Université de Montréal

ESTIMATION OF STEEL EXPORTS & IMPORTS TO ANALYZE THE IMPACT OF FREE TRADE ON PRODUCTION IN THE STEEL INDUSTRY

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SUMMARY

Earlier in this century, Canada's exports were mainly primary products, of which Canada is a major supplier. The number of countries selling primary products has increased, technological revolutions have introduced many substitutes for these products, and Canada is now a major exporter of manufactured goods over which international competition is fierce. As a result of these developments, market access is now a key issue for Canadian exporters. With exports accounting for more than 30 per cent of Canada's gross domestic product, it is clear that international trade is the livelihood of the Canadian economy. Most importantly, in spite of past efforts to diversify our markets, Canada's trade with the United States has steadily increased from 66 per cent of total Canadian trade in 1981 to more than 75 per cent today. Therefore, achieving improved security of access to the United States market through a bilateral agreement is as important as improving the quality of existing access.

The Canada - US Free Trade Agreement, was signed due to the large size of the Canadian and United States bilateral trade. The deal which provides among other things for the removal of all tariff barriers between the two countries over a 10-year period, starting January 1st, 1989, is designed to liberalize trade in goods and services between the two countries, liberalize conditions for investment, and establish an effective framework for handling bilateral trade disputes. A number of studies have sought to calculate the cost to Canada of its tariff and the benefits that would result from its removal, both unilaterally and bilaterally, vis-à-vis the United States. Several of these studies treat Canada as a price taker and conclude that we would experience significant gains from trade liberalization. This is not

surprising since, it follows directly from the way Canada's price behaviour is modeled. Our study is no different, as its purpose is to simulate the impact of the bilateral agreement on output in the iron and steel sector of the manufacturing industry.

Canada is endowed with an abundance and diversity of primary metals, from which the Canadian economy is strongly based on their export for jobs and income. A major category of our primary metals is iron and steel. Since iron and steel are important contributors to the Canadian economy, in terms of trade volume, this is therefore the reason of interest for undertaking the research on this topic. This research paper is aimed at determining the impact of the Canadian - US Free Trade Agreement on the steel industry. The macroeconometric approach undertaken here enables us to determine the possible effects of terms of trade and of revenue on the demand of the Canadian steel industry's exports and imports. The relevance of these estimations are to simulate the impact of the Bilateral Free Trade Agreement on output in the iron and steel sector of the Canadian manufacturing industry, by comparing the observed and predictatory post - Free Trade Agreement regression results.

The results obtained demonstrate that the steel industry can increase its output, once the tariff abolition implemented by the agreement is incorporated into the model. The results of our analysis are consistent with the literature review, on the subject, summarized in this paper. All simulations indicate that there will be output expansion in the steel manufacturing industry. The positive impact on Canadian exports to the United States is due to a decrease in Canada's terms of trade which in turn, makes Canadian goods less costly.

RESUME

Le Canada est un pays commerçant. Aujourd'hui plus de 30 pour cent du produit intérieur brut de notre pays dépend directement des exportations. Plus de 75 pour cent de ces exportations sont destinées vers le marché des Etats-Unis. Il est évident que le commerce extérieur représente l'une des pierres d'assise de l'économie canadienne. Les échanges entre le Canada et les Etats-Unis sont d'une toute première importance car, malgré les efforts entrepris dans le passé pour diversifier nos marchés, ceux-ci ont continué à croître pour passer de 66 pour cent de l'ensemble du commerce extérieur du Canada en 1981 à plus de 75 pour cent actuellement. De toute évidence, un régime d'échanges internationaux libéralisé et stable, particulièrement avec les Etats-Unis, est important pour le maintien de la prospérité au pays canadien.

Depuis 1947, sous les auspices du GATT, le Canada a progressivement réduit sa protection tarifaire, à l'instar des autres pays. Au cours des quelques 30 dernières années, les droits de douane imposés par le Canada ont diminué, en moyenne, dans une proportion de deux tiers. Les baisses tarifaires qui ont suivi les rondes successives de négotiations du GATT sont à l'origine d'un accroissement sensible des échanges internationaux. Pour sa part, le Canada a bénéficié considérablement de la libéralisation des échanges qui c'est produite à l'échelle mondiale au cours des 25 dernières années. Une libéralisation accrue des échanges dans le but d'améliorer, par le biais d'une plus grande concurrence, le fonctionnement des marchés au Canada et d'accroître le niveau de vie des Canadiens.

En maitière tarifaire, l'accord poursuit la tendance amorcée, depuis la Seconde Guerre mondiale, vers une libéralisation des échanges. Présentement, environ 70 pourcent des échanges de biens entre le Canada et les Etats-Unis se font en franchise de droits de douane. La majorité des produits soumis aux droits de douane entre dans cette catégorie. La protection tarifaire s'est beaucoup plus accrue pour les biens manufacturés au Canada qu'aux Etats-Unis. Le secteur sidérurgique, n'est pas une exception car, l'acier est frappé d'un droit de 11.6 pourcent aux Etats-Unis contre 12.5 pourcent au Canada. L'accord aura pour effet d'éliminer, sur une période de 10 ans, débutant le 1er janvier 1989, les droits douaniers qui s'appliquent sur le 30 pourcent restant du commerce bilateral avec les Etats-Unis. Cette phase de transition vise à permettre l'industrie et les travailleurs de s'adapter graduellement au nouveau contexte de libre-échange.

Les principaux arguments en faveur d'une libréralisation des échanges ont eté fréquemment démontrés. Magun et al affirme qu'il existe au moins cinq raisons qui militent en faveur du libre-échange entre le Canada et les Etats-Unis:

(1) un tel arrangement permettrait le Canada de tirer un plus grand profit de ses **avantages comparatifs** grâce à une spécialisation plus poussée;

(2) il rendrait possible une **rationalisation de l'activité manufaturière au Canada** et permettrait à ce secteur de bénéficier des **économies d'échelle** associées à des marchés de plus grande taille;

(3) il favoriserait le diffusion de la technologie dans l'industrie canadienne et **l'expansion** des activités de **recherche et de développement;**

(4) il **inciterait** l'industrie canadienne à une plus grande **efficacité** en l'exposant à la concurrence plus vive qui prévaut sur les marchés de plus grande taille;

(5) **il garantirait au Canada l'accès au vaste marché des Etats-Unis** et
accroîtrait la confiance des investisseurs à l'égard du Canada, entraî-
nant du même coup une augmentation des investissements d'origine
intérieure tout autant qu'étrangère au Canada.

D'après ces principaux arguments, une libéralisation des échanges devrait déboucher
sur une plus grande spécialisation à l'échelle internationale et faire en sorte que
consommateurs et producteurs aient accès à une vaste gamme de biens et services à
meilleur prix que si ceux-ci étaient produits au pays même.

Notre analyse nous permet en particulier d'évaluer l'effet de l'accord de
libre-échange sur les exportations canadiennes vers les Etats-Unis et sur les
importations canadiennes de marchandises semblables à des fins de consommation ou
de production. Plus précisément, l'objet de cette étude est d'estimer les exporta-
tions et les importations de fer et de l'acier, afin de simuler les répercussions de
l'accord de libre-échange sur la production dans le secteur sidérurgique. L'éval-
uation quantitative des effets de l'accord se porte sur une méthodologie macro-
économétrique. La principale conclusion qui se dégage de notre analyse quantitative
est que l'accord de libre-échange entraînera une augmentation dans la production du
secteur sidérurgique.

Il ressort de nos simulations que le Canada retirerait des avantages appréc-
iables d'un accord bilatéral de libre-échange avec les Etats-Unis, alors que l'in-
dustrie sidérurgique bénéficiera des gains de production et de consommation. La
valeur de ces effets dépend sur la nature du libre-échange que sous-tendent les
hypothèses retenues, ainsi que de la structure et des propriétés des modèles utilisés
pour simuler ces répercussions. Ce qui importe de notre analyse est le caractère

des résulats car celui-ci déterminera que tous les Canadiens bénéficieront des avantages économiques de l'accord de libre échange entre Canada et les Etats-Unis.

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To my sister for her endless encouragement

and

In Memory of my late uncle,

Constantinos Tsatoumas

for his guidance

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I INTRODUCTION

Canada has always been a nation of traders. From our flourishing business in furs, fish and whale oil in the 17th century to the present day, Canada has been economically nurtured and shaped by our ability to trade internationally. The value of our exports has increased 1000 per cent since the end of the Second World War and our trade with other nations, particularly the United States, accounts for about 30 per cent of our total income as a nation.[1]

Canada and the United States have long been each other's most important trading partners. In 1986, our sales of products to the United States amounted to about 93 billion dollars, accounting for more than 80 per cent of all our exports. Canada received 21 per cent of United States exports, amounting to approximately 57 billion dollars.[2] The Canadian economy generates 30 percent of its income and employment through its exports. With 2 million jobs depending on exports, the Canadian economy is strongly based on its exports, of which, the majority are natural resources or produced thereof. The majority of Canadian exports of natural resources are resource-based primary metals. Canada is endowed with an abundance and diversity of primary metals, of which steel is the major exported metal in this manufacturing industry.

The steel industry makes a sizeable contribution to the Canadian economy, accounting for about 6.3 per cent of our domestic output of goods and services, in

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[1] *Energy, Mines and Resources Canada,* "Iron in Canada", Minister of Supply & Services Canada, Ottawa, 1986, p.3.

