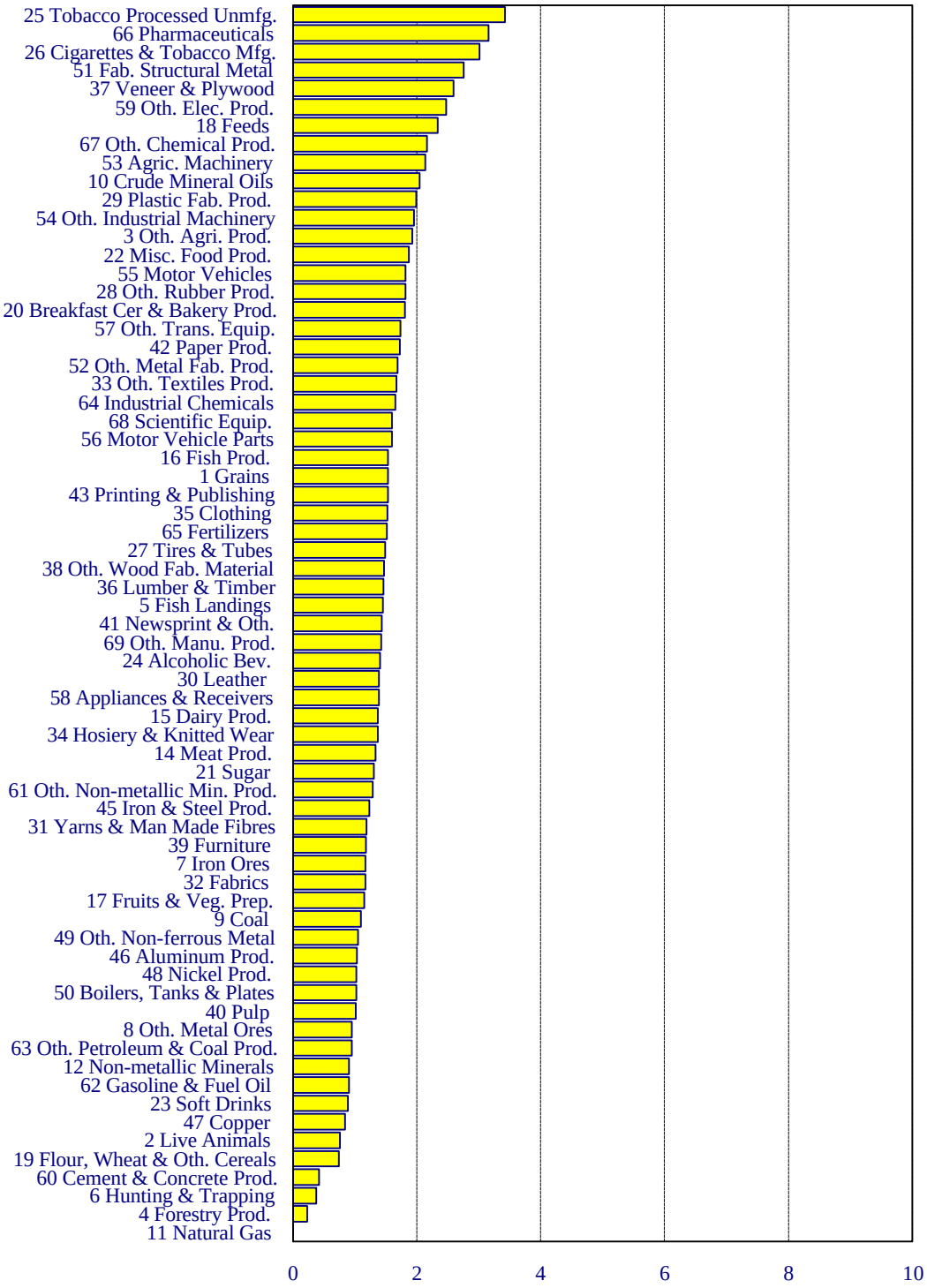


Figure 4. Ratio of 1996 Interprovincial Trade to 1989 Interprovincial Trade

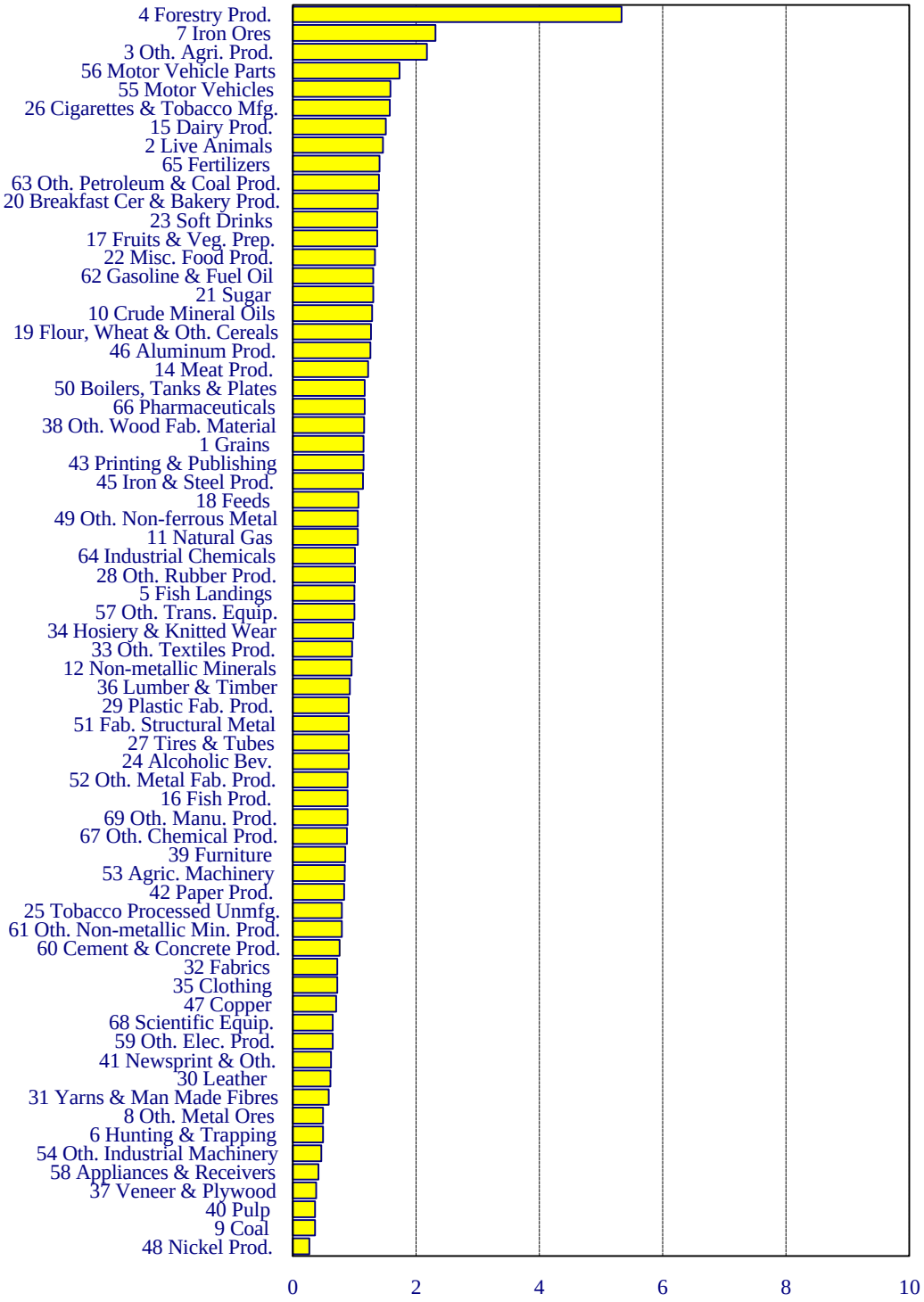


Figure 5. Ratio of U.S. Trade to Interprovincial Trade, 1996

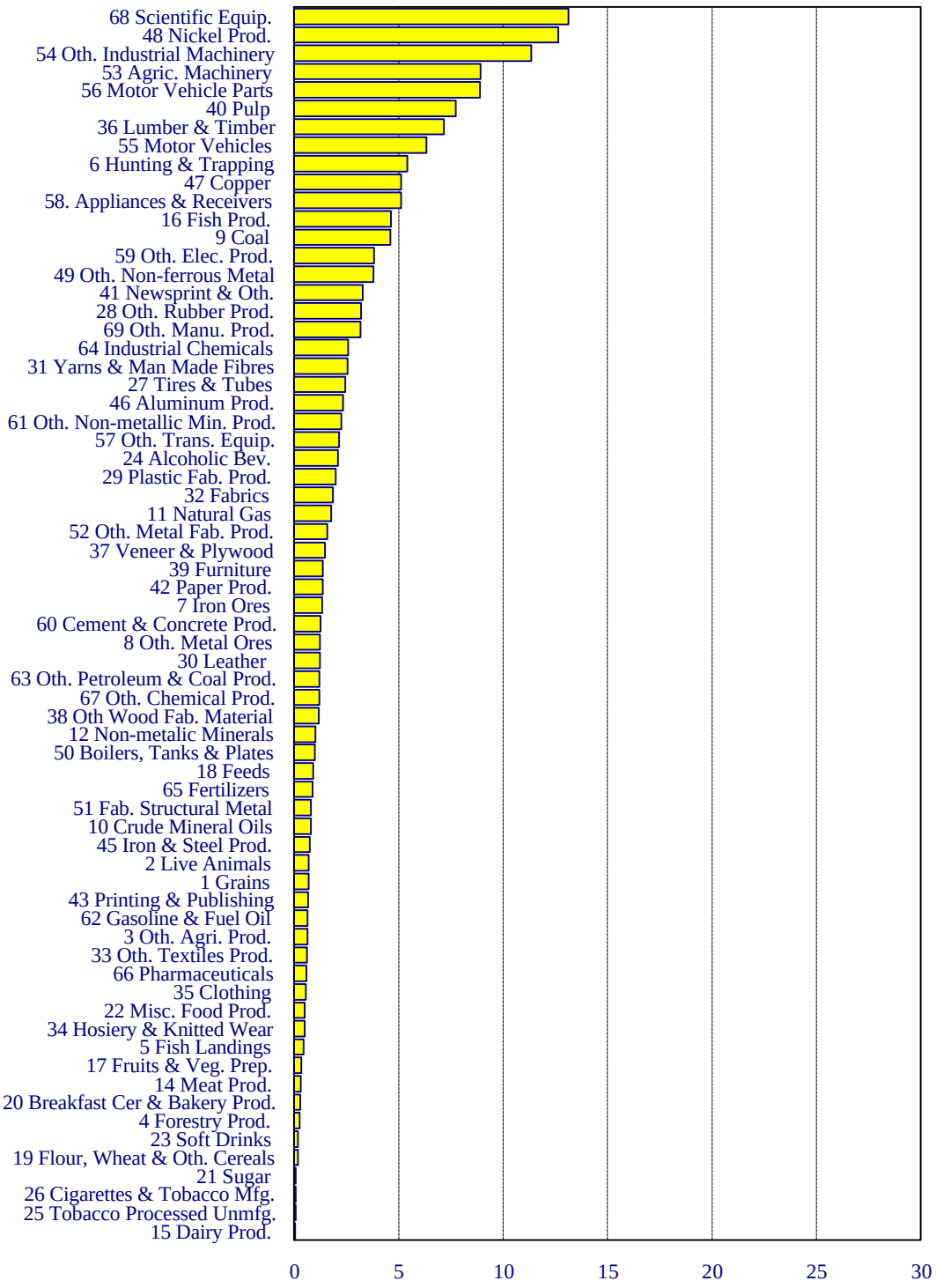


Figure 6. Ratio of ROW Trade to Interprovincial Trade, 1996

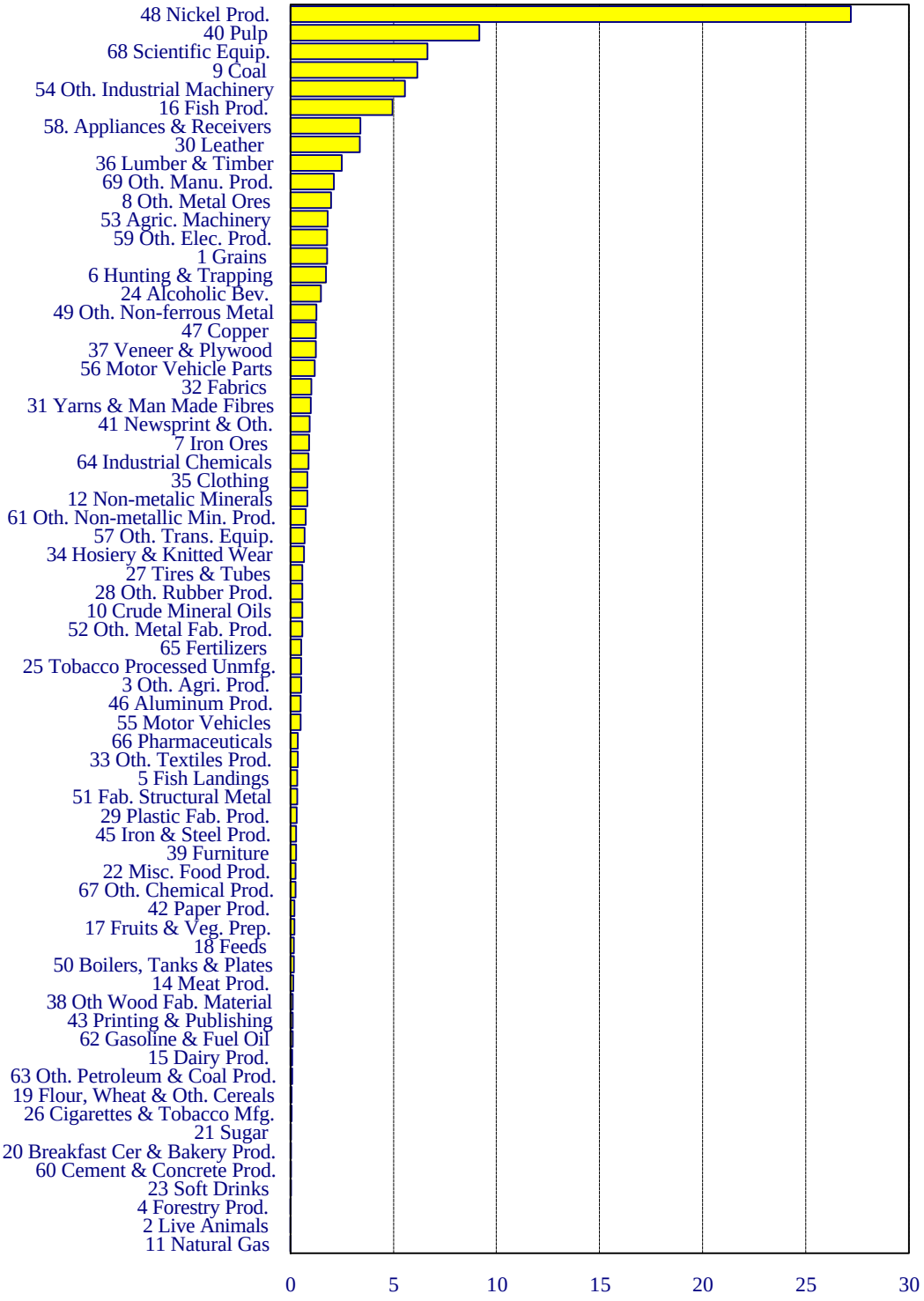


Figure 7. Duty Collected as a Percentage of Imports

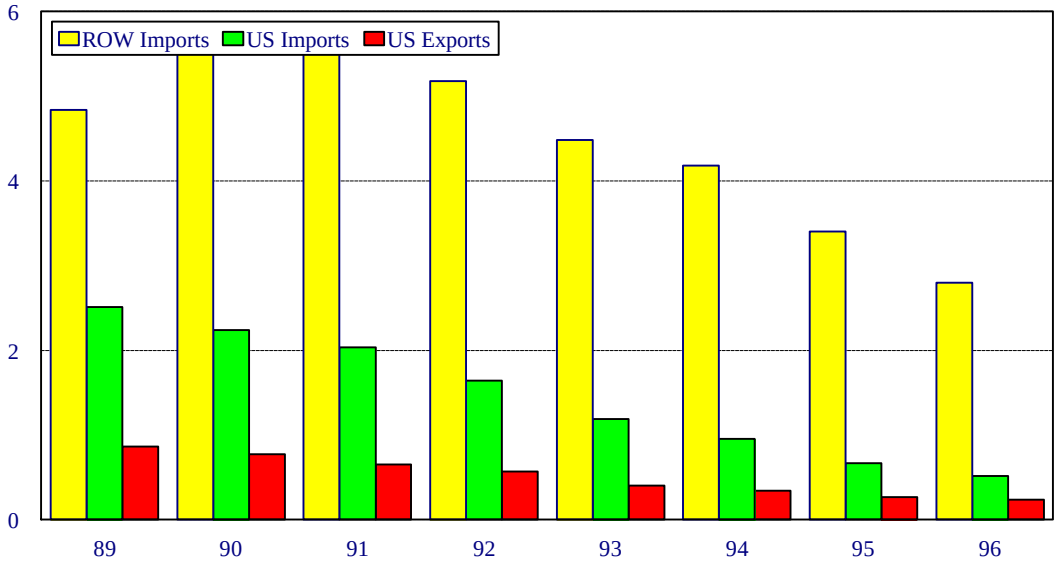


Table 4. Effects of Tariff Changes on Trade Flows

Equation No.	**(i)**	**(ii)**	**(iii)**	**(iv)**	**(v)**	**(vi)**	**(vii)**
Dependent variable	dlmus	dlxus	dlip	dlmrow	i-iii	ii-iii	i-iv
Independent variables							
ΔCanTarUS	-0.032		0.040	0.019	-0.045		-0.045
	(2.8)		(2.1)	(1.0)	(2.0)		(2.4)
ΔUSTarCan		-0.117				-0.121	
		(4.0)				(3.9)	
ΔCanTarROW				-0.083			0.056
				(2.1)			(1.5)
dlxus			0.347				
			(2.9)				
RB^2	0.141	0.270	0.142	0.057	0.069	0.261	0.091
SEE	0.260	0.470	0.370	0.373	0.505	0.494	0.367

Notes: Absolute values of t-statistics are reported below coefficients. The dependent variable is the logarithm of the ratio of 1996 trade to 1989 trade, with each observation reflecting a different industry. The tariff changes are the 1996 percentage average tariffs minus the corresponding values in 1989. Equations (i) to (iv) are the ratios for the separate trade flows, while the dependent variables for equations (v) through (vii) are differences, with (v) = (i)-(iii), (vi) = (ii)-(iii), and (vii) = (i)-(iv).

