Revealed Preference Tests of the Stolper-Samuelson Theorem

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Abstract

This paper conducts revealed preference tests of the Stolper-Samuelson theorem. To do this, it examines representations made before the House of Commons committee

studying the Canadian-United States Free Trade Agreement. Assuming presentations coincide with the self interest of the presenters, the effects of trade liberalization on factor returns are inferred.

1.0 Introduction

Wolfgang Mayer (1974) and Michael Mussa (1974) have demonstrated that factor owners' positions on trade issues depend on the degree of mobility of factors of production between industries.[1] If there are two factors of production which are mobile, the Stolper-Samuelson theorem holds.[2] In this case, the owners of the relatively scarce factor of production are harmed as a result of trade liberalization (Wolfgang F. Stolper and Paul A. Samuelson, 1941). However, the owners of the relatively abundant factor benefit. If immobile factors of production are present, the situation is quite different. Mayer (1974) and Mussa (1974) have both demonstrated that the interests of the owners of immobile factors of production are directly tied to the industry the factors are employed in.

The implications of factor mobility are obvious. In a two factor world, if factors are mobile, the respective factor owners should form mutually opposed lobbying groups. However, if factors are immobile, lobbying should occur along sectoral lines. The next section will present revealed preference tests which have been conducted by Stephen P. Magee. Section 3 will discuss problems with generalizing the results. Using Canadian data, the fourth section will attempt to overcome the problem of the short term nature of the legislation involved in Magee's paper (see section 3). It is found this changes the

outcomes of the tests. The last section will present caveats and conclusions.

2 Magee's Revealed Preference Tests

In an important contribution, Stephen P. Magee (1980) and Stephen P. Magee, William A. Brock and Leslie Young (1989) have attempted to construct revealed preference tests of the Stolper-Samuelson theorem. To do this, they use the *Summary of Testimony for the Hearings before the Committee on Ways and Means in the U.S. House of Representatives on the Trade Reform Act of 1973,* May-June 1973. The summaries reveal the preferences of twenty-nine trade associations representing management and twenty-three unions. It is assumed that these organizations represent the interests of capital and labour respectively. The Stolper-Samuelson theorem suggests the following implications (Magee, Brock and Young, 1989, p. 104):

1. Capital and labour in a given industry will oppose each other on the issue of protection