[2] *Energy, Mines and Resources Canada,* "Iron in Canada", Minister of Supply & Services Canada, Ottawa, 1986, p.5.

1984, it is almost half of the total manufacturing industry domestic output. This sector employees 8.7 per cent of the total primary metal Canadian workforce and has an influence on many other key Canadian industries that require steel in their production process. Such industries include: transportation equipment, agricultural equipment, and ferrous metal production, to name a few. Exporting 74 per cent of Canadian steel to the United States and importing 31 per cent of its steel from the United States, the United States is Canada's largest steel trading partner.[3]

Their large world-wide trade flow, along with the small size of the Canadian economy (in comparison to the United States) are the factors underlying examination of access to the United States market through free trade. The Economic Council of Canada, the Macdonald Royal Commission on the Economic Union, and the C.D. Howe Institute have all indicated that every region in Canada, and most industries, would benefit from free trade. The 1988 Annual Review of the Economic Council, together with a supporting study, estimated that the Agreement would mean a substantial increase in Canadian jobs, production, and our standard of living. The Canada-United States Free Trade Agreement signed on January 2nd, 1988 and effective on January 1st, 1989, is a milestone in our trading relationship, offering secure and expanded access for our goods and services in the American market and creating economic opportunities nationally and in every region in Canada.[4]

This research paper has been prepared to empirically estimate the Canadian steel exports and imports in order to analyze the impact of the Bilateral Free Trade

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[3] *Energy, Mines and Resources Canada,* "Iron in Canada", Minister of Supply & Services Canada, Ottawa, 1986, p.6.

[4] Magun et al., "Open Borders," *Economic Council of Canada,* No. 344, April 1988, p.5.

Agreement on output in the steel industry. The determination and analysis of this impact is of importance since the Canadian economy is strongly based on its natural resources. The report consists of four sections. The first section demonstrates the historical context of the agreement as well as the importance of Canadian access to the United States market. In this section, we also deal with a minor discussion on the possible drawbacks of such an agreement.

The second section introduces us to the steel industries in both countries, namely their principal producers and these producers' development within the industry. The industry's barriers to trade prior to the implementation of the Canada-US Free Trade Agreement and their elimination through this agreement are discussed.

The following section presents a review of the literature on this issue. We do not fail to include both theoretical and empirical research undertaken by various economists. A series of studies, over the last 30 years have attempted to empirically estimate the welfare gains on the Canadian economy from free trade across the Canadian-United States border. The insights of these studies permit the examination of the steel and of the primary metal industry with their impact on production and employment. Principal difficulties with these studies are also cited.

The fourth and last section presents the model which was used empirically. An introduction of the model's purpose and methodology, as well as the model's assumptions are elaborated on in this section. The empirical findings obtained from the estimations of Canadian steel exports and imports are indicated and their probable impact on output is then summarized. The estimations are then repeated

for what we refer to from here on in as the post - Free Trade Agreement (FTA) period, namely 1989-1991. These second estimations include only observations from the post - FTA period. That is, from the first semester of 1989 to the third semester of 1990 (the most current year for which data is observed). Lastly, we estimate the Canadian steel exports and imports for the post - FTA period, but this time taking into account the elimination of tariff barriers implemented through the agreement. We refer to this stage of estimation as the predictatory post - FTA regressions, as we attempt to predict the effect of the agreement on our dependent variables. Serving as predictions, these empirical findings are noted and the changes in the terms of trade are discussed in comparison to the observed post-Free Trade Agreement results. This comparison of the industry's predictions versus the actual observed estimation of imports and exports is undertaken to determine likely outcomes on output.

Finally, a conclusion recapitulating the necessity of the agreement is presented. This conclusion also depicts the possible outcome of the Canada - US Free Trade Agreement in relation to its probable impact on output in the industry under study.

II EVOLUTION OF THE FREE TRADE AGREEMENT

THE AGREEMENT IN A HISTORICAL CONTEXT

Canada's economic relations with the United States have long been accompanied with difficulty, as Canada oscillated between economic nationalism and the notion of closer economic relations with the United States. Whenever one of the

two countries has looked toward more liberal bilateral trade, the other has rejected it.

The first Canadian - United States experiment with free trade commenced with the Reciprocity Treaty of 1854-1866, which eliminated tariffs on most cross-border trade. The United States later abrogated this treaty, partly as a retaliation for Britain's favoritism of the South during the United States Civil War. During the first decade after Confederation, Canadian governments sought to restore the treaty. When these attempts failed, Canada turned inward. Sir John A. Macdonald's Protectionist National Policy, introduced in 1878, was aimed at building a Canadian industrial base behind tariff walls. It succeeded in creating a branch plant manufacturing industry based on servicing the low-volume home market with high-cost production that was shielded by import duties. In 1896 the Americans one again rejected Canadian proposals for reciprocity. In 1911, however, it was a Canadian election, implementing Borden's Conservative Party, that ended hopes of substantial bilateral liberalization.

In the 1930s, Canadian trade policy shifted toward an outward-looking stance. This occurred because of two sets of pressures. Firstly, some Canadian manufacturing had passed the infant-industry stage and was ready to begin its full integration into the world trading market. Secondly, the high tariffs established in the United States by the Tariff Act of 1930 - referred to as the Smoot-Hawley Act, after the originators of the legislation, and in Canada by the Bennett government, clearly were harming both countries by restricting their mutually profitable trade. As a result of these pressures, Canada signed two major trade-liberalizing agreements with the United States in the mid-1930s.

As the Canadian prime minister in 1948, W.L. Mackenzie King, after considering a free trade agreement with the United States, refused to continue with any bilateral negotiations. Instead, Canada placed its trust in multilateral arrangements by becoming a member of the GATT (General Agreement on Tariffs and Trade), established at the end of World War II. This committed Canada to a policy of liberalizing its foreign trade and confirmed its rejection of an inward-looking policy based on heavy protectionism. Since the ratification of the GATT in 1948, tariff barriers impending world trade have been progressively lowered. The Kennedy Round in 1967 and the Tokyo Round in 1979 produced significant changes in the rules governing trade. As a trading nation, Canada not only adjusted, it profited substantially from the resulting rapid growth in world trade.

The bilateral agreements made in the 1930s with the United States and successive GATT rounds of tariff reductions have removed approximately three quarters of the Canadian trade barriers that were in place in 1953.[5] Although this is an impressive result, and although much of Canadian-United States trade now moves completely tariff free, the remaining United States tariffs still exert what is considered to be a substantial restraining effect on Canadian exports to that country. The Canadian-US Free Trade Agreement dismantles most of the existing restrictions on Canada's trade with the United States, its largest trading partner.

In 1982, Canada and the United States once again became interested in a bilateral arrangement. The result was the historic Trade Policy Review of 1983. The Canadian government, under Brian Mulroney, recognized the "economic impe-

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[5] Magun et al., "Open Borders," *Economic Council of Canada*, No. 344, April 1988, p.87.

rative": Canadian prosperity depends on assured access to the United States market. Canada's traditional insistence on maintaining a distinct country from the United States was not abandoned. The compromise was the policy recommendation that "careful consideration will be given to the advantages and disadvantages of limited free trade agreements with the United States in particular sectors." After a joint examination, sectoral free trade was abandoned as it would be impossible to balance gains and loses for each country within each industry. In September 1985, the Macdonald Royal Commission recommended negotiating a comprehensive free trade agreement with the United States. The Free Trade Agreement entered into effect on January 1st, 1989.[6]

THE IMPORTANCE OF ACCESS

The objective of the Free Trade Agreement is to improve the access of each country's exporters to the other country's market. This agreement helps access in three ways: it increases the access of Canadian producers to the US market, it makes that access more secure, and it promises to add to that security in the future.

The free trade issue is more important to Canada than to the United States, for two reasons. Firstly, since in size, the Canadian economy is only a small fraction of the United States economy, bilateral trade is much more important relative to Canada's economy. Secondly, Canada has higher average tariffs than the United States and imposes them on a larger fraction of imports. The average

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[6] *External Affairs Canada*, "Canadian Trade Policy for the 1980s: A Discussion Paper & A Review of Canadian Trade Policy, No. 10, Minister of Supply & Services Canada, Ottawa, 1983, p.3.

Canadian tariff rate on all goods is about 3.8 per cent (11.2 per cent of the total value of dutiable Canadian imports from the United States) compared to 2.3 per cent in the United States (6.5 per cent for Canadian exports to the United States). On the other hand, non-tariff barriers are generally higher in the United States. That is, 1.8 per cent compared to 1.0 per cent in Canada.[7]

A reason of equal importance to both countries, for signing the agreement, involves the size of their trade. The Canada-United States trade is considered as the largest bilateral trade flow in the world, with 72 per cent of Canadian imports coming from the United States and 75 per cent of Canadian exports going to the United States, in 1984.[8] The small size of our economy (in comparison to the United States) and the large size of our trade with the United States are the factors underlying the examination of access to the United States market through the free trade deal.

There are at least five main economic arguments in favour of bilateral free trade between Canada and the United States:

(1) It would enable Canada to further **exploit comparative advantage** through increased specialization;

(2) It would permit the **rationalization of Canadian manufacturing** and allow it to reap the benefits of **scale economies** from larger markets;

(3) It would encourage technological diffusion within industry and **expand our R & D efforts**;

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[7] Magun et al., "Impact of Canada-US Free Trade on the Canadian Economy, "*Economic Council of Canada*, No. 331, August 1987, p.16.