Figure 8. Collected Duty Rate Changes for Imports from ROW, 1989-96

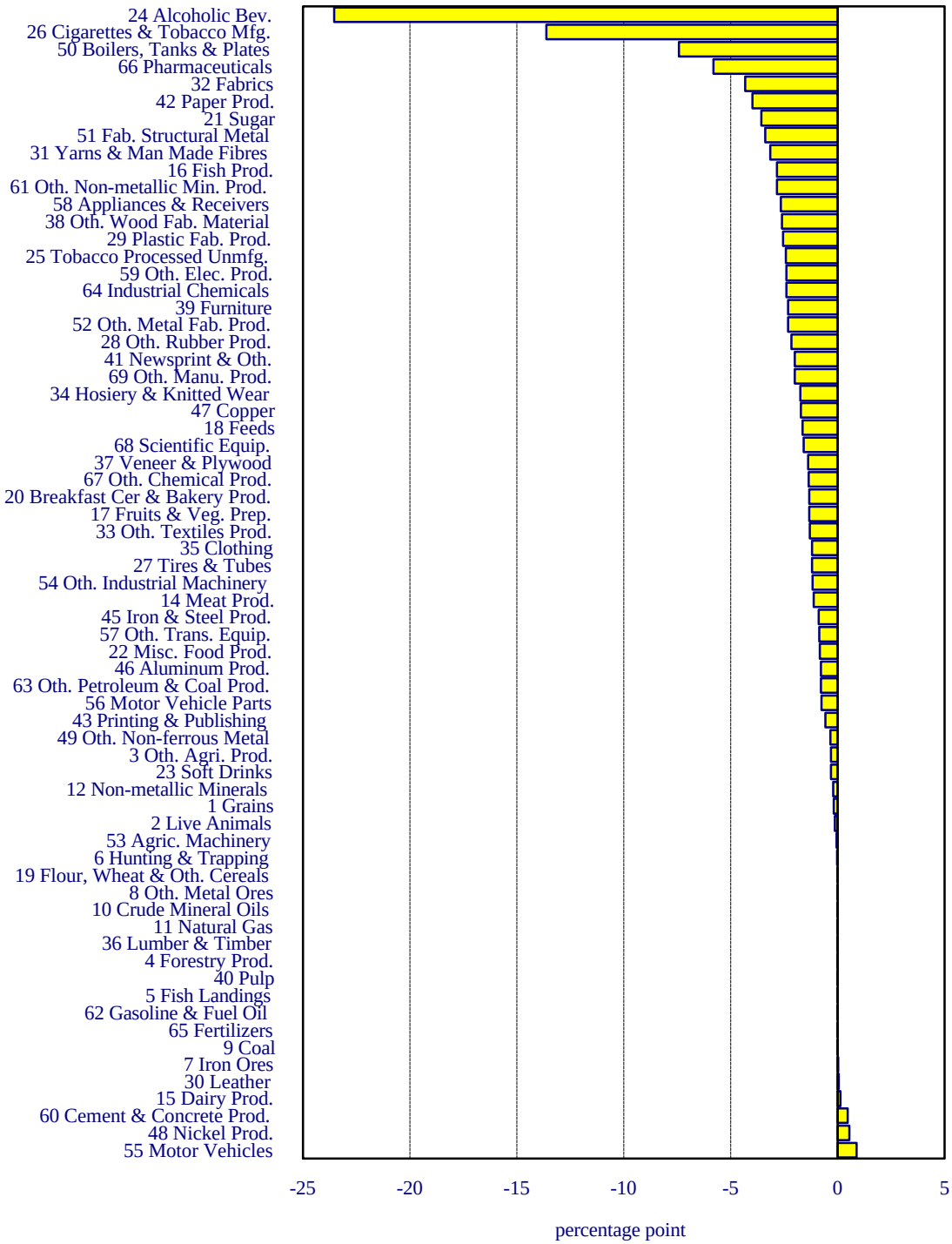


Figure 9. Collected Duty Rate Changes for Imports from the U.S., 1989-96

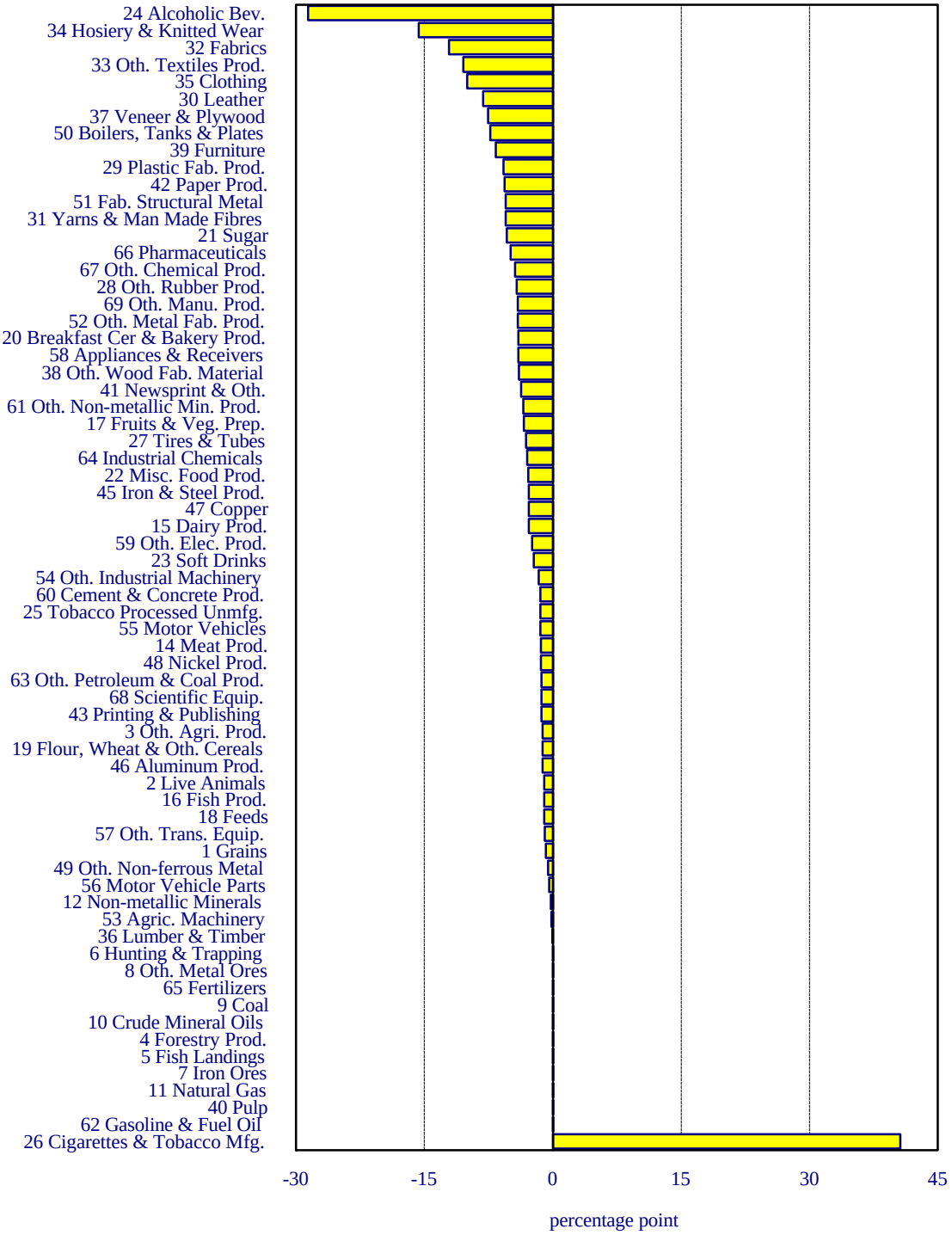


Figure 10. Collected Duty Rate Changes for Exports to the U.S., 1989-96

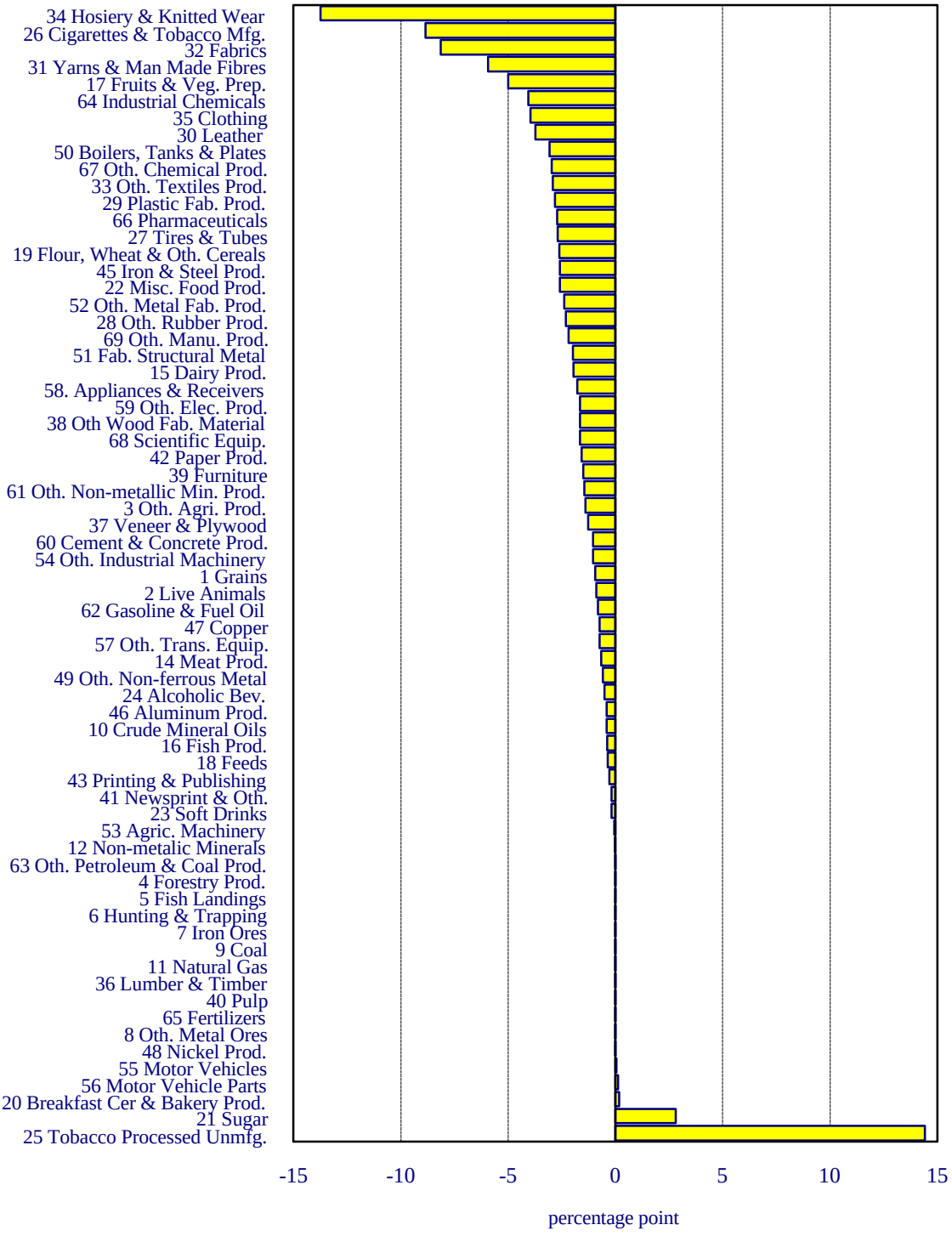
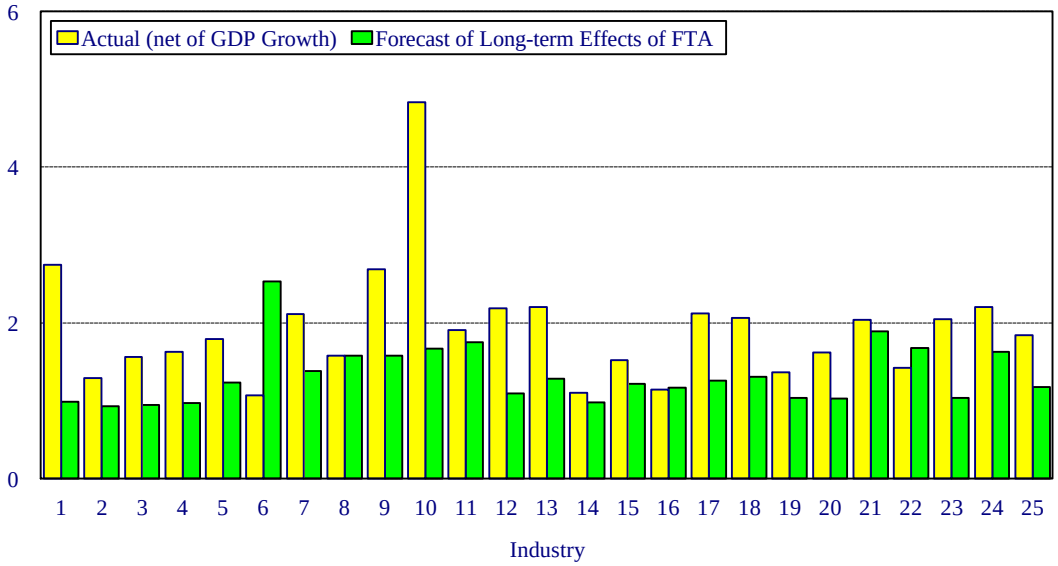


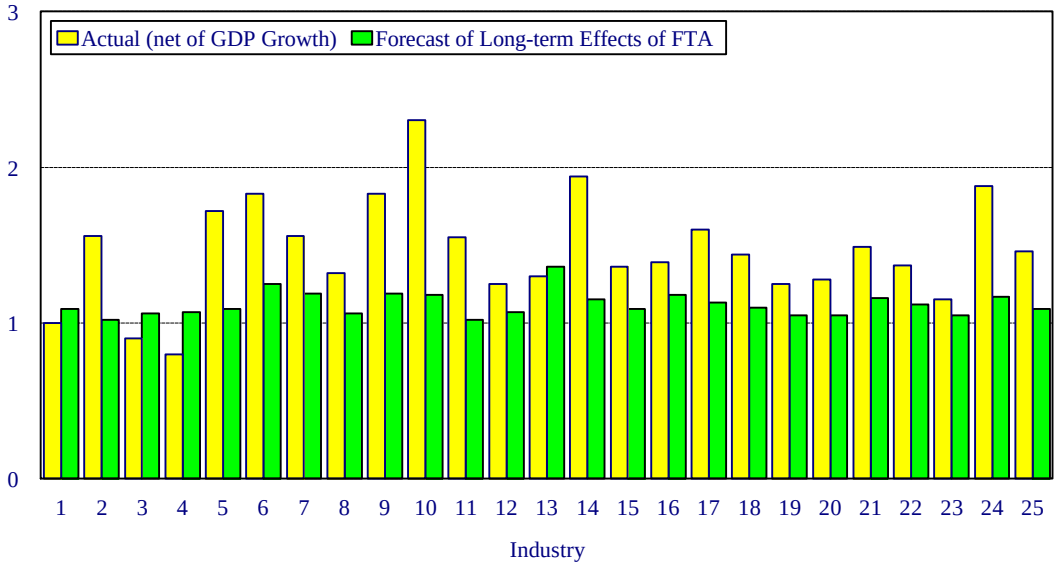
Figure 11. Effects of FTA on Exports
Actual vs Forecast (r = 0.15)



The first equation shows a significant impact of changes in Canadian import tariff rates on the growth of imports from the United States. The estimated effect is very substantial, since the change in tariff rates is measured in percentage points, and the growth of trade is the ratio of 1996 to 1989 trade. Thus a decrease of one percentage point in a commodity's tariff rate is associated with a 3.2 percent cumulative increase in trade between 1989 and 1996. Thus the average tariff cuts of 3.9 percentage points between 1989 and 1996 are estimated to have increased imports by 12.4 percent. The estimated effects of U.S. tariff reductions on the growth of Canadian exports to the United States are even larger, as shown in equation (ii), with the tariff cuts averaging 2 percentage points implying an average export increase of 24 percent (= 0.117 x 2.06). In both cases the proportion of the inter-industry variance in trade explained is small, showing that while the estimated effect of tariffs is substantial, it is far from the whole story.[13]

Our primary attempt to estimate the effects of the FTA on interprovincial trade is shown as equation (iii) in Table 4. The drop in Canadian tariffs is found to have a substantial trade-diversion effect. The coefficient of 0.04 implies that each percentage point reduction in Canadian tariffs on U.S. imports would decrease interprovincial trade by 4 percent. The total drop from 1989 to 1996, across the 42 commodities, was 3.9 percentage points, implying a reduction of interprovincial trade of over 15 percent (0.156 = 3.9 x 0.04, and *exp*(0.156) = 1.15). Equations not reported show that there was no direct interprovincial trade effect evident from the reductions in U.S. tariff rates, although there is some evidence of indirect effects flowing from export volumes, as revealed by the negative sign on exports to the United States in equation (ii). Combining the results of equations (ii) and (iii) implies that the drop in U.S. tariffs created rather than diverted interprovincial trade. The size of this effect is estimated to be large enough to offset about half of the interprovincial trade losses caused by the FTA-related reductions in Canadian import tariffs. The proportionate increase in interprovincial trade is about 0.04 (0.117 x 0.347 = 0.0406) for each percentage point drop in U.S. tariffs. The average drop of 2.06 percentage points would thus have increased interprovincial trade by about 8 percent (2.06 x 0.0408 = 0.0836).