[8] Turk, Jim, Le Libre-Echange avec les E.U.: Les Implications pour le Canada, *Institution de Recherche Appliquée sur le travail*, 6 juin 1986, p.8.

(4) It would **stimulate** overall **efficiency** by exposing Canadian industry to the greater competition that a larger market provides;

(5) It would **secure Canadian access to the large United States market** and increase investor confidence in Canada, resulting in increased foreign and domestic investment in Canada.[9]

Advocates of a Canada-United States Free Trade Agreement also note the benefit which would result from the increased security of access to the United States market. Among the major economies of the developed world, only Canada and Australia together with New Zealand have neither a large domestic market, like the United States and Japan, nor access to a market of over 100 million people (through a bilateral or other free trade arrangement), like countries within the European Community. The importance of assured access to a market of at least 100 million consumers, is that most economists feel this to be the level needed to be competitive on a world scale:

Canadian market is 25 million people
United States market is 240 million people
EFTA & EC markets are 360 million people
Australia and New Zealand are 20 million people.[10]

The Canada-United States Free Trade Agreement also expands our potential for exploiting economies of scale in Canadian industry through enhanced access to a market almost 10 times the size of our own. In manufactured goods in which there are economies of scale and other advantages of a large market, with a domestic market of about 25 million people, how can Canada compete with producers in Japan, the United States, or Europe who have access to tariff-free markets of more

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[9] Magun et al., "Open Borders," *Economic Council of Canada*, No. 344, April 1988, p.9.

[10] Wilkinson, B.W., "Reservations About a Canadian - US Free Trade Agreement at this time", in *Canada in the Changing World Economy*, C.D. Howe Institute, Montreal, 1980, p.14.

than 100 million. By allowing goods to flow freely between the two countries, an agreement would provide Canadian producers and consumers with the benefits of a "domestic" Canada-United States market of more than 200 million people.

The basic case for free trade remains the same as that formulated two centuries ago by David Ricardo: "the law of comparative advantage". The theory of comparative advantage states that nations will specialize in producing those goods for which they were best fitted and that trade liberalization will produce benefits to all the parties concerned because of differences in relative costs of production. It benefits nations to produce domestically the goods in which they are relatively more efficient and import those in which they are relatively less efficient. Essentially, free trade will encourage international specialization and provide a wide range of goods and services from which to choose, at lower costs to consumers and producers, than would be the case if they are produced domestically.

There are other economic arguments for freer trade. It is commonly argued that a country with a relatively small market such as Canada will benefit much more from liberalized trade through realization of scale economies than will a country with a large market. Free trade, by granting secure access to the large United States market and by permitting Canadian companies to take advantage of scale economies from larger plants and longer production runs would thus, improve total factor productivity, lead to lower unit production costs, and a higher Canadian standard of living. By promoting competition, free trade will also reduce wage-price rigidities and improve the output-inflation trade-off. The incentive to adopt new

technology and the pressure to achieve higher efficiency generally are greater if an industry is exposed to the rigours of international competition.[11]

However, Bilateral Canada - US Free Trade could hurt some firms and industries whose current costs are higher than those of their American counterparts. Confronted by new competition, some of these firms will not successfully adjust and would not survive. Business dislocations and changes in jobs will almost certainly be part of the adjustments during a transitional period. Many firms could face strong adjustment pressures as they adapt to the larger North American market. Many Canadian plants would undergo adjustment costs by rationalizing through mergers or takeovers, by designing better or new products, or by folding. These adjustment costs have to be weighed against the gains from free trade. There will definitely be industries and regions which will be the winners and the losers from the Canadian - US Bilateral Free Trade Agreement.

III THE STEEL INDUSTRY

Canada is the largest supplier of steel products to the American market, after Japan and the European Community. As well, in 1989, Canadian iron and steel exports to the United States made up 74.2 per cent of total Canadian iron and steel exports. Since total Canadian exports to the United States, in 1989, were in the 74 per cent range,[12] we can conclude that the iron and steel industry is a major revenue generating sector of the Canadian economy. In terms of imports, Canada

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[11] Magun et al., "Impact of Canada-US Free Trade on the Canadian Economy, "Economic Council of Canada, No. 331, August 1987, p.4.

[12] Statistics Canada Catalogue, No. 41-226, 1989, p.721.

imported 10.8 per cent of its total iron and steel imports from the United States in 1989. As we discussed in the proceeding sections of this paper, Canada is rich in natural resources, therefore the lower percentage of Canadian iron and steel imported from the United States (versus the higher percentage of exports) is justifiable by this explanation. In 1989, importing 68 per cent of its total imports from the United States, Japan, the European Economic Community (EEC), the Organization for Economic Cooperation and Development (OECD), and the rest of the world,[13] we can conclude that the Canadian economy is based more on exports than imports. That is, the Canadian economy is based on local production of its resources, which are exported to generate revenues both nationally and locally to their respective producers.

Though Canadian and United States steel producers share a decrease in consumption since 1974, the Canadian integrated steel industry is much healthier than its United States counterpart. The products of the primary steel industry are: rods, structural shapes, rails, plates, sheets, and strips of various composition and weight.

THE UNITED STATES STEEL INDUSTRY

Nearly 40 per cent of manufacturing industries in the United States depend on the manufacture and the use of steel. About three-quarters of the workers in the industry are employed in five states: Pennsylvania, Ohio, Indiana, Illinois, and New York. The United States Steel Corporation ranks as the largest steel producing company in the world, producing about one-quarter of the United States

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[13] *Statistics Canada Catalogue*, No. 41-226, 1989, p.721.

steel. The next top companies include Armco Steel Corporation, Bethlehem Corporation, National Steel Corporation, and Republic Steel Corporation.[14]

Completed in 1969, the last plant built was Bethlehem's Burns Harbor Facility. Since then, United States integrated steel producers found it impossible to build new plants due to the slow growth in demand. Firstly, slow growth for steel producers caused a decrease in prices and lower capacity production. The 1985 forecast for United States raw steel production was 170 million tons, while 88 million tons were actually produced. In comparison to the 1985 figure, the United States raw steel production is expected to increase and is estimated at 90 million tons. Secondly, the decline in scrap steel prices and the minimum efficient scale of 250 000 to 500 000 tons, rather than the 3 million to 5 million tons required annually in an integrated steelworks, have incurred the melting of scrap in electric furnaces attractive relative to the production of steel. Therefore, small minimill steel companies are eroding the integrated companies' market share.[15]

Minimills now account for 29 million tons of capacity, a rise from 10 million tons in 1975. These minimills now dominate the market for the basic small-diameter products and are entering the medium-sized structurals and sheet steel market. Three of the largest publicly traded minimill companies are Nuvor, Florida Steel, and Northwestern Steel & Wire.[16]

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[14] Stern, R.M. et al. ed., *Perspectives on a Canada-US Free Trade Agreement*, Brookings, Washington D.C., 1987, p.236.

[15] *American Iron & Steel Institute*, Steel Industry Economics & Federal Income Tax Policy, AISI, Washington D.C., June 1975, p.4.

[16] Barnett, F. Donald & Robert W. Crandall, *Up from the Ashes: The Rise of the Steel Minimill in the US*, Brookings, Washington D.C. 1986, p.55.

Not only were United States producers battered with the decline in steel consumption, they were also battered by a rising dollar in the 1980s. This resulted in increased imports of both steel and goods fabricated from steel, thus further reducing the final demand of United States steel.

THE CANADIAN STEEL INDUSTRY

The Canadian steel industry faced the same problems as the United States industry. Nevertheless, Dofasco Inc. and Stelco Inc., the two leading Canadian integrated steel producers have outperformed their United States counterparts. Hamilton-based Dofasco Inc. is the largest steelmaker, accounting for 42 per cent of Canada's raw steel production. Toronto-based Stelco Ltd., is followed by Algoma Steel Corporation Ltd. of Sault Ste. Marie, Ontario. Smaller producers include Sydney Steel Corp. on Cape Breton Island, Ipsco Inc. of Regina and Montreal-based Ivaco. The construction and automobile industries are the largest steel users in Canada. Other products for which steel is used include railway ties, cans for the food processing industry, and pipes for the oil and gas sector.

The reason for the Canadian industry's greater success in the 1970s and the early 1980s has been the relatively weaker Canadian dollar (in comparison to its United States counterpart), lower wages, and a superior investment strategy. The comparably weaker Canadian dollar has made the United States an attractive source of export sales. This, together with United States steel prices remaining high, by world standards, permits Canadian producers to export profitably to the United States.

High labour costs have been particularly damaging to the United States integrated steel producers since the 1970s. For example, in 1986, United States steelworking employees received $22.24, while Canadians received $15.57 (i.e. United States dollars per hour). Regardless, Canadian steelworkers earned 30 per cent less than their United States counterparts throughout 1975-1986. This difference has commenced to narrow as United States producers obtain wage concessions and Canadian wages increase. The differences in wage rates between Canadian and United States producers provided Canadians with a 40 to 50 dollar cost advantage on a ton of steel in 1981-1985.[17]

The two largest Canadian producers, Dofasco Inc. and Stelco Inc., have modernized more than their United States counterparts, but neither company invested as intensively as the most aggressive United States companies. Dofasco has clearly outperformed all the integrated steel producers in the United States and in Canada. Its shares increased by 160 per cent in 1975-85, while Stelco's shares slightly declined by 1.6 per cent.[18] The result was that both companies outperformed their large United States integrated counterparts by a wide margin. Thus, we can conclude that the Canadian industry possesses a better investment strategy.