Figure 12. Effects of FTA on Imports
Actual vs Forecast (r = 0.41)



The net effect of the FTA tariff changes on interprovincial trade is thus estimated to be a reduction of about 7 percent (-0.156 + 0.084 = -0.077, and *exp*(-0.077) = 0.93). How does this compare to the total shortfall of 1996 provincial trade relative to what the gravity model would have predicted? From the service-adjusted calculations of Table 1, 1996 interprovincial trade was 13 percent less than would have been expected. Our rough estimates suggest that slightly more than half of this shortfall may have been directly or indirectly due to the FTA tariff cuts, with a 15 percent diversion effect from the Canadian tariff cuts offset by a 7 percent trade-creation effect arising from the drop in U.S. tariffs.

How can we explain that Canadian tariff cuts reduced interprovincial trade while U.S. tariff cuts increased it? One possible reason is that there were many industries in which Canadian subsidiaries were set up by U.S. firms to supply for the Canadian market, with shorter production runs and higher average costs than the corresponding U.S. plants designed to service the larger U.S. market. When the FTA provided for the phased elimination of most tariffs, at a time when many U.S. manufacturing firms were already engaged in rationalizing and down-sizing their operations, the result may well have been the closure of many Canadian branch plants of U.S. firms. The net trade effects of the closure of Canadian subsidiaries would have been to increase imports from the United States directly to the province of consumption, thus eliminating some interprovincial trade that previously linked the Canadian subsidiaries to their Canadian customers.

Any FTA-induced increases in exports, by contrast, are likely to induce some increases in interprovincial trade of intermediate or final products. If there were any closure of subsidiary plants in the United States, this could have led to a drop in interstate trade; but there are no interstate trade data available to assess whether this actually happened. In fact, given the much larger size of the U.S. market, there are much less likely to have been scale-based reasons for Canadian firms to have closed their U.S. subsidiaries, and there are in any event many more U.S. subsidiaries operating in Canada than Canadian subsidiaries in the United States. This asymmetry also helps to explain why U.S. tariff rates influence Canadian exports more than Canadian tariffs influence Canadian imports. As the various general equilibrium models of the FTA emphasized, once the U.S. tariff is low enough to encourage the entry of Canadian firms, the scale of U.S. sales can be large relative to pre-existing Canadian production, since the U.S. market is ten times as large as the Canadian market.

The Canadian tariff reductions on imports from the rest of the world are estimated to have had a significant role in explaining the growth of imports from the rest of the world, as shown by equation (iv). There is also a smaller, and insignificant, trade-diversion effect of the FTA-related reductions of Canadian tariffs. The 1989-1996 reductions in import tariffs facing ROW imports to Canada, averaging 1.6 percentage points, are estimated to have increased imports from the ROW to Canada by about 10 percent ($0.065 \times 1.6 = 0.104$).

It is possible to combine the evidence from the equations for individual trade flows to ask to what extent the changes in tariffs have influenced the relative growth of international and interprovincial trade. Each of equations (v) through (vii) estimates the difference between the growth rates of two trade flows. Equation (v) estimates the growth of imports from the United States less the growth of interprovincial trade, and finds a significant effect, equal to the import-creating effect from equation (i) plus the diversion effect from equation (iii). Equation (vi) shows a slightly larger effect than does equation (ii), suggesting that, if anything, U.S. import tariffs have diversion effects on interprovincial trade, since the U.S. tariff drops are estimated to have an implied negative effect on interprovincial trade. Finally, equation (vii) asks to what extent the drops in Canadian tariffs influenced the differential rate of growth of imports from the United States and the ROW. The effect of the FTA cuts are larger and more significant, with the estimated size of the two effects, per percentage point change in tariffs, being similar, but of opposite sign. Since the Canadian tariffs on imports from the United States were reduced by more than twice as much as those on imports from the ROW, the net effect of the two sets of tariff changes was to increase the U.S. share of total Canadian imports, while causing both import flows to rise relative to interprovincial trade flows.

Finally, we compare the actual post-FTA growth of Canada-U.S. trade by sector with what was forecast before the event. Figure 11 and Table 5 compare the actual growth of exports to the United States with what was projected by the general equilibrium model underlying the Department of Finance's evaluation of the FTA.[14] Figure 12 and Table 6 show the corresponding comparison for Canadian imports from the United States. In both cases, there is a positive correlation between the model forecasts and the actual increases, although in most sectors the actual increases were far greater than those forecast by the model.[15] This shows once again how large have been the actual changes relative to what had been expected, since the general equilibrium model embodied relatively high price elasticities for merchandise trade flows (2.8 for imports and 4.4 for exports) and the tariff reductions used in the model calculations are, if anything, greater than the average tariff reductions witnessed so far. Thus, the FTA apparently generated much more north-south trade than had been forecast. A second and more troubling element of the puzzle is that although trade increases have been much greater than forecast, the productivity gains that were supposed to have been the motivation and the reward for the increased trade have not been evident. The projected changes in the scale and pattern of manufacturing trade were projected by the model to have led

to increases in scale economies sufficient to reduce average unit costs in manufacturing by 2.7 percent. The much larger actual increases in trade should presumably have led to even larger productivity increases. However, while there is substantial evidence, in this paper and in Clausing (1996), that industries with larger tariff reductions have seen larger trade changes, there is no cross-industry evidence of corresponding productivity improvements. One possibility, sketched more fully in chapter 7 of Helliwell (1998), is that the degree of linkage between the U.S. and Canadian markets before the FTA was already great enough to permit the major gains from comparative advantage and production scale to be realized. More research on productivity in matched Canadian and U.S. industries is needed to see if this is a plausible hypothesis. Alternatively, or additionally, some have argued that the pre-FTA measured productivity gap between Canadian and U.S. manufacturing, which has shown no signs of closing despite the post-FTA increases in trade, may comprise measurement error as much as potential for advantageous trade expansion.

Table 5
Canadian Exports to the United States

Industry	Actual 1996-89 -dlnGDP	Forecast FTA/no FTA
Agriculture	2.75	0.99
Forestry	1.29	0.93
Fishing and Trapping	1.56	0.95
Mining	1.63	0.97
Food and Beverages	1.79	1.23
Tobacco	1.07	2.53
Rubber and Plastics	2.11	1.38
Leather	1.58	1.58
Textiles	2.69	1.58
Knitting	4.83	1.67
Clothing		1.911.75
Wood	2.19	1.09
Furniture	2.20	1.28
Pulp and Paper	1.10	0.98
Printing and Publishing	1.52	1.22
Primary Metals	1.14	1.17
Metal Products	2.12	1.26
Machinery and Equipment	2.06	1.31
Cars and Parts	1.37	1.04
Other Transportation	1.62	1.03
Elect. Products	2.04	1.89
Mineral Products	1.42	1.68
Oil and Coal Products	2.05	1.04
Chemical Products	2.20	1.63
Other Manufactured Products	1.84	1.18
Average	1.92	1.33

Table 6
Canadian Imports to the United States

Industry	Actual 1996/1989 -dlnGDP	Forecast FTA/no FTA
Agriculture	1.00	1.09
Forestry	1.56	1.02
Fishing and Trapping	0.90	1.06
Mining	0.80	1.07
Food and Beverages	1.72	1.09
Tobacco	1.83	1.25
Rubber and Plastics	1.56	1.19
Leather	1.32	1.06
Textiles	1.83	1.19
Knitting	2.30	1.18
Clothing	1.55	1.02
Wood	1.25	1.07
Furniture	1.30	1.36
Pulp and Paper	1.94	1.15
Printing and Publishing	1.36	1.09
Primary Metals	1.39	1.18
Metal Products	1.60	1.13
Machinery and Equipment	1.44	1.10
Cars and Parts	1.25	1.05
Other Transportation	1.28	1.05
Elect. Products	1.49	1.16
Mineral Products	1.37	1.12
Oil and Coal Products	1.15	1.05
Chemical Products	1.88	1.17
Other Manufactured Products	1.46	1.09
Average	1.46	1.12

5. CONCLUSIONS

The evidence from both aggregate and commodity-level data shows that interprovincial trade has grown significantly less than Canada-United States and Canada-ROW trade from 1989 to 1996. Tariff changes, and especially those associated with the Canada-United States Free Trade Agreement, are able to explain slightly more than half of the shortfall of 1996 interprovincial trade relative to what the gravity model suggests it should have been. The primary role of the FTA appears to have been to increase direct trade flows between Canada and the United States, although the evidence suggest some contribution also from trade diversion. The most likely locus of trade diversion appears to be a shift from interprovincial trade to imports of manufactures from the United States. This pattern of results is likely to be more secure than are the precise numbers, since the statistical power of the estimates is still quite low. To get a better idea of the size and significance of the effects of the FTA on interprovincial trade, it would be desirable to supplement the available data in two ways, first by disaggregating the commodities to allow a closer match with tariff categories, and hence to provide more differences among the industries in the tariff-reduction experiences, and second by adding a number of pre-FTA years to the data sample.

Although the disaggregated results are not yet strong enough to permit secure estimates of the precise role of the FTA in determining the level of interprovincial trade, the aggregate results presented in section 3 are extremely robust. Interprovincial trade linkages remain twelve times stronger than those between Canada and the United States. The FTA did indeed have a border-reducing effect, since our best estimate, strongly supported by the data, is that the pre-FTA border effect of over 18 fell to 12 between 1990 and 1993, and has remained on a plateau since. There may be some post-FTA effects on interprovincial trade still to come, but the fact that the border effect has remained fairly constant for the last four years suggests that at least the first round of trade adjustments is now complete. In the absence of any appearance of a new downward trend, the post-FTA Canadian economy retains a strong national structure, with interprovincial trade linkages more than an order of magnitude tighter than those between provinces and states.

Does this dense interprovincial trade network, relative to the international network, imply that Canada is missing out on productivity improvements from expanded trade? Our research, combined with that from post-FTA productivity studies, would suggest not. The sharp post-FTA growth in Canada-U.S. trade, in part substituting for interprovincial trade, has apparently not led to strong productivity increases, either in the aggregate or in the industries most subject to FTA effects. Thus it is plausible that the current strength of trade linkages between Canada and the United States, and in general among the industrial countries, is sufficient to permit access to internationally transferable technological progress, and to attain adequate economies of scale. If this preliminary conclusion were to be supported by continued research, then it is likely that national economies should continue to have much stronger trade and other economic and social linkages than are found in the global economy.

NOTES

1 The FTA came into effect on January 1, 1989.

2 See Holland (1994) for a detailed discussion.

3 Hazledine (1990) surveys most of the pre-FTA CGE models and results, several of which are included in Whalley, ed. (1986), and emphasizes the extent to which the conclusions depend on the assumed costs and competitive structures.

4 There are other studies suggesting that border may be an important factor in preventing full integration. Thomas (1993) shows that there is no positive relationship between regional personal savings and private investment in Canada suggesting that personal savings are perfectly mobile within Canada. Bayoumi and Klein (1997) confirm his finding in that their results indicate full capital mobility within Canada but only partial capital mobility between Canada and the rest of the world.

5 The results are reported in equation (viii) of Table 2 of Helliwell (1997).

6 Following the Harmonized Classification System, Clausing uses the 6-digit level of commodity detail, which includes approximately 5000 commodity groups. When commodity groups containing less than $100,000 of annual trade are eliminated, her sample size drops in half (although the commodities with annual trade flows smaller than $100,000 constitute in total only about 1 percent of total trade). The sample is further reduced by removing those commodities for which the liberalization status could not be ascertained.

7 There are 90 interprovincial flows because each of the ten provinces exports to each of the nine other provinces. In this study we do not consider intra-provincial trade flows.

8 These are the border states plus the largest non-border states, the same sample used by McCallum (1995) and Helliwell (1998). These trading pairs undertake almost all trade between the United States and Canada. We exclude the trade between provinces and the smallest states to reduce the number of zero observations, and to minimize the risk that the log-linear results are overly influenced by large proportionate changes in very small trade flows.

9 Since this represents only 2 percent of the total observations, it was no surprise to find that alternative ways of treating these zero observations made no material difference to the results.

10 The sum of these two variables takes the value of 1.0 for each observation, since we do not have data for inter-state trade. Thus constant term must be excluded to avoid singularity in estimation. If the coefficients of both variables are permitted to take different values from year to year, as they are in our estimation, then the results are equivalent to those that would be obtained by including the *HOME* variable covering interprovincial trade and then permitting the constant term to take a separate value for each sample year.