In the 1990s, the industry has faced the same troubles that have beset virtually all Canadian manufacturers. First, the recession has meant fewer orders from its customers in the automobile and construction industries. The soaring Canadian dollar has also made steel exports more expensive and less competitive in

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[17] Stern, R.M. et al. ed., *Perspectives on a Canada-US Free Trade Agreement*, Brookings, Washington D.C., 1987, p.236-7.

[18] Stern, R.M. et al. ed., *Perspectives on a Canada-US Free Trade Agreement*, Brookings, Washington D.C., 1987, p.237.

export markets and high interest rates have increased the cost of doing business. In 1990, shipments totalled 12.7 million tons, down from 14.7 million the previous year. Employment was about 34 000 in 1990, 5 000 lower from 1989. Total sales hit $8.7 billion in 1989, the most recent year in which sales compare to those of the previous year.[19]

BARRIERS TO TRADE

The structure of tariff protection is noted as being very similar in the two countries. That is, the industries that are highly protected in Canada are, for the most part, also highly protected in the United States. In both countries, tariff protection is much higher for manufactured goods than for non-manufactured goods. Within the manufacturing industry, tariffs are relatively high on labour-intensive non-durable manufactured goods and relatively low on semi-durable as well as durable manufactured products.[20]

Tariff Barriers

The tariffs impending the Canada-United States trade have been coming down as a result of multilateral negotiations with GATT. Currently, about 70 per cent of Canadian merchandise trade with the United States is free of tariffs. The tariff on the remaining 30 per cent of our bilateral trade with the United States will be eliminated by the agreement. That is, the Canada - US Free Trade Agree-

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[19] "Steel Industry woes are mounting", *The Gazette*, May 4, 1991, p.D5.

[20] Magun et al., "Impact of Canada-US Free Trade on the Canadian Economy, "*Economic Council of Canada*, No. 331, August 1987, p.18.

ment will gradually eliminate these tariffs over a period of ten years, as started on January 1st, 1989.[21]

The steel tariff elimination process will occur in 10 equal steps. That is, having started on January 1st, 1989, it will terminate on January 1st, 1998. Directly prior to the implementation of the agreement, the United States steel tariff was 11.6 per cent ad valorem versus a slightly higher Canadian steel tariff of 12.5 per cent ad valorem. The tariff on structural steel imported for Canada was approximately 6 per cent higher than on structural steel exported to the United States.[22]

Non - Tariff Barriers

Since the mid-1970s, in response to import countries' difficulties in adjusting to changes in both, comparative advantage and a troubled international economic climate, national governments have used non-tariff barriers to improve their competitive position. Due to GATT obligations which lower tariffs, protection has taken other forms which include: voluntary export restraints on supplier countries, subsidies, contingency protection, orderly marketing agreements, and discriminatory government procurement policies. We will only undertake the discussion of the first three forms of protection, as these three pertain to the sector under study.

Non-tariff barriers on Canadian exports of steel products to the United States will be removed under their respective Free Trade Agreement. The **voluntary**

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[21] Magun et al., "Open Borders," *Economic Council of Canada,* No. 344, April 1988, p.17.

[22] *The Canada - US Free Trade Agreement*, chap. 7, article 702.

export restraint non-tariff barrier on specialty steel possessing a duty of 9.5 per cent will be eliminated only on October 1st, 1991.[23] Non-tariff barriers to trade on United States exports of steel products to Canada were non-existent prior to the implementation of the Free Trade Agreement, therefore the agreement did not necessitate their elimination.

Export subsidies are recognized for providing the subsidized producer with a competitive advantage. From the perspective of the rest of the world, an export subsidy lowers the relative price of our goods and leads to increased foreign demand or increased exports. The increase in exports, that is induced by this subsidy, unambiguously raises output and employment. In general, the Canadian producers receive slightly more subsidies than their American counterparts. However, this is not the case for our iron and steel products. These products receive a Canadian subsidy of 4 per cent versus the United States subsidy of 8 per cent. Overall, the structure of subsidies is noted by Magun et al as being very similar in the two countries.[24]

Both Canada and the United States make use of **contingency mechanisms** to protect domestic producers from unfair competition from imports. Recent United States trade laws have imposed contingency protection against Canada in order to discourage cases of dumping. The United States anti-dumping protection on steel products amounts to approximately 19 per cent and is in effect since December

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[23] Magun et al., "Impact of Canada-US Free Trade on the Canadian Economy, *"Economic Council of Canada*, No. 331, August 1987., p.87.

[24] Magun et al., (1987, p.45).

1986. The Canadian trade action against the United States on anti-dumping cases in cutting and greasing steel rules carries a duty of 22.9 per cent.[25]

EFFECTS OF ELIMINATION OF TRADE BARRIERS

In evaluating the effects of bilateral free trade on the Canadian economy in a more detailed way, it is important to distinguish between the effects of removing our own trade barriers against goods from the United States and the effects of removing United States trade barriers against our goods. The elimination of tariffs will benefit both consumers and producers in the two countries by providing lower prices to consumers and lower input costs to producers. Lower costs for imported materials, together with more open and secure market access to the large United States market, would make the Canadian industry more productive and competitive both at home and abroad. The elimination of the United States tariffs would encourage further processing of materials and products, and increase the value-added in Canada, because United States tariff rates are higher on processed goods, than on primary materials.

Bilateral removal of tariff and non-tariff barriers through increased import competition would force Canadian manufacturing firms to rationalize their opera-tions, to reduce their average costs, and in turn, to become more efficient in order to compete and survive in a tariff-free North American marketplace. In general, trade theory states that a decrease in tariffs implies a reduced price on imports enjoyed by consumers in both countries. Under free trade, Canadian firms would

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[25] Magun et al., "Impact of Canada-US Free Trade on the Canadian Economy, "*Economic Council of Canada*, No. 331, August 1987, p.45.

not be producing goods unless we have a comparative advantage. Since tariffs are phased-out over a 10-year period, both the benefits and the adjustment costs of the Free Trade Agreement will occur gradually.

Elimination of Canadian Trade Barriers

Tariff reduction on Canadian imports from the United States will displace domestically produced goods in favour of imports. In general, the removal of Canadian trade barriers will reduce the price within Canada of imports from the United States market. That is, if the Canadian exporters absorb the United States tariff while the Canadian consumers pay for the Canadian tariff, there will be an increase in the terms of trade. Thus, this increase along with the reduction in export prices and the increase in import prices will lead to a deterioration of Canada's terms of trade. This in turn will decrease Canadian welfare gains.

Elimination Of United States Trade Barriers

Tariff reduction on United States imports from Canada allows Canadian penetration of the United States market. With the elimination of this tariff, Canadian exporters would no longer pay this "tax" and thus become opportune to increase their exports to the United States. Where there are economies of scale, the increased volume of Canadian output in specialized export products would reduce manufacturing costs. The increase in the United States demand for Canada's exports will enable Canadian firms to raise the price of Canadian exports to the United States market, therefore improving Canadian terms of trade. This in turn will raise Canadian real income.

IV REVIEW OF ECONOMIC LITERATURE ON THE AGREEMENT AND THEIR PRINCIPAL DIFFICULTIES

Both theoretical and empirical work examine the potential effects of a Canada - US Free Trade Agreement. The traditional theoretical framework of neoclassical trade theory is such as examined in 1967 studies by Eastman & Stykolt and Wonnacott & Wonnacott. The empirical studies examined include: Boadway & Treddenick (1978), Harris & Cox (1984;1986), and Magun et al (1988). The latter empirical study was used as a role model for this paper, since it is consistent with our paper in estimating the effects of free trade on output and employment.

Many of the studies have encountered difficulties with precise data availability, with limitations of modelling, and with estimation techniques available at the time the studies were undertaken. Not surprisingly, a wide variation in estimated gains appears. However, the disagreements are quantitative and not qualitative, as long run benefits are positive and in some studies significantly so. The largest part of the gains estimated are found in the empirical work of Harris & Cox and Wonnacott & Wonnacott. The largeness of these gains stems from the effect of including economies of scale in their models.

THEORETICAL STUDIES

Eastman & Stykolt (1967) conducted their study based on two objectives. Firstly, in studying the degree of industrial inefficiency in Canada with reference to tariff protection and secondly in explaining the varying degree of foreign ownership across manufacturing industries. In so doing, the authors develop the Eastman-Stykolt Hypothesis which states that Canadian plants are of inefficiently small size

in high tariff / high concentration industries. The results of their 16 industry sample confirms their hypothesis.

These authors were particularly concerned with the question of economies of scale in iron and steel production. Steel smelting was of efficient scale size in Canada but blast furnace and rolling mill operations were inefficiently small scale. The simulation indicates that Canadian output would expand at the pig-iron and steel smelting stage accompanied by expansion of products from the finishing mills. The result is derived by assuming constant returns to scale and no attempt was undertaken to account for technological relationships which can exist between smelting and mill production. The authors affirm that with the emergence of free trade, economies of scale would come into operation and output at the rolling and finishing level would be more encouraged than indicated.

Wonnacott And Wonnacott (1982) update the possible consequences of free trade, fifteen years after their original study. The authors note that some of the free trade gains since their first study in 1967 are as a result of the Kennedy and Tokyo Rounds. Due to these Rounds of tariff cuts, the authors quote the remaining gains from free trade are lower than originally calculated: "these gains would come from increased productivity manufacturing."

THEORETICAL STUDIES' PRINCIPAL DIFFICULTIES

Studies on the effects of the tariff structure on welfare gains, extending to economies with many sectors and with interindustry flows, cannot be considered definitive, as too many assumptions and parameters have been arbitraily used.

Therefore, these studies are inadequate analytical tools for considering the real-world effects of tariffs in a general equilibrium setting. For instance, the belief that average productivity would rise more in Canada under free trade than under tariff-freer trade does not rest on the assumption that it clearly solves all of our productivity problems. Wonnacott & Wonnacott affirm this in their quote, "There are marketing boards and other forms of regulations that will continue to keep Canadian productivity below its potential."

EMPIRICAL STUDIES

The first major empirical study on the impact of bilateral free trade rather than unilateral free trade between Canada and the United States was undertaken by **Wonnacott & Wonnacott (1967).** After having considered bilateral tariff abolition from pre-Kennedy Round levels, the authors recommend that it would be advantageous for Canada to negotiate a free trade deal with the United States. The empirical findings of their partial equilibrium model with scale economies concluded that a Bilateral Free Trade Agreement with the United States would increase the Canadian GNP by 8.2 per cent. The authors estimate that the potential benefit would be as high as 7 to 10.5 per cent of GNP, of which 4 per cent is attributed by lower manufacturing prices.

The authors studied the costs of steel pipe producers in the domestic group of iron and steel intermediate products. On the basis of observed prices, the authors conclude, that due to the output of steel pipes and tubes, these goods could not become an exportable Canadian product under free trade, although the present levels of production in the Canadian domestic market could be maintained if these

producers could reach the United States level of efficiency. The authors express some doubt that this would be possible in the Canadian context, thus are more pessimistic than indicated in their simulation results. In the simulation, relative prices in Canada are allowed to vary and the simulation indicates that this change would favour the producers in the domestic group.

Boadway & Treddenick (1978) use a calculable general equilibrium model of the Canadian economy with constant returns to scale and homogeneous products to compute the effects of the tariff structure. The model consists of 56 industries, labour factors, capital factors, and interindustry product flows. Using 1966 data, their computations adopt Cobb-Douglas production functions for primary inputs, while intermediate inputs are allowed to enter in either fixed proportions (version 1) or in variable proportions according to Cobb-Douglas technology (version 2). These results are then compared with those obtained when tariff distortions are removed.

The authors note that when world export demand elasticity is unity, the wage-rental ratio falls when tariffs are removed, indicating that the tariff structure protects labour-intensive industries relative to capital-intensive ones. When export demand elasticities are unity, the labour demand in the metal industry is in the same direction as output. That is, in the iron and steel manufacturing industry employment demonstrates increases of 1.27 per cent and changes in output of 0.93 per cent. The authors stipulate that their computations cannot be considered definitive. As indicated by the rise in output when tariffs are removed, the capital-intensive iron and steel manufacturing industry is discriminated against by

the tariff structure. The authors discovered that overall, non-traded industries tend to be protected and traded industries discriminated against by the tariff structure.

Harris & Cox (1984) have constructed a general equilibrium model of trade between Canada and the United States with scale economies, imperfect competition, and capital mobility. The model requires 20 manufacturing industries with declining average costs and nine non-manufacturing industries with constant returns to scale. Firms in the manufacturing sector are assumed to follow either collusive pricing or monopolistic pricing. Under collusive pricing, the home country tariff reductions tend to increase production. The higher the tariffs initially, the greater the scale economies realized through liberalization. In contrast, under monopolistic competition, reduction of the home tariff leads to lower firm production. Thus, in order to prevent either of these two opposite outcomes, a weighted average of the two pricing strategies is used.

Using 1976 protection levels, the model estimates the gains from bilateral free trade considering the effects of eliminating tariffs on most products (basically manufactured goods) as well as, in some cases eliminating a few non-tariff measures. The unilateral and multilateral free trade experiments for Canada and the rest of the world were conducted with the Harris 1984 model. Welfare gains of 4.13 per cent (4 per cent of the Canadian GNP) from unilateral free trade and welfare gains of 8.59 per cent (8 to 10 per cent of GNP) from multilateral free trade are obtained.

The authors ascertain that tariff reductions improve economic welfare through various ways. For instance, foreign tariff reductions allow Canada greater

penetration of foreign markets, which leads to an increase in production and lower average costs. On the other hand, Canadian tariff reductions demonstrating increases in welfare will firstly, lower tariffs permitting consumers the freedom to choose the utility-maximizing combination of imports and domestic goods; the traditional source of gains from trade. In addition, lower tariffs promote competition domestically which will further increase production and lower average costs.

The **Harris & Cox (1986)** study attempts to measure the impact on Canada of the Canada-US Bilateral and Sectoral Free Trade Arrangement. The authors define a "sectoral free trade arrangement" as a bilateral removal of trade barriers between Canada and the United States, involving five manufacturing sectors: textiles, steel, agricultural machinery, urban transportation equipment, and chemicals. The analysis is based on a quantitative general equilibrium model and most of the data is data from Harris (1984). However, export elasticities are adopted from Stern, Francis, Schumacher (1976) and import elasticities from Hazledine (1981).

The authors emphasize the importance of United States export subsidies in assessing the overall impact of sectoral free trade. Their results tend to suggest that the higher the export subsidies in the United States, the smaller the overall benefits to Canada from sectoral free trade. They reiterate that the five "target" sectors benefit more under a sectoral free trade agreement than under a bilateral free trade agreement (see Table 1). Bilateral free trade provides welfare gains of 8.9 per cent of Canadian GNP. This number is slightly larger that the 8.59 per cent reported in Harris (1984) using lower tariff estimates. The authors note that in particular, the steel "target" sector does moderately well under bilateral free trade due to high labour / capital ratios in the base equilibrium.

TABLE 1

INDUSTRY PERFORMANCE & RATIONALIZATION

SECTORAL VERSUS BILATERAL FREE TRADE

STEEL "TARGET SECTOR"

	D-output	**D-Employment**
Bilateral Free Trade	27.9 %	3.7 %
Sectoral Free Trade	33.2 %	25.8 %

Notes: Both trade liberalization experiments assume the removal of export subsidies on the appropriate trade between Canada and the US industries.

D-output refers to the relative change in industry over base.

D-employment is the relative change in industry employment over base.

SOURCE: Cox and Harris, 1986

Under sectoral free trade, output and employment in the steel sector increase 33.2 per cent and 25.8 per cent respectively. These figures are superior to those under bilateral free trade. The latter demonstrates increases of only 27.9 per cent and 3.7 per cent respectively (see Table 2). The authors request interpretation of the results with caution, especially in the view of the weakness of non-tariff barrier estimates and the elasticity values they used. They claim that, as the small country with scale economies in our manufacturing industries, Canada benefits by the diversion of United States trade from other countries towards us. The authors also stressed that their intention was to provide approximative estimates not only of the benefits of sectoral free trade to Canada, but also of the broader economic implications and the resulting sectoral reallocations. In a brief explanation of the merits and drawbacks of "sectoral free trade", they noted that an increase in the volume of two-way trade should produce benefits in the form of increased specialization and economies of scale.

The empirical study of **Magun et al** (1988) was undertaken for the Canadian Economic Council due to increased demand for a quantitative model capable of simulating the effects of bilateral trade negotiations with the United States, on the Canadian economy. In essence, focussing on its aim, the study estimates the effects of the Free Trade Agreement on output and employment. The study of Magun et al is retained as a role model for this research paper, since our own aim is also to simulate the effects of the agreement on output.

Magun et al (1988) designed two bilateral free trade scenarios in order to assess both, the transitional (1995) impacts and the longer-term (1989-1998) impacts of the Canadian - US Free Trade Agreement on the Canadian economy. The first

TABLE 2

COMPARISON OF SECTORAL AND BILATERAL FREE TRADE

	S.F.T. (WITH EXPORT SUBSIDIES)	B.F.T.
Rise in (W/P) real wages	About 5 %	About 2.7 %
Shift in L between sectors	2 %	7 %
Elimination of firms in 5 sectors in the long-run equilibrium	14.4 % ELIM	53 % ELIM
Welfare gains	NC	8.6 % - 8.9 %
5 Sectors	Surplus*	Deficit

*The authors stipulate that there is no welfare significance to this result. They quote that this refers to the situation in which the balance of payments is in equilibrium.

Notes: ELIM : Elimination
NC   : Not Calculated
SFT   : Sectoral Free Trade
BFT   : Bilateral Free Trade
W   : Wage rate
P   : Price
L   : Labour

DATA SOURCE: Cox and Harris, 1986.

scenario (simulation 1) examines the impact on the Canadian economy from the removal of trade barriers on freely trade goods. In the second scenario (simulation 2), the removal of trade barriers is supplemented by industry-specific productivity improvements in 20 Canadian manufacturing industries. Both scenarios are carried out with the CANDIDE 3.0 Model (i.e. a large scale disaggregated sectoral macro-econometric model) under the flexible exchange rate regime. By linking the aggregate results from the CANDIDE 3.0 to the Statistics Canada Input - Output Model, the authors estimated long-range effects (through the year 1998) of bilateral free trade on output and employment by industry.