11 For the years 1991 to 1996 these border effects are thus exactly the same as those shown at the bottom of Table 2.2 in Helliwell (1998).

12 The index of service intensity is just the series listed as *M* divided by its 1988 value.

13 In view of the risk of reverse causation, a referee suggested using reverse regression of these and other bivariate equations, with $1/\beta$ from the reversed regression and β from the original regression being treated as likely bounds for the true β in the original regression. $1/\beta$ from the reversed regressions is, in all the bivariate regressions, larger than the βs shown in the tables. This test would suggest that the results shown in the table are more likely to underestimate than overestimate the effects of tariff changes on trade.

14 The sectoral projections are drawn from a January 1988 Finance Canada paper entitled "Modelling the Free Trade Agreement in Finance's General Equilibrium Trade Model". The actual growth is represented by the ratio of actual 1996 to 1989 trade minus the change in the logarithm of nominal GDP between 1989 and 1996.

15 A cross-sectional regression for exports covering all 25 sectors is not significant, but becomes so if the first six industries are removed, thus leaving out food, tobacco and the primary industries. The simple correlations between the actual and predicted series are 0.13 for the 25 sectors, and 0.40 for the smaller group of 19 sectors. As can be seen from Table 5, tobacco was forecast to be a big export gainer, while this has not shown up in the export statistics. For imports the regression is significant using either 25 or 19 sectors. The simple correlations in these two cases are 0.41 for all 25 sectors, and 0.33 for the smaller group of 19 sectors.

BIBLIOGRAPHY

Aitken, Norman D. (1973), "The Effect of EEC and EFTA on European Trade: A Temporal Cross-Section Analysis." *American Economic Review*, 63: 881-92.

Anderson, James E. (1979), "A Theoretical Foundation for the Gravity Equation." *American Economic Review*, 69: 106-16.

Balassa, Bela (1989) "Trade Creation and Trade Diversion in the European Common Market." In Bela Balassa (ed.), *Comparative Advantage, Trade Policy and Economic Development*, New York: New York University Press, Washington Square, 109-130.

Bayoumi, Tamim and Barry Eichengreen (1995), "Is Regionalism Simply a Diversion? Evidence from the Evolution of the EC and EFTA." NBER Working Paper No. 5283. Cambridge: National Bureau of Economic Research.

Bayoumi, Tamim and Michael W. Klein (1997), "A Provincial View of Capital Mobility." *IMF Staff Papers*, 44:534-56.

Bergstrand, Jeffrey H. (1989), "The Generalized Gravity Equation, Monopolistic Competition and the Factor Proportions Theory in International Trade." *Review of Economics and Statistics*, 71**:** 143-53.

Bikker, Jacob A. (1987), "An International Trade Flow Model with Substitution: An Extension of the Gravity Model." *Kyklos*, 40: 315-37.

Clausing, Kimberly (1996), "Trade Creation and Trade Diversion in the Canada-United States Free Trade Agreement." Ph.D. Thesis, Harvard University.

De Grauwe, Paul (1988) "Exchange Rate Variability and the Slowdown in Growth of International Trade." *IMF Staff Papers*, 35: 63-84.

Deardorff, Alan V. (1995), "Determinants of Bilateral Trade: Does Gravity Work in a Neoclassical World?" NBER Working Paper No. 5377. Cambridge: National Bureau of Economic Research.

Engel Charles and John H. Rogers (1996), "How Wide Is the Border?" *American Economic Review*, 86: 1112-25.

Ensign, Prescott C. (1997), "Firm Response to Bilateral/Regional Trade Liberalization: An Empirical Study of Canadian Acquisitions in the U.S." National Centre for Management Research and Development, University of Western Ontario.

Frankel, Jeffrey A. and Shang-Jin Wei (1993) « Trade Blocs and Currency Blocs." NBER Working Paper No. 4335. Cambridge: National Bureau of Economic Research.

Gaston, Noel and Daniel Trefler (1997), "The Labour Market Consequences of the Canada-U.S. Free Trade Agreement." *Canadian Journal of Economics*, 30: 18-41.

Gondwe, Derrick K. and Winston H. Griffith (1989), "Trade Creation and Trade Diversion: A Case Study of MDCs in CARIFTA, 1968-1974." *Social and Economic Studies*, 38: 149-75.

Hanson, Gordon H. (1994), "Regional Adjustment to Trade Liberalization." NBER Working Paper No. 4713. Cambridge: National Bureau of Economic Research.

Hazledine, Tim (1990), "Why Do the Free Trade Numbers Differ So Much? The Role of Industrial Organization in General Equilibrium." *Canadian Journal of Economics*, 23: 791-801.

Head, Keith and John Ries (1997), "Market-Access Effects of Trade Liberalization: Evidence From the Canada-U.S. Free Trade Agreement." In Richard C. Feenstra (ed.), *The Effect of U.S. Trade Protection and Promotion Policies*, Chicago: University of Chicago Press, 323-42.

Helliwell, John F. (1996), "Do National Borders Matter for Quebec's Trade?" *Canadian Journal of Economics*, 29: 507-22.

Helliwell, John F. (1997), "National Borders, Trade and Migration." *Pacific Economic Review*, 2: 165-85.

Helliwell, John F. (1998), *How Much Do National Borders Matter?* Washington: Brookings Institution.

Helpman, Elhanan (1984), "Increasing Returns, Imperfect Markets and Trade Theory." In Jones, Ronald and Peter Kenen, eds., *Handbook of International Trade*, Amsterdam: North-Holland, Volume 1, 325-65.

Holland, Kenneth M. (1994), "NAFTA and the Single European Act." In Mason, T. David and Abdul M. Turay (eds.), *Japan, NAFTA and Europe: Trilateral Cooperation or Confrontation*, New York: St. Martin's Press, 1-37.

Kumar, Vikram and Joseph A. Whitt Jr. (1992), "Exchange Rate Variability and International Trade." *Economic Review - Federal Reserve Bank of Atlanta,77*: 17-32.

McCallum, John (1995), "National Borders Matter: Canada-U.S. Regional Trade Patterns." *American Economic Review*, 85 615-23.

McKibbin, Warwick J. (1994), "Dynamic Adjustment to Regional Integration: Europe 1992 and NAFTA." *Journal of the Japanese and International Economics*, 8: 422-53.

Pöyhönen, Peutti (1963), "A Tentative Model for the Volume of Trade Between Countries." *Weltwirtschaftliches Archiv.*, 90: 93-100.

Statistics Canada (1993), "Trade Patterns: Canada-United States, the Manufacturing Industries, 1981-1991." Statistics Canada Catalogue 65-504E, Ottawa.

Thomas, Alun H. (1993), "Saving, Investment, and the Regional Current Account: An Analysis of Canadian, British and German Regions." IMF Working Paper No. 93/62, Washington (DC).

Tinbergen, Jan (1962), *Shaping the World Economy: Suggestions for an International Economic Policy*. New York: The Twentieth Century Fund.

Wei, Shang-Jin (1996), "Intra-National versus International Trade: How Stubborn are Nations in Global Integration?" NBER Working Paper No. 5531, Cambridge: National Bureau of Economic Research.

Whalley, John, ed. (1986), *Canada-United States Free Trade*. Toronto: University of Toronto Press.

Wonnacott, Ronald J. (1994), "Canada's Role in NAFTA: To What Degree has it been Defensive?" In Victor Bulmer-Thomas, Nikki Craske and Mónica Serrano (eds.), *Mexico and the North American Free Trade Agreement: Who Will Benefit?*, New York: St. Martin's Press, 163-175.

Wylie, Peter J. (1995), "Partial Equilibrium Estimates of Manufacturing Trade Creation and Diversion Due to NAFTA." *The North American Journal of Economics and Finance*, 6: 65-84.

APPENDIX
LIST OF INDUSTRIES AND DUTY RATES

Table A1
Duty Rates on Imports to Canada from the United States
(Based on Revenue Canada Customs Import Files)

	CALCULATED RATES OF DUTY COLLECTED ON CANADIAN IMPORTS FROM THE UNITED STATES	1989	1990	1991	1992	1993	1994	1995	1996
1	GRAINS	1,11	1.09	1.01	1.00	0.89	0.81	0.50	0,3
2	LIVE ANIMALS	1.20	1.40	0.99	1.07	0.51	0.37	0.29	0.16
3	OTHER AGRICULTURAL PRODUCTS	1.59	1.55	1.45	1.24	1.02	0.86	0.57	0,38
4	FORESTRY PRODUCTS	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0
5	FISH LANDINGS	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0
6	HUNTING AND TRAPPING PRODUCTS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	IRON ORES AND CONCENTRATES	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
8	OTHER METAL. ORES AND CONCENTR.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	COAL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	CRUDE MINERAL OILS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	NATURAL GAS	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	NON-METALLIC MINERALS	0,2	0.17	0.15	0.08	0.05	0.05	0.02	0.00
13	SERVICES INCIDENTAL TO MINING	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	MEAT PRODUCTS	1.78	1.86	1.45	1.23	1.02	0.78	0.51	0.40
15	DAIRY PRODUCTS	4.14	4.26	4.85	3.43	3.09	2.90	1.69	1.51
16	FISH PRODUCTS	1.16	0.94	0.84	0.69	0.48	0.33	0.22	0.14
17	FRUITS AND VEGETABLES PREPARATIONS	5.00	5.62	5.52	5.01	4.13	3.43	2.60	1.82
18	FEEDS	1.07	0.48	0.11	0.12	0.07	0.07	0.06	0.04
19	FLOUR, WHEAT, MEAL AND OTHER CEREALS	2.76	2.63	2.91	1.93	1.47	0.95	0.94	1.47
20	BREAKFAST CEREAL AND BAKERY PROD.	5.90	6.35	5.94	5.18	4.07	3.42	2.64	1.81
21	SUGAR	5.83	6.13	5.85	4.11	3.34	3.76	1.89	0.45
22	MISC. FOOD PRODUCTS	4.25	5.32	4.71	3.98	3.09	2.40	1.97	1.42
23	SOFT DRINKS	4.28	5.08	3.75	2.15	3.05	1.89	1.66	1.17
24	ALCOHOLIC BEVERAGES	25.28	16.31	12.47	11.22	10.92	9.63	11.01	10.06
25	TOBACCO PROCESSED UNMANUFACT.	4.90	4.71	3.50	2.76	2.20	1.50	0.87	0.50
26	CIGARETTES AND TOBACCO MFG.	10.16	9.40	18.32	9.39	8.86	7.41	6.63	4.29
27	TIRES AND TUBES	3.52	2.73	2.72	2.13	1.02	0.73	0.62	0.42
28	OTHER RUBBER PRODUCTS	5.16	5.06	4.65	3.80	2.99	2.58	1.80	1.36
29	PLASTIC FABRICATED PRODUCTS	7.66	8.05	7.24	5.90	4.50	3.74	2.75	1.92
30	LEATHER AND LEATHER PRODUCTS	10.66	5.87	5.86	4.59	3.46	3.31	2.60	1.86
31	YARNS AND MAN MADE FIBRES	6.64	6.28	4.49	4.24	2.82	2.15	1.67	1.19
32	FABRICS	14.67	13.73	11.73	9.83	7.10	5.31	4.04	2.62
33	OTHER TEXTILE PRODUCTS	13.05	12.64	11.83	9.56	7.67	6.21	4.32	3.00
34	HOSIERY AND KNITTED WEAR	20.24	12.11	9.53	9.01	7.79	6.91	6.03	4.13
35	CLOTHING AND ACCESSORIES	12.27	5.70	5.23	5.31	4.94	4.30	3.47	2,5
36	LUMBER AND TIMBER	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	VENEER AND PLYWOOD	8.53	6.91	7.22	4.82	2.71	1.45	1.33	0.95