In simulation 1, the estimated long-range effects on net output and employment for primary metals demonstrated increases of 5.17 per cent and 2.93 per cent respectively. On the other hand, simulation 2 indicated increases of 6.65 per cent and 2.73 per cent respectively (see Table 3). In summary, we conclude that simulation 1 demonstrates a more positive impact of bilateral free trade on employment on the primary metal industry and simulation 2 demonstrates a more positive impact on output. The aggregated effects on output and employment are different whether or not we retain the improvements in the Canadian manufacturing productivity (simulation 2).

The differences encountered with the long-range effects are due to the fact that not one simulation is consistent in demonstrating increases in both output and employment. In the case of the transitional 1995 effect on output and employment, the removal of trade barriers (simulation 1) demonstrates increases in both output and employment. For the primary metal industry in 1995, simulation 1 yields an output of 5.77 per cent, superior to the 4.43 per cent increase in simulation 2.

TABLE 3

IMPACT OF CANADA - US FTA ON OUTPUT & EMPLOYMENT IN :

(a) the year 1995

(b) the long term

	SIMULATION 1		SIMULATION 2	
	% change in output	% change in employment	% change in output	% change in employment
Solution (a)				
primary metal industry	5.77	3.9	4.43	3.2
total industries	3.3	2.6	1.6	1.4
Solution (b)				
primary metal industry	5.17	2.93	6.65	2.73
total industries	2.5	1.8	0.6	0.55

Notes: FTA: Free Trade Agreement

SOURCE: Magun et al, 1988

Likewise in 1995, simulation 1 yields an increase in employment of 3.9 per cent versus 3.2 per cent in simulation 2 (see Table 3). Thus, we can conclude that in simulation 1, the impact of bilateral free trade on output and employment in primary metal industries is positive and accounts for, close to 90 per cent of the gains in output and employment. The authors state that in general, primary metals benefit more than the other trade-positive manufacturing industries due to the removal of the United States non-tariff barriers on Canadian exports of shakes and shingles.

Magun et al demonstrate that bilateral free trade with the United States would create many more jobs in Canada than it would eliminate. The study notes a 2 to 1 ratio of total jobs created to total jobs lost. In primary metals, it would create 9 400 jobs while 4 400 jobs would be lost, for a net gain of 500 jobs in the industry over a ten year period. In all, primary metals would generate only 2 per cent of the 300 000 total jobs created within ten years. Concluding their study, Magun et al cite that, under free trade, Canadian manufacturing could benefit from three main types of scale economies: industry size economies, rationalization, and product specialization.[26]

EMPIRICAL STUDIES' PRINCIPAL DIFFICULTIES

Those who work with calculable general equilibrium models often come to different views as to how they should be used and how the results should be interpreted.

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[26] Magun et al., (1988 p.45).

The virtue of these models is that they provide a consistent integrated framework through which the interacting effects of policy changes can be traced. Their weaknesses are their reliance on critical (and untested) assumptions and their use of key parameter values for which the empirical evidence is limited.[27]

In the above quotation, Whalley indicates his opinion on the calculable general equilibrium model's use and points out the potential fragility of these numbers. He states one source of this fragility is the empirical estimates of model parameter values that are used in these exercises and that a partial substitute for "good" parameter values are confidence intervals on key policy predictions.[28]

Whalley contends that even with the neoclassical framework, the effects of terms of trade and small efficiency gains, are a direct result of a particular assumption of the model that almost everyone uses. This assumption, known as the Armington Assumption in the calculable general equilibrium literature is that, in demand, foreign and domestic goods are imperfect substitutes. In the multi-country framework, this assumption is generalized to an assumption that commodities are distinguished by location of production and by type of product.

The Armington Assumption is used primarily for convenience, as it solves two problems. The first is the observation that most trade is "two-way" trade between countries within the same commodity category. The second is that countries do not specialize to the extent predicted by the Heckscher - Ohlin or Ricardian theory, assuming that the number of factors, which are mobile between

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[27] Whalley, J. et al., *Canadian Trade Policies & the World Economy*, University of Toronto Press, Toronto, 1985, p.456.

[28] Whalley, J. et al., *Canadian Trade Policies & the World Economy*, University of Toronto Press, Toronto, 1985, p.458.

industries but not between countries, is small relative to the number of goods. The problem is that the pattern of commodity trade is not endogeneous to the model and is insensitive to the pattern of protection. Unfortunately, this excludes a great deal that is of interest in the analysis of trade liberalization. For example, it excludes any gains in world productive efficiency that can be achieved through changes in the pattern of specialization.

Various economists have commented that factors such as increased technological advances, faster diffusion of new technology, the realization of scale economies, greater product variety, and a reduction of monopoly power are factors that, once included properly, would lead to a view of trade liberalization dramatically different from the one conveyed in the static neoclassical trade model. While this assertion is common in the literature, it is backed up with few estimates of these gains. One factor not omitted in some models is scale economies. The difference between putting in economies of scale and leaving them out can be significant within a general equilibrium framework. As Harris (1984) mentions, "using the same trade elasticities but adding scale economies and imperfectly competitive pricing affected by import competition yields welfare gains on the order of four times the conventional gains".

From traditional Heckscher - Ohlin - Samuelson trade theory it is known that relative factor intensities within the general equilibrium framework play an essential role in explaining variations in: factor price, interindustry output, and the pattern of trade. In the calculable general equilibrium model, the procedure is to use factor ratios as measured in the benchmark equilibrium: constructed from data

for a particular year. The difficulty with this procedure is that the measured capital / labour ratios could be different from the "true" ratio.

General equilibrium, input-output, and **macroeconometric models** have their strengths and weaknesses. General equilibrium and input-output models alike, have a comparative advantage over the macroeconometric models in capturing the long-run allocative and distributional consequences of Canada - United States free trade. On the other hand, macroeconometric models are considered to be better suited to analyze the short -to - medium - term consequences of changes in trade policy for output, for employment, for price level, and for interest rates. Unlike the calculable general equilibrium models, macroeconometric models such as the CANDIDE 3.0 do not fully incorporate the long-term supply constraints on the Canadian economy. For example, the macroeconometric models do not assume full employment in the short -to - medium - term. Whereas, with the general equilibrium models, the unemployment rate is assumed to remain contant at the base level in the long term. As a result, most of the benefits of free trade are reflected in increased productivity and real incomes with no impact on overall employment. In contrast, in the CANDIDE 3.0 model, improvements in real income increase the level of employment and the size of the labour force. Moreover, in macroeconometric models, monetary variables play a role in the determination of final demand, in the closing of the output gap, and in the reduction of unemployment.[29]

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[29] Magun et al., "Impact of Canada - US Free Trade on the Canadian Economy", *Economic Council of Canada,* No. 331, April 1988, p.15-16.

V THE MODEL

PURPOSE AND METHODOLOGY

The purpose of our model is to estimate the Canadian steel exports and imports. In so doing, this will enable us to simulate the impact of bilateral free trade on output in the steel sector of the Canadian economy. The model consists of the following two equations:

(1) the aggregate demand of Canadian exports;

(2) the aggregate demand of Canadian imports.

Both of these equations are functions of the relative price of steel products, the relative price of substitutes, and the level of national revenue.

$$X_s = f\ (Pc_s\ /\ Pus_s\ ,\ Prw_s\ /\ Pus_s\ ,\ GNPus) \tag{1}$$

$$M_s = g\ (Pus_s\ /\ Pc_s\ ,\ Prw_s\ /\ Pc_s\ ,\ GNPc) \tag{2}$$

We define the variables used in the model as follows:

X_s : export demand for steel

$Pc_s\ /Pus_s$: relative price of steel

Prw_s/Pus_s : relative price of substitutes

$GNPus$: level of national revenue (scale variable)

M_s : import demand for steel

$Pus_s\ /Pc_s$: relative price of steel

Prw_s/Pc_s : relative price of substitutes

$GNPc$: level of national revenue (scale variable)

Expressing the equations in natural logarithmic form, in order to render the model to linear form and to emit the elasticities, we obtain the following regression form for the model:

$$\ln X_s = \alpha_1 + \alpha_2 \ln(Pc_s/Pus_s) + \alpha_3 \ln(Prw_s/Pus_s) + \alpha_4 \ln(GNPus) + u_t \quad (1)'$$

$$\ln M_s = \beta_1 + \beta_2 \ln(Pus_s/Pc_s) + \beta_3 \ln(Prw_s/Pc_s) + \beta_4 \ln(GNPc) + u_t \quad (2)'$$

Assumptions of the Model:

With the approach taken in this study, there are two types of assumptions. The first has to do with supply and demand: the quantity supplied must at least equal the quantity demanded. The assumption is that, when firms find that demand exceeds supply, prices will rise, encouraging increased production and reducing demand. When firms find that supply exceeds demand, they reduce output. The second set of assumptions is concerned with cost-price conditions. It is required that, in equilibrium, revenues must at least cover costs. If costs exceed revenues, it is assumed that the activity in question will not be undertaken.

The assumptions in this model are either compatible or similar to those found in the national models of either Harris (1984) or Magun et al (1988):

(1) the simultaneous removal of tariffs between two countries;

(2) local manufacturers can sell in both local and international markets;

(3) some types of production have additional sources of protection;

(4) under the Eastman-Stykolt Hypothesis or the "law-of-one-price"

model[30], Canadian producers establish their Canadian price by adding the Canadian tariff to the border price. Likewise, they establish their export price by subtracting the United States tariff from their border price if for some reason there is intense competition;

(5) a flexible exchange rate.

Selected Regression Models:

$$\ln X_s = \alpha_1 + \alpha_2 \ln (Pc_s / Pus_s{}^*e) + \alpha_3 \ln (GNPus) + u_t \qquad (1)"$$

$$\ln M_s = \beta_1 + \beta_2 \ln (Pus_s{}^*e / Pc_s) + \beta_3 \ln (GNPc) + u_t \qquad (2)"$$

Variables Retained for the Model:

X_s : Canadian exports of steel to the United States

M_s : Canadian imports of steel from the United States

Pc_s : Paache price index of Canadian steel

Pus_s : Paasche price index of United States steel

e : exchange rate (Canadian dollar / United States dollar)

$GNPc$: Canadian GNP in constant dollars

$GNPus$: United States GNP in constant dollars

Anticipated signs:

$$\alpha_1 < 0; \alpha_2 < 0; \alpha_3 > 0; \alpha_4 > 0$$

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[30] Hazledine, Tim, "Protection and Prices, Profits and Productivity in Thirty-three Canadian Manufacturing Industries", Discussion Paper No. 110, *Economic Council of Canada*, Ottawa, 1981, p.3.

$$\beta_1<0; \quad \beta_2<0; \quad \beta_3>0; \quad \beta_4>0$$

In the crude mineral sector, apart from potash, sulfur, gold, and perhaps aluminum, the competitive position and future world demand for many of Canada's staple minerals are weak. Technological developments increasingly allow the replacement of metals such as plastics, glass, and ceramics. Demand for metals has also declined because of down-sizing and weight-reducing measures in the automobile industry, in defence products, and in other industries, in order to reduce energy consumption and costs. Use of lead and asbestos has declined because of greater awareness of their danger to human health. Our once strong metal sector has exported throughout the world, for decades, and at the crude stage of processing has faced zero tariffs by most industrialized nations. Yet this world export business neither stimulated the industry to keep itself abreast of worldwide changes in the use of metals nor undertook research to develop new uses for these metals. Apart from aluminum, new product research by the metals industries has been almost nil. Therefore, perfect substitutes for iron and steel are difficult to determine, but likely substitutes may be found depending on the industry these primary metals are used in. This justifies the elimination, in equations (1)" and (2)" of the model, of the explained variable: relative price of substitutes. As there are no likely perfect substitutes for steel, the anticipated coefficients α_3 and β_3 will be very small, even statistically insignificant.

In the model, the export demand is an important dependent variable as it is governed by production. The import demand in turn is governed by consumption. Each equation utilizes relative prices since this ratio reflects the competition between different producers in a given country rather than the relationship of the

importing country and its own production. The justification for the GNP is that there exists a positive relationship between this measure of revenue and the dependent variable.

The Canadian economy is specialized in the production of exportables. Importables are available in the United States market in perfectly elastic supply at the American currency price "Pus". Let "e" denote the Canadian currency price of foreign exchange. Then import prices in Canadian currency are "Pus*e". The Canadian currency price of the goods we produce is "Pc". With these definitions we introduce the terms of trade or the relative price of domestic goods in terms of importables as: (Pus*e / Pc). An increase in the terms of trade implies that Canadian goods have become relatively cheaper. The terms of trade also affect the world demand of our goods. For instance, a rise in the relative price of imports will reduce imports and raise exports.[31]

The results of the model will permit us to conclude how the impact of free trade will influence output in the sector under study. Canadian exports of steel and the terms of trade (Pc_s / Pus_s*e) are negatively related, whereas Canadian exports and production are positively related. Canadian imports of steel and terms of trade (Pus_s*e / Pc_s) as well as Canadian exports and production are both positively related. Thus Canadian steel exports are expected to rise yielding an increase in production.

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[31] Dornbusch, Rudiger, *Open Economy Macroeconomics*, Basic Books, New York, 1980, p.41.

Statistical Data Selected:

(a) Sample: observations: 39

semestrial data: 1981 I -1990 III

base year: 1981

(b) Data source: Statistic Canada Cansim Database

Statistic Canada Catalogues

Bank of Canada Review

Economic Indicators

(c) Regression technique: Ordinary Least Square (OLSQ)

(d) Problems Encountered with Data:

Our sample contains 39 observations of which the statistical data selected consists of semestrial data ranging from the first semester of 1981 to the third semester of 1990. We choose to work with data in constant dollars as well as with 1981 as the base year. The reason for this is that, since most of the data collected to carry out the regressions was collected in this manner, we did not want any discrepancies and incoherences. For the data that was not collected with our mutual base year, the Statistic Canada adjustment factor, pertaining to each data category, was used to convert it to our base year.

The main source of the data was the Statistic Canada Cansim Database. The problem with this Database was that most of the series extracted from it did not terminate by including the 1990 data. It was imperative to include the most

frequent data available, so that our post – Free Trade Agreement regressions would have the most possible number of observations. In order to complete the data to the 39th observation, data was subsequently collected from the corresponding Statistic Canada Catalogues. The data for the exchange rate was collected from the Bank of Canada Review and the data for the United States GNP was collected from the Economic Indicators, printed by the Bureau of Economic Analysis in the United States.

In order to obtain all the parameters in the same currency, the data for the United States was converted to Canadian dollars using the exchange rate noted above, in the "variables retained" section of this paper. It is also important to mention that all variables in the model were transformed to real terms, except for the Paasche price indices. More precisely, the Canadian exports of steel to the United States were divided by the Paasche price index of steel exports and the United States GNP deflator was used to deflate the United States GNP into constant dollars. Once in constant dollars, the United States GNP was converted into Canadian dollars by the exchange rate. To be symmetrically consistent, the same was done for the variables in equation (2)".

Regression results

We firstly carry out a regression of the entire sample. That is, we regress equation (1)" to estimate the aggregate demand of Canadian steel exports. We then regress equation (2)" to estimate the aggregate demand of Canadian steel imports. This procedure gives us the following results:

$$\ln X_g = 45.1409 - 0.02338 \ln(Pc_g / Pus_g{}^*e) + 0.54133 \ln(GNPus)$$

(t-student) (4.556) (-0.085) (4.252)

$R^2 = 0.6119$

$\overline{R^2} = 0.5903$

$\hat{\rho} = 0.4921$

$d = 1.9552$

$F = 28.3753$

$$\ln M_g = 3170.34 + 1.3644 \ln(Pus_g{}^*e / Pc_g) + 39.6625 \ln(GNPc)$$

(t-student) (2.443) (3.464) (2.410)

$R^2 = 0.6288$

$\overline{R^2} = 0.6082$

$\hat{\rho} = 0.8113$

$d = 1.9303$

$F = 30.4890$

To illustrate the effects of the Canada - US Free Trade Agreement on the Canadian economy, two scenarios are developed. In order to assess the impact of bilateral free trade in both scenarios, the model was regressed for only the period after the signing of the deal. In the first scenario, the model is regressed without the removal of tariff barriers, whereas in the second scenario, all trade barriers on steel products traded between the two countries are removed. The removal of tariff barriers in the second scenario does not include the removal of non-tariff barriers. Since the elimination of the voluntary export restraint non-tariff barrier is effective only on October 1st, 1991, the prices affected would

correspond only to data on the last semester of 1991. Therefore, the justification for the omission of the non-tariff barrier on steel and its respective effect on relatif prices is namely that our data terminates at the third semester of 1991 and does not include the fourth semester.

Regression results (post - FTA)

In the first scenario, we now regress the model for the period after the implementation of the Free Trade Agreement (post - FTA). More specifically, our regression sample commences from the first semester of 1989, when the agreement entered into effect, and terminates at the last observation of our sample. That is, this regression contains seven observations that incorporate the year 1989 in its entirety until the third semester of 1990, inclusive. We obtain the following regression results:

$$\ln X_s = 443.197 - 0.06390 \ln(Pc_s / Pus_s * e) + 4.4263 \ln(GNPus)$$
$$(\text{t-student}) \quad (1.333) \quad (-0.0565) \quad (1.665)$$

$$R^2 = 0.7249$$
$$\overline{R}^2 = 0.5874$$
$$p = 0.0552$$
$$d = 1.7626$$
$$F = 5.2701$$

$$\ln M_s = -70.7619 + 0.02988 \ln(Pus_s{}^*e / Pc_s) + 0.8312 \ln(GNPc)$$

$$(\text{t-student}) (-2.034) \quad (3.394) \quad\quad\quad (1.899)$$

$$R^2 = 0.7950$$

$$\overline{R}^2 = 0.6583$$

$$\rho = -0.2486$$

$$d = 3.3959$$

$$F = 3.8780$$

In effect, it would prove to be interesting to determine the impact of free trade on the steel sector. That is, our interest lies in the question: "Is there a structural change at the time of the free trade agreement?" This can be determined using the Chow test which aims to test equality of sets of coefficients in two regressions. The test remains to verify if the set of coefficients are significantly different from zero. If all the coefficients are significantly different from zero, this implies that there is structural change at the time of the free trade agreement. The only problem with regressing the model in this way is that, since free trade entered into effect on January 1st, 1989, the number of observations available are too few to accurately determine whether or not there is structural change. Therefore, we attempt to simulate the effect of the Free Trade Agreement on our exports and imports by the method described in the second scenario.