CALCULATED RATES OF DUTY COLLECTED ON CANADIAN IMPORTS FROM THE UNITED STATES	1989	1990	1991	1992	1993	1994	1995	1996
38 OTHER WOOD FABRICATED MATERIALS	4.65	4.76	3.82	2.73	1.79	1.44	1.04	0.61
39 FURNITURE AND FIXTURES	6.89	6.92	4.85	2.89	0.58	0.53	0.35	0.27
40 PULP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41 NEWSPRINT AND OTHER PAPER STOCK	3.72	3.62	2.33	1.31	0.16	0.12	0.08	0.03
42 PAPER PRODUCTS	6.01	5.39	4.13	2.53	0.94	0.71	0.41	0.29
43 PRINTING AND PUBLISHING	1.40	1.02	0.97	0.53	0.11	0.12	0.10	0.06
44 ADVERTISING, PRINT MEDIA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45 IRON AND STEEL PRODUCTS	4.01	4.37	3.98	3.29	2.57	2.30	1.85	1.17
46 ALUMINUM PRODUCTS	1.26	1.02	0.72	0.50	0.24	0.16	0.12	0.10
47 COPPER AND COPPER ALLOY PRODUCTS	2.96	3.56	2.44	1.57	1.41	0.97	0.54	0.36
48 NICKEL PRODUCTS	1.59	0.93	0.77	0.40	0.19	0.07	0.04	0.02
49 OTHER NON FERROUS METAL PRODUCTS	0.61	0.94	0.75	0.51	0.27	0.17	0.12	0.09
50 BOILERS, TANKS AND PLATES	8.23	6.90	3.56	4.23	1.86	1.76	1.03	0.84
51 FABRICATED STRUCTURAL METAL PROD	7.15	6.37	6.61	5.80	4.23	3.48	2.20	1.40
52 OTHER METAL FABRICATED PRODUCTS	4.91	4.83	4.13	3.14	2.07	1.49	1.18	0.81
53 AGRICULTURAL MACHINERY	0.15	0.15	0.11	0.09	0.05	0.05	0.02	0.01
54 OTHER INDUSTRIAL MACHINERY	1.82	1.65	1.33	0.90	0.54	0.48	0.29	0.21
55 MOTOR VEHICLES	1.65	0.48	0.45	0.55	0.51	0.49	0.48	0.31
56 MOTOR VEHICLE PARTS	0.51	0.46	0.42	0.26	0.18	0.18	0.11	0.10
57 OTHER TRANSPORT EQUIPMENT	1.13	1.23	0.87	0.87	0.39	0.32	0.23	0.14
58 APPLIANCES AND RECEIVERS, HOUSEHOLD	5.18	4.72	4.12	3.63	2.97	2.22	1.59	1.01
59 OTHER ELECTRICAL PRODUCTS	3.20	2.89	2.48	2.05	1.57	1.48	0.92	0.61
60 CEMENT AND CONCRETE PRODUCTS	1.49	1.30	0.92	0.67	0.18	0.08	0.03	0.03
61 OTHER NON-METALLIC MINERAL PROD.	3.95	3.90	3.14	2.57	1.66	1.21	0.85	0.56
62 GASOLINE AND FUEL OIL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
63 OTHER PETROLEUM AND COAL PROD.	1.57	1.42	1.26	1.06	0.78	0.66	0.46	0.32
64 INDUSTRIAL CHEMICALS	3.18	2.63	1.83	1.09	0.34	0.27	0.15	0.12
65 FERTILIZERS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
66 PHARMACEUTICALS	4.98	3.93	3.64	3.48	2.21	1.66	0.11	0.04
67 OTHER CHEMICAL PRODUCTS	4.89	4.65	3.68	2.31	1.23	1.16	0.86	0.59
68 SCIENTIFIC EQUIPMENT	1.58	1.31	0.99	0.72	0.54	0.44	0.32	0.25
69 OTHER MANUFACTURED PRODUCTS	5.47	4.93	4.46	3.82	2.99	2.52	1.71	1.09
78 ELECTRIC POWER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
93 NON-COMPETING IMPORTS	0.06	0.01	0.01	0.01	0.01	0.01	0.01	0.00
TOTAL, PRIMARY GOODS	0.51	0.52	0.52	0.50	0.43	0.35	0.22	0.14
TOTAL, MANUFACTURED GOODS	2.57	2.31	2.09	1.78	1.22	0.97	0.68	0.50
TOTAL, PRIMARY AND MANUFACTURED GOODS	2.44	2.21	2.01	1.72	1.19	0.95	0.67	0.48

Note: Values for duties collected continue to appear for many commodities after the FTA tariff rates have been eliminated. These amounts represent duties on goods imported from, but not produced in the United States, or goods that do not meet FTA content rules.

Table A2
Duty Rates on Canadian Exports to the United States
(Based on U.S. Customs Services Import Files)

	CALCULATED RATES OF DUTY COLLECTED ON CANADIAN EXPORTS TO THE UNITED STATES	1989	1990	1991	1992	1993	1994	1995	1996
1	GRAINS	0.81	1.37	1.08	1.49	1.00	0.82	0.37	0.14
2	LIVE ANIMALS	0.75	0.62	0.39	0.21	0.01	0.01	0.01	0.00
3	OTHER AGRICULTURAL PRODUCTS	1.54	1.39	1.39	1.31	0.81	0.52	0.42	0.28
4	FORESTRY PRODUCTS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	FISH LANDINGS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	HUNTING AND TRAPPING PRODUCTS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	IRON ORES AND CONCENTRATES	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	OTHER METAL. ORES AND CONCENTRATES	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
9	COAL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	CRUDE MINERAL OILS	0.34	0.21	0.17	0.09	0.00	0.00	0.00	0.00
11	NATURAL GAS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	NON-METALLIC MINERALS	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.00
13	SERVICES INCIDENTAL TO MINING	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	MEAT PRODUCTS	0.60	0.52	0.36	0.10	0.09	0.05	0.04	0.03
15	DAIRY PRODUCTS	3.70	2.77	2.39	2.22	2.08	1.43	1.28	1.24
16	FISH PRODUCTS	0.38	0.28	0.21	0.14	0.10	0.09	0.07	0.06
17	FRUITS AND VEGETABLES PREPARATIONS	5.74	4.87	4.12	3.50	2.71	1.93	1.37	0.90
18	FEEDS	0.31	0.29	0.15	0.02	0.03	0.01	0.00	0.00
19	FLOUR, WHEAT, MEAL AND OTHER CEREALS	2.42	2.21	2.34	2.05	1.38	1.06	0.71	0.44
20	BREAKFAST CEREAL AND BAKERY PROD.	0.20	0.45	0.59	0.35	0.67	0.56	0.53	0.47
21	SUGAR	0.44	0.03	1.14	2.10	3.05	2.69	2.46	2.47
22	MISC. FOOD PRODUCTS	2.96	2.79	2.97	2.23	1.73	1.17	0.92	0.59
23	SOFT DRINKS	0.20	0.19	0.17	0.09	0.07	0.09	0.00	0.00
24	ALCOHOLIC BEVERAGES	0.80	0.93	0.93	0.66	0.65	0.55	0.32	0.24
25	TOBACCO PROCESSED UNMANUFACTURED	8.14	7.95	7.56	6.80	5.90	5.18	4.12	3.00
26	CIGARETTES AND TOBACCO MFG.	8.77	6.85	4.22	3.63	3.11	2.58	1.79	1.25
27	TIRES AND TUBES	2.82	2.56	2.21	1.85	1.50	1.12	0.83	0.57
28	OTHER RUBBER PRODUCTS	2.55	2.81	2.42	1.91	1.24	0.91	0.68	0.67
29	PLASTIC FABRICATED PRODUCTS	3.03	2.90	2.63	2.13	1.68	1.26	0.92	0.66
30	LEATHER AND LEATHER PRODUCTS	4.96	5.23	5.51	4.12	3.45	3.14	2.62	1.77
31	YARNS AND MAN MADE FIBRES	5.76	3.87	3.54	3.09	1.77	1.04	0.83	0.62
32	FABRICS	8.35	8.15	8.89	7.40	5.46	3.37	2.47	1.74
33	OTHER TEXTILE PRODUCTS	3.99	3.49	3.04	2.47	2.08	1.76	1.74	1.11
34	HOSIERY AND KNITTED WEAR	15.29	13.38	12.12	9.99	8.20	6.54	4.86	3.44
35	CLOTHING AND ACCESSORIES	8.45	9.33	9.15	7.86	5.99	4.99	4.36	3,6
36	LUMBER AND TIMBER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	VENEER AND PLYWOOD	1.13	0.85	0.62	0.36	0.12	0.09	0.07	0.07
38	OTHER WOOD FABRICATED MATERIALS	1.38	1.33	1.25	0.78	0.26	0.20	0.15	0.13
39	FURNITURE AND FIXTURES	1.91	1.42	1.02	0.59	0.08	0.12	0.07	0.05
40	PULP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41	NEWSPRINT AND OTHER PAPER STOCK	0.18	0.17	0.12	0.07	0.01	0.01	0.00	0.00

CALCULATED RATES OF DUTY COLLECTED ON CANADIAN EXPORTS TO THE UNITED STATES	1989	1990	1991	1992	1993	1994	1995	1996
42 PAPER PRODUCTS	1.40	1.07	0.76	0.44	0.18	0.14	0.09	0.08
43 PRINTING AND PUBLISHING	0.22	0.28	0.25	0.13	0.05	0.04	0.02	0.01
44 ADVERTISING, PRINT MEDIA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45 IRON AND STEEL PRODUCTS	2.80	2.53	2.46	2.10	1.59	1.22	0.90	0.60
46 ALUMINUM PRODUCTS	0.33	0.20	0.15	0.09	0.06	0.05	0.04	0.02
47 COPPER and COPPER ALLOY PRODUCTS	0.79	0.71	0.57	0.33	0.12	0.46	0.31	0.16
48 NICKEL PRODUCTS	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00
49 OTHER NON FERROUS METAL PRODUCTS	0.88	1.01	0.94	0.40	0.43	0.36	0.24	0.19
50 BOILERS, TANKS AND PLATES	2.62	2.49	2.07	1.11	0.60	0.38	0.23	0.14
51 FABRICATED STRUCTURAL METAL PROD.	2.22	1.97	1.71	1.28	1.07	0.88	0.64	0.47
52 OTHER METAL FABRICATED PRODUCTS	2.36	2.34	1.88	1.49	1.04	0.75	0.55	0.42
53 AGRICULTURAL MACHINERY	0.07	0.07	0.10	0.06	0.08	0.07	0.02	0.01
54 OTHER INDUSTRIAL MACHINERY	1.04	0.92	0.69	0.44	0.18	0.13	0.10	0.10
55 MOTOR VEHICLES	0.00	0.03	0.06	0.06	0.04	0.02	0.02	0.04
56 MOTOR VEHICLE PARTS	0.28	0.48	0.15	0.14	0.12	0.20	0.31	0.35
57 OTHER TRANSPORT EQUIPMENT	0.59	0.34	0.18	0.11	0.05	0.14	0.14	0.12
58 APPLIANCES AND RECEIVERS, HOUSEHOLD	2.02	2.04	1.67	1.14	0.85	0.74	0.53	0.38
59 OTHER ELECTRICAL PRODUCTS	1.61	1.19	0.89	0.72	0.57	0.58	0.34	0.29
60 CEMENT AND CONCRETE PRODUCTS	1.05	0.72	0.65	0.23	0.02	0.00	0.00	0.00
61 OTHER NON-METALLIC MINERAL PROD.	1.54	1.20	0.94	0.77	0.53	0.53	0.44	0.32
62 GASOLINE AND FUEL OIL	0.28	0.18	0.16	0.08	0.04	0.01	0.00	0.00
63 OTHER PETROLEUM AND COAL PROD.	0.06	0.07	0.05	0.04	0.00	0.00	0.01	0.01
64 INDUSTRIAL CHEMICALS	3.82	2.36	1.55	0.84	0.13	0.12	0.09	0.07
65 FERTILIZERS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
66 PHARMACEUTICALS	2.24	1.86	2.49	2.45	1.68	1.38	0.01	0.01
67 OTHER CHEMICAL PRODUCTS	3.03	2.51	1.96	1.12	0.76	0.62	0.46	0.29
68 SCIENTIFIC EQUIPMENT	1.96	1.33	0.95	0.72	0.63	0.43	0.38	0.39
69 OTHER MANUFACTURED PRODUCTS	2.11	2.04	1.77	1.54	1.20	0.98	0.58	0.44
78 ELECTRIC POWER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
93 NON-COMPETING IMPORTS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL, PRIMARY GOODS	0.26	0.21	0.17	0.15	0.07	0.07	0.04	0.02
TOTAL, MANUFACTURED GOODS	0.77	0.70	0.59	0.48	0.34	0.27	0.21	0.19
TOTAL, PRIMARY AND MANUFACTURED GOODS	0.71	0.65	0.54	0.44	0.30	0.25	0.19	0.17

Note: Values for duties collected continue to appear for many commodities after the FTA tariff rates have been eliminated. These amounts represent duties on goods exported from, but not produced in Canada, or goods that do not meet FTA content rules.