Predicatory regression results (post - FTA)

In the second scenario, in order to evaluate the effects of bilateral free trade on the Canadian economy in a more detailed way, it is important to distinguish between the effects of removing our own trade barriers against goods from

the United States and the effects of removing United States trade barriers against our goods.

Repeating the prior regression, we now include the effect of the elimination of both, the Canadian and the United States steel tariff on the terms of trade. Our empirical findings are as follows:

$$\ln X_s = 458.561 - 0.05961 \ln(Pc_s / Pus_s{}^*e) + 4.61806 \ln(GNPus)$$
(t-student) (1.380) (-0.519)   (1.666)

$$R^2 = 0.7235$$

$$\overline{R^2} = 0.5852$$

$$\hat{p} = 0.0332$$

$$d = 1.7679$$

$$F = 5.2331$$

$$\ln M_s = -70.693 + 0.02992 \ln(Pus_s{}^*e / Pc_s) + 0.8314 \ln(GNPc)$$
(t-student) (-2.032) (3.393)   (1.897)

$$R^2 = 0.7949$$

$$\overline{R^2} = 0.6581$$

$$\hat{p} = -0.2488$$

$$d = 3.3957$$

$$F = 3.8751$$

EXPLANATION OF RESULTS

In this last sub-section on the model, we present an interpretation of the empirical results we obtained for our steel sector of the manufacturing industry. I first proceeded to estimate the two single-equation model's specifications separately by the Ordinary Least Square Method (OSLQ). The rough measure of the goodness of fit of the different specifications is the adjusted R^2 coefficient. The adjusted R^2 turns out to be smaller than the R^2 in all cases and is approximately around the 60 per cent level. As it turns out, this figure is a little lower than expected. This may be due to the fact that the relative price of substitutes has been eliminated from the original functional form of the model given by equation (1)' and (2)'.

When dealing with time series data, there is a problem of autocorrelation of previous errors. This problem has been corrected using the Cochrane-Orcutt iterative procedure. Our results demonstrate that we obtain superior values for the coefficient of autocorrelation when estimating, using our entire sample, imports rather than exports. The opposite is true when estimating imports for our smaller sample period. More specifically, our smaller sample incorporates only the last 7 observations, which include those at the start of the Free Trade Agreement and on. Upon review of the empirical results, we note that the Durbin - Watson statistic (d) varied from 1.7626 to 3.39598 and that the Fischer statistic (F) varied from 3.87505 to 30.4890.

Interpreting the regression results, for both equations, in their economic relevance, we remark that all coefficients possess the anticipated signs to those predicted by the model and are, in general, statistically significant at the five per

cent level. The only coefficient that is not however, is the coefficient of the terms of trade (Pc_8 / Pus_8*e) which is estimated for the dependent variable "X_8".

In international trade theory, if the price of exports rises, the terms of trade (Pc_8 / Pus_8*e) will increase and in turn, Canadian exports will decrease. This theory also stipulates that, as the price of imports rises, the terms of trade (Pus_8*e / Pc_8) will rise, thus leading to an increase of Canadian imports. We now analyze our regression results to determine whether or not, our empirical findings are consistent with international trade theory.

In our first scenario, holding the two explanatory variables constant, the aggregate demand of Canadian steel exports is estimated at approximately 443 thousand dollars, while the aggregate demand of Canadian steel imports is estimated at a decrease of 70.76 thousand dollars, ceteris paribus. In the second scenario, Canadian steel exports are simulated at over 458 thousand dollars, ceteris paribus and our imports decrease by 70.69 thousand dollars, ceteris paribus. This implies that the aggregate demand of Canadian exports will rise and the aggregate demand of Canadian imports will also slightly increase.

We now examine the exogeneous variables in both scenarios, in order to access the Free Trade Agreement's impact on the terms of trade. For steel exports, when comparing scenario 1 to scenario 2, our results demonstrate that the terms of trade (Pc_8 / Pus_8*e) have increased. The increase in the terms of trade implies that Canadian steel exports will decrease. Since the coefficient of the terms of trade is not significant at any level, the above interpretation is inconclusive. In terms of imports, when comparing scenario 1 to scenario 2, our results demonstrate

that the terms of trade (Pus_s*e / Pc_s) have increased. This increase signifies that Canadian steel imports will decrease, while Canadian steel exports will increase. The noted increase in Canadian steel exports is due to Canadian steel producers exporting at the same price but American steel producers buying at a lower price, therefore leading to an increase in American demand for Canadian steel exports because of lower trade barriers. More specifically in the steel manufacturing industry, steel exports to the United States increase due to the lower cost brought on by economies of scale found in the manufacturing industries. Theoretically, an increase in demand for Canadian exports will cause an improvement in our terms of trade.

Exports to the United States are encouraged by the elimination of tariffs under the bilateral free trade agreement, but the improvement in Canada's terms of trade dampens the increase by raising the United States dollar cost of Canadian exports. Theoretically, the rise in Canada's terms of trade leads countries in the rest of the world to buy less from Canada than was purchased before the agreement. Unfortunately, our empirical findings in steel exports for Canada's terms of trade are statistically insignificant therefore we cannot arrive at any such conclusion. The changes in imports are similar. Imports from the United States are encouraged by the rise in Canada's terms of trade which makes foreign goods cheaper.

Whether or not the change in exports should be regarded as significant depends on the size of the industry being affected. In the case of the primary metal industry output attained 18 million dollars in 1987, accounting for 40.9 per cent of total exports. The ratio of exports to total supply for the United States in

1987 was 23.5 per cent compared to 17.4 per cent for the rest of the world. In examining the commodity classification of iron and steel products we note the 1987 domestic supply to be over 8 million dollars with exports to the United States of over 1 million. In examining exports to the United States per unit of domestic supply, iron and steel products reach a level of 13.4 per cent.[32] We conclude that the iron and steel products are commodities whose export ratios expand. This expansion is due to the fall in Canada's terms of trade.

The competition generated for any given amount of imports depends on the size of the domestic industry. In order that this question may be answered, imports must also be related to domestic supply. Imports in the primary metal industry account for 18 million with the ratio to total imports of 23.9 per cent in 1987. The ratio for United States imports of primary metals is 15.6 per cent in 1987.[33] Therefore, imports are stimulated because of the liberalization of trade between Canada and the United States as well as the higher level of Canadian GNP.

Under the bilateral agreement output in the steel industry should expand. The change in the level of output can be explained in general terms by changes in the terms of trade and by the level of national income. Since steel exports will rise, we can infer that the output in this industry will also increase. This occurs because economies of scale are present in the manufacturing industry. Thus, we may conclude that the lower cost of production due to the economies of scale is the dominant feature accounting for changes in output. However, it is important to

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[32] Magun et al., "Open Borders", *Economic Council of Canada*, No. 344, April 1988, p.60.

[33] Magun et al., "Open Borders", *Economic Council of Canada*, No. 344, April 1988, p.62.

note that the anticipated effect of economies of scale will not be as substantial in our second scenario, where the number of observations are limited to seven, as it would be if the second scenario sample contained all the observations for the entire 10-year post free trade period. Nevertheless, we anticipate the changes in output to be in the same direction and the same magnitude as the changes in steel exports.

It is important to note however, that the agreement's full impact will make itself felt only gradually, since tariffs and other trade barriers are to be phased-out over a 10-year period. An important factor that would have perhaps been included in our regressions is the recession which commenced in 1990. In Canada, the recession started in the first semester of 1990 and only hit the United States in the second semester. Since the recession lasted up until the second semester of 1991, it would have proven interesting to have incorporated a dummy variable to represent this in our regressions in order to determine this variable's effect on the demand of steel. In this study, as in any other, it has not been possible to model all aspects of the Free Trade Agreement.

VIII CONCLUSION

The Canada - US Free Trade Agreement improves Canada's position as both a steel producer and steel consumer. From its perspective as a steel producer, Canada obtains protection from changes in United States trade law at a time of growing protectionism. We would like freer trade to increase this industry's revenues. This will enhance our steel supplies, increase employment and open new opportunities to advance our technological capacities and add to competition in Canadian steel markets.

As a small country (relative to the United States) with scale economies in our manufacturing industries, Canada benefits by diversion of United States trade from other countries towards us. Under free trade, Canadian manufacturing will benefit from three types of scale economies:

(1) industry size economies

(2) rationalization

(3) product specialization.

The Canada - US Free Trade Agreement represents another step in the evolution of Canadian and world trade. The agreement is an important contribution to Canada's future economic growth, regional development and overall prosperity. It is consistent with Canada's obligations to its trading partners in the GATT. It actually builds upon GATT principles and goes beyond them in such new provisions as services and international trade-related investment measures. The agreement demonstrates Canada's willingness to reduce trade barriers around the world.

Trade liberalization, a cornerstone in the Government of Canada's overall economic strategy, offers Canadians a chance to grow and prosper in a competitive and dynamic economy. By adding significantly to the potential for economic growth, incomes and employment, the agreement will enhance the ability of governments to stimulate economic development in Canada's poorer regions.

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