Table A3
Duty Rates on Imports to Canada from the Rest of the World
(Based on Revenue Canada Customs Import Files)

	CALCULATED RATES OF DUTY COLLECTED ON CANADIAN IMPORTS FROM ROW	1989	1990	1991	1992	1993	1994	1995	1996
1	GRAINS	0.22	0.09	0.17	0.60	0.04	0.19	0.72	0.10
2	LIVE ANIMALS	0.14	0.01	0.01	0.00	0.06	0.04	0,13	0.00
3	OTHER AGRICULTURAL PRODUCTS	1.38	1.26	1.26	1.33	1.49	1.47	1.34	1.20
4	FORESTRY PRODUCTS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	FISH LANDINGS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	HUNTING AND TRAPPING PRODUCTS	0.03	0.00	0.00	0.00	0.17	0.00	0.00	0.01
7	IRON ORES AND CONCENTRATES	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
8	OTHER METAL. ORES AND CONCENTRATES	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.00
9	COAL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	CRUDE MINERAL OILS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	NATURAL GAS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	NON-METALLIC MINERALS	0.27	0.26	0.58	0.21	0.29	0.29	0.29	0.03
13	SERVICES INCIDENTAL TO MINING	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	MEAT PRODUCTS	1.64	1.78	1.76	1.69	1.19	0.86	0.68	0.56
15	DAIRY PRODUCTS	1.69	2.30	2.24	2.04	1.74	1.83	1.75	1.82
16	FISH PRODUCTS	3.81	3.18	3.09	2.39	2.14	1.94	1.60	0.96
17	FRUITS AND VEGETABLES PREPARATIONS	5.75	6.09	6.09	5.53	5.55	5.63	5.10	4.21
18	FEEDS	1.71	1.04	0.98	1.06	0.66	0.57	0.45	0.46
19	FLOUR, WHEAT, MEAL AND OTHER CEREALS	6.43	6.74	9.39	10.35	7.80	6.15	5.78	6.60
20	BREAKFAST CEREAL AND BAKERY PROD.	4.75	5.89	5.41	5.24	4.42	4.62	3.63	3.45
21	SUGAR	4.80	4.93	6.20	5.98	5.59	4.26	2.36	1.24
22	MISC. FOOD PRODUCTS	3.87	4.04	4.00	4.22	3.93	3.83	3.53	3.10
23	SOFT DRINKS	1.71	6.04	7.45	2.43	7.90	5.43	5.81	3.02
24	ALCOHOLIC BEVERAGES	39.95	18.61	17.33	15.18	12.20	14.13	14.00	14.06
25	TOBACCO PROCESSED UNMANUFACTURED	5.38	8.35	6.94	1.25	2.45	1.08	1.76	2.98
26	CIGARETTES AND TOBACCO MFG.	43.00	45.34	12.86	12.19	7.48	12.86	9.74	11.22
27	TIRES AND TUBES	7.82	9.53	9.54	9.36	8.46	8.50	7.37	6.94
28	OTHER RUBBER PRODUCTS	8.84	6.74	5.72	5.43	5.62	5.27	5.90	5.78
29	PLASTIC FABRICATED PRODUCTS	8.57	9.71	9.55	9.15	8.06	7.62	6.79	6.01
30	LEATHER AND LEATHER PRODUCTS	13.11	17.18	17.06	16.82	14.58	14.07	14.33	13.30
31	YARNS AND MAN MADE FIBRES	7.91	9.70	9.57	9.06	7.10	6.52	5.98	4.89
32	FABRICS	15.04	16.61	17.17	15.90	14.03	13.35	12.21	11.03
33	OTHER TEXTILE PRODUCTS	11.27	15.32	14.31	12.31	10.58	11.34	10.64	9.48
34	HOSIERY AND KNITTED WEAR	19.96	25.81	25.45	23.94	19.62	19.61	19.31	18.17
35	CLOTHING AND ACCESSORIES	13.93	17.14	16.84	16.08	14.59	14.43	13.93	12,68
36	LUMBER AND TIMBER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	VENEER AND PLYWOOD	4.80	5.08	5.23	4.94	4.67	4.31	3.98	3.41
38	OTHER WOOD FABRICATED MATERIALS	4.55	4.24	4.01	3.50	2.70	2.94	2.53	2.27
39	FURNITURE AND FIXTURES	8.93	11.57	10.43	10.93	8.34	8.82	8.11	6.75
40	PULP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41	NEWSPRINT AND OTHER PAPER STOCK	3.51	3.95	3.41	3.80	3.96	4.03	3.02	1.42
42	PAPER PRODUCTS	7.54	7.92	7.63	7.32	7.18	6.75	5.09	4.06

CALCULATED RATES OF DUTY COLLECTED ON CANADIAN IMPORTS FROM ROW	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**
43 PRINTING AND PUBLISHING	1.08	1.10	1.06	0.92	0.92	0.90	0.82	0.65
44 ADVERTISING, PRINT MEDIA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45 IRON AND STEEL PRODUCTS	3.79	5.25	5.12	4.14	3.97	5.25	3.91	2.78
46 ALUMINUM PRODUCTS	2.23	2.69	2.08	1.93	2.11	1.94	1.48	1.45
47 COPPER AND COPPER ALLOY PRODUCTS	2.94	3.39	3.33	3.08	2.94	2.12	1.20	0.76
48 NICKEL PRODUCTS	0.32	0.32	0.35	0.10	0.12	0.10	0.36	0.89
49 OTHER NON FERROUS METAL PRODUCTS	0.94	1.30	1.72	0.66	1.02	0.65	0.53	0.45
50 BOILERS, TANKS AND PLATES	9.82	9.54	7.83	6.61	8.00	6.45	4.72	2.83
51 FABRICATED STRUCTURAL METAL PROD	5.87	6.11	5.95	5.88	5.21	5.36	4.33	3.44
52 OTHER METAL FABRICATED PRODUCTS	5.56	6.69	7.12	6.40	5.62	5.08	4.45	3.41
53 AGRICULTURAL MACHINERY	0.13	0.16	0.16	0.17	0.10	0.11	0.13	0.09
54 OTHER INDUSTRIAL MACHINERY	1.86	1.99	1.87	1.66	1.31	1.26	0.87	0.65
55 MOTOR VEHICLES	13.86	15.74	12.78	11.54	8.56	6.54	5.09	4.50
56 MOTOR VEHICLE PARTS	1.38	1.60	1.65	1.03	0.84	0.69	0.63	0.65
57 OTHER TRANSPORT EQUIPMENT	0.87	1.32	1.18	0.56	1.02	0.72	0.36	0.17
58 APPLIANCES AND RECEIVERS, HOUSEHOLD	3.88	4.31	4.36	2.52	2.26	2.02	1.74	1.37
59 OTHER ELECTRICAL PRODUCTS	3.39	3.89	3.44	3.21	2.73	2.41	1.95	1.41
60 CEMENT AND CONCRETE PRODUCTS	1.37	1.27	2.00	1.04	3.49	2.09	2.41	2.15
61 OTHER NON-METALLIC MINERAL PROD.	7.47	7.82	7.99	7.26	6.34	6.19	5.42	4.50
62 GASOLINE AND FUEL OIL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
63 OTHER PETROLEUM AND COAL PROD.	1.31	0.54	0.39	0.41	0.55	1.02	0.82	0.41
64 INDUSTRIAL CHEMICALS	3.22	4.02	4.09	4.23	4.15	4.07	1.58	1.04
65 FERTILIZERS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
66 PHARMACEUTICALS	5.87	8.97	8.96	8.83	7.73	7.43	0.09	0.07
67 OTHER CHEMICAL PRODUCTS	5.41	6.17	6.03	5.74	5.82	5.93	5.21	4.33
68 SCIENTIFIC EQUIPMENT	3.20	3.42	3.42	2.88	2.66	2.32	1.99	1,58
69 OTHER MANUFACTURED PRODUCTS	4.98	6.22	6.14	5.90	5.28	5.40	3.94	3,17
78 ELECTRIC POWER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
93 NON-COMPETING IMPORTS	0.35	0.57	0.90	0.96	0.34	0.22	0.19	0.04
TOTAL, PRIMARY GOODS	0.11	0.17	0.12	0.11	0.14	0.14	0.13	0.09
TOTAL, MANUFACTURED GOODS	5.81	6.54	6.17	5.77	4.85	4.39	3.64	3.13
TOTAL, PRIMARY AND MANUFACTURED GOODS	5.22	5.65	5.49	5.13	4.38	4.00	3.30	2,76

INDUSTRY CANADA RESEARCH PUBLICATIONS

INDUSTRY CANADA WORKING PAPER SERIES

No. 1 **Economic Integration in North America: Trends in Foreign Direct Investment and the Top 1,000 Firms**, Industry Canada, Micro-Economic Policy Analysis Staff including John Knubley, Marc Legault and P. Someshwar Rao, 1994.

No. 2 **Canadian-Based Multinationals: An Analysis of Activities and Performance**, Industry Canada, Micro-Economic Policy Analysis Staff including P. Someshwar Rao, Marc Legault and Ashfaq Ahmad, 1994.

No. 3 **International R&D Spillovers Between Industries in Canada and the United States**, Jeffrey I. Bernstein, Carleton University and National Bureau of Economic Research, under contract with Industry Canada, 1994.

No. 4 **The Economic Impact of Mergers and Acquisitions on Corporations**, Gilles Mcdougall, Micro-Economic Policy Analysis, Industry Canada, 1995.

No. 5 **Steppin' Out: An Analysis of Recent Graduates Into the Labour Market**, Ross Finnie, School of Public Administration, Carleton University and Statistics Canada, 1995.

No. 6 **Measuring the Compliance Cost of Tax Expenditures: The Case of Research and Development Incentives**, Sally Gunz, University of Waterloo, Alan Macnaughton, University of Waterloo, and Karen Wensley, Ernst & Young, Toronto, under contract with Industry Canada, 1996.

No. 7 **Governance Structure, Corporate Decision-Making and Firm Performance in North America**, P. Someshwar Rao and Clifton R. Lee-Sing, Micro-Economic Policy Analysis, Industry Canada, 1996.

No. 8 **Foreign Direct Investment and APEC Economic Integration**, Ashfaq Ahmad, P. Someshwar Rao and Colleen Barnes, Micro-Economic Policy Analysis, Industry Canada, 1996.

No. 9 **World Mandate Strategies for Canadian Subsidiaries**, Julian Birkinshaw, Institute of International Business, Stockholm School of Economics, under contract with Industry Canada, 1996.

No. 10 **R&D Productivity Growth in Canadian Communications Equipment and Manufacturing**, Jeffrey I. Bernstein, Carleton University and National Bureau of Economic Research, under contract with Industry Canada, 1996.

No. 11 **Long-run Perspective on Canadian Regional Convergence**, Serge Coulombe, Department of Economics, University of Ottawa, and Frank C. Lee, Industry Canada, 1996.

No. 12 **Implications of Technology and Imports on Employment and Wages in Canada**, Frank C. Lee, Industry Canada, 1996.

No. 13 **The Development of Strategic Alliances in Canadian Industries: A Micro Analysis,** Sunder Magun, Applied International Economics, 1996.

No. 14 **Employment Performance in the Knowledge-Based Economy**, Surendra Gera, Industry Canada, and Philippe Massé, Human Resources Development Canada, 1996.

No. 15 **The Knowledge-Based Economy: Shifts in Industrial Output**, Surendra Gera, Industry Canada, and Kurt Mang, Department of Finance, 1997.

No. 16 **Business Strategies of SMEs and Large Firms in Canada**, Gilles Mcdougall and David Swimmer, Micro-Economic Policy Analysis, Industry Canada, 1997.

No. 17 **Impact of China's Trade and Foreign Investment Reforms on the World Economy**, Winnie Lam, Micro-Economic Policy Analysis, Industry Canada, 1997.

No. 18 **Regional Disparities in Canada: Characterization, Trends and Lessons for Economic Policy**, Serge Coulombe, Department of Economics, University of Ottawa, 1997.

No. 19 **Inter-Industry and U.S. R&D Spillovers, Canadian Industrial Production and Productivity Growth**, Jeffrey I. Bernstein, Carleton University and National Bureau of Economic Research, under contract with Industry Canada, 1998.

No. 20 **Information Technology and Labour Productivity Growth: An Empirical Analysis for Canada and the United States**, Surendra Gera, Wulong Gu and Frank C. Lee, Micro-Economic Policy Analysis, Industry Canada, 1998.

No. 21 **Capital-Embodied Technical Change and the Productivity Growth Slowdown in Canada**, Surendra Gera, Wulong Gu and Frank C. Lee, Micro-Economic Policy Analysis, Industry Canada, 1998.

No. 23 **Restructuring in Canadian Industries: A Micro Analysis**, Sunder Magun, Applied International Economics, under contract with Industry Canada, 1998.

No. 24 **Canadian Government Policies Toward Inward Foreign Direct Investment**, Steven Globerman, Simon Fraser University and Western Washington University, and Daniel Shapiro, Simon Fraser University, under contract with Industry Canada, 1998.

No. 25 **A Structuralist Assessment of Technology Policies – Taking Schumpeter Seriously on Policy,** Richard G. Lipsey and Kenneth Carlaw, Simon Fraser University, with a contribution by Davit D. Akman, research associate, under contract with Industry Canada, 1998.

No. 26 **Intrafirm Trade of Canadian-Based Foreign Transnational Companies,** Richard A. Cameron, Micro-Economic Policy Analysis, Industry Canada, 1998.

No. 27 **Recent Jumps in Patenting Activities: Comparative Innovative Performance of Major Industrial Countries, Patterns and Explanations**, Mohammed Rafiquzzaman and Lori Whewell, Micro-Economic Policy Analysis, Industry Canada, 1998.

No. 28 **Technology and the Demand for Skills: An Industry-Level Analysis**, Surendra Gera and Wulong Gu, Industry Canada, and Zhengxi Lin, Statistics Canada, 1999.

No. 29 **The Productivity Gap Between Canadian and U.S. Firms**, Frank Chung Lee and Jianmin Tang, Micro-Economic Policy Analysis, Industry Canada, 1999.

No. 30 **Foreign Direct Investment and Productivity Growth: The Canadian Host-Country Experience**, Surendra Gera, Wulong Gu and Frank C. Lee, Micro-Economic Policy Analysis, Industry Canada, 1999.

INDUSTRY CANADA DISCUSSION PAPER SERIES

No. 1 **Multinationals as Agents of Change: Setting a New Canadian Policy on Foreign Direct Investment**, Lorraine Eden, Carleton University, 1994.

No. 2 **Technological Change and International Economic Institutions**, Sylvia Ostry, Centre for International Studies, University of Toronto, under contract with Industry Canada, 1995.

No. 3 **Canadian Corporate Governance: Policy Options**, Ronald. J. Daniels, Faculty of Law, University of Toronto, and Randall Morck, Faculty of Business, University of Alberta, 1996.

No. 4 **Foreign Direct Investment and Market Framework Policies: Reducing Frictions in APEC Policies on Competition and Intellectual Property**, Ronald Hirshhorn, 1996.

No. 5 **Industry Canada's Foreign Investment Research: Messages and Policy Implications**, Ronald Hirshhorn, 1997.

No. 6 **International Market Contestability and the New Issues at the World Trade Organization,** Edward M. Graham, Institute for International Economics, Washington (DC), under contract with Industry Canada, 1998.

No. 7 **Implications of Foreign Ownership Restrictions for the Canadian Economy – A Sectoral Analysis,** Steven Globerman, Western Washington University, under contract with Industry Canada, 1999.

INDUSTRY CANADA OCCASIONAL PAPER SERIES

No. 1 **Formal and Informal Investment Barriers in the G-7 Countries: The Country Chapters**, Industry Canada, Micro-Economic Policy Analysis Staff including Ashfaq Ahmad, Colleen Barnes, John Knubley, Rosemary D. MacDonald and Christopher Wilkie, 1994.

Formal and Informal Investment Barriers in the G-7 Countries: Summary and Conclusions, Industry Canada, Micro-Economic Policy Analysis Staff including Ashfaq Ahmad, Colleen Barnes and John Knubley, 1994.

No. 2 **Business Development Initiatives of Multinational Subsidiaries in Canada**, Julian Birkinshaw, University of Western Ontario, under contract with Industry Canada, 1995.

No. 3 **The Role of R&D Consortia in Technology Development**, Vinod Kumar, Research Centre for Technology Management, Carleton University, and Sunder Magun, Centre for Trade Policy and Law, University of Ottawa and Carleton University, under contract with Industry Canada, 1995.

No. 4 **Gender Tracking in University Programs**, Sid Gilbert, University of Guelph, and Alan Pomfret, King's College, University of Western Ontario, 1995.

No. 5 **Competitiveness: Concepts and Measures**, Donald G. McFetridge, Department of Economics, Carleton University, 1995.

No. 6 **Institutional Aspects of R&D Tax Incentives: The SR&ED Tax Credit**, G. Bruce Doern, School of Public Administration, Carleton University, 1995.

No. 7 **Competition Policy as a Dimension of Economic Policy: A Comparative Perspective**, Robert D. Anderson and S. Dev Khosla, Economics and International Affairs Branch, Bureau of Competition Policy, Industry Canada, 1995.

No. 8 **Mechanisms and Practices for the Assessment of The Social and Cultural Implications of Science and Technology**, Liora Salter, Osgoode Hall Law School, University of Toronto, under contract with Industry Canada, 1995.

No. 9 **Science and Technology: Perspectives for Public Policy**, Donald G. McFetridge, Department of Economics, Carleton University, under contract with Industry Canada, 1995.

No. 10 **Endogenous Innovation and Growth: Implications for Canada**, Pierre Fortin, Université du Québec à Montréal and the Canadian Institute for Advanced Research, and Elhanan Helpman, Tel Aviv University and the Canadian Institute for Advanced Research, under contract with Industry Canada, 1995.

No. 11 **The University-Industry Relationship in Science and Technology**, Jérôme Doutriaux, University of Ottawa, and Margaret Barker, Meg Barker Consulting, under contract with Industry Canada, 1995.

No. 12 **Technology and the Economy: A Review of Some Critical Relationships**, Michael Gibbons, University of Sussex, under contract with Industry Canada, 1995.

No. 13 **Management Skills Development in Canada**, Keith Newton, Industry Canada, 1995.

No. 14 **The Human Factor in Firm's Performance: Management Strategies for Productivity and Competitiveness in the Knowledge-Based Economy**, Keith Newton, Industry Canada, 1996.

No. 15 **Payroll Taxation and Employment: A Literature Survey**, Joni Baran, Industry Canada, 1996.

No. 16 **Sustainable Development: Concepts, Measures, Market and Policy Failures at the Open Economy, Industry and Firm Levels**, Philippe Crabbé, Institute for Research on the Environment and Economy, University of Ottawa, 1997.

No. 17 **Measuring Sustainable Development: A Review of Current Practice,** Peter Hardi and Stephan Barg, with Tony Hodge and Laszlo Pinter, International Institute for Sustainable Development, 1997.

No. 18 **Reducing Regulatory Barriers to Trade: Lessons for Canada from the European Experience**, Ramesh Chaitoo and Michael Hart, Center for Trade Policy and Law, Carleton University, 1997.

No. 19 **Analysis of International Trade Dispute Settlement Mechanisms and Implications for Canada's Agreement on Internal Trade**, E. Wayne Clendenning and Robert J. Clendenning, E. Wayne Clendenning & Associates Inc., under contract with Industry Canada, 1997.

No. 20 **Aboriginal Businesses: Characteristics and Strategies for Growth**, David Caldwell and Pamela Hunt, Management Consulting Centre, under contract with Aboriginal Business Canada, Industry Canada, 1998.

CANADA IN THE 21ST CENTURY SERIES

No. 1 **Global Trends: 1980-2015 and Beyond**, J. Bradford De Long, University of California, Berkeley, under contract with Industry Canada, 1998.

No. 2 **Broad Liberalization Based on Fundamentals: A Framework for Canadian Commercial Policy**, Randy Wigle, Wilfrid Laurier University, under contract with Industry Canada, 1998.

No. 3 **North American Economic Integration: 25 Years Backward and Forward**, Gary C. Hufbauer and Jeffrey J. Schott, Institute for International Economics, Washington (DC), under contract with Industry Canada, 1998.

No. 4 **Demographic Trends in Canada, 1996-2006 : Implications for the Public and Private Sectors**, David K. Foot, Richard A. Loreto and Thomas W. McCormack, Madison Avenue Demographics Group, under contract with Industry Canada, 1998.

No. 5 **Capital Investment Challenges in Canada**, Ronald P. M. Giammarino, University of British Columbia, under contract with Industry Canada, 1998.

No. 6 **Looking to the 21st Century – Infrastructure Investments for Economic Growth and for the Welfare and Well-Being of Canadians**, Christian DeBresson, Université du Québec à Montréal, and Stéphanie Barker, Université de Montréal, under contract with Industry Canada, 1998.

No. 7 **The Implications of Technological Change for Human Resource Policy**, Julian R. Betts, University of California, San Diego, under contract with Industry Canada, 1998.

No. 8 **Economics and the Environment: The Recent Canadian Experience and Prospects for the Future**, Brian R. Copeland, University of British Columbia, under contract with Industry Canada, 1998.

No. 9 **Individual Responses to Changes in the Canadian Labour Market**, Paul Beaudry and David A. Green, University of British Columbia, under contract with Industry Canada, 1998.

No. 10 **The Corporate Response – Innovation in the Information Age**, Randall Morck, University of Alberta, and Bernard Yeung, University of Michigan, under contract with Industry Canada, 1998.

No. 11 **Institutions and Growth: Framework Policy as a Tool of Competitive Advantage for Canada**, Ronald J. Daniels, University of Toronto, under contract with Industry Canada, 1998.

PERSPECTIVES ON NORTH AMERICAN FREE TRADE SERIES

No. 1 **Can Small-Country Manufacturing Survive Trade Liberalization? Evidence from the Canada–U.S. Free Trade Agreement**, Keith Head and John Ries, University of British Columbia, under contract with Industry Canada, 1999.

No. 2 **Modelling Links Between Canadian Trade and Foreign Direct Investment,** W. Hejazi and A.E. Safarian, University of Toronto, under contract with Industry Canada, 1999.

No. 3 **Trade Liberalisation and the Migration of Skilled Workers,** Steven Globerman, Western Washington University and Simon Fraser University, under contract with Industry Canada, 1999.

No. 4 **The Changing Industry and Skill Mix of Canada's International Trade**, Peter Dungan and Steve Murphy, Institute for Policy Analysis, University of Toronto ,under contract with Industry Canada, 1999.

No. 5 **Effects of the Canada-United States Free Trade Agreement on Interprovincial Trade**, John F. Helliwell, University of British Columbia, Frank C. Lee, Industry Canada, and Hans Messinger, Statistics Canada, 1999.

JOINT PUBLICATIONS

Capital Budgeting in the Public Sector, in collaboration with the John Deutsch Institute, Jack Mintz and Ross S. Preston eds., 1994.

Infrastructure and Competitiveness, in collaboration with the John Deutsch Institute, Jack Mintz and Ross S. Preston eds., 1994.

Getting the Green Light: Environmental Regulation and Investment in Canada, in collaboration with the C.D. Howe Institute, Jamie Benidickson, G. Bruce Doern and Nancy Olewiler, 1994.

To obtain copies of documents published under the Research Publications Program, please contact:

Publications Officer
Micro-Economic Policy Analysis
Industry Canada
5th Floor, West Tower
235 Queen Street
Ottawa, Ontario, K1A 0H5

Tel.: (613) 952-5704
Fax: (613) 991-1261
E-mail: mepa.apme@ic.gc.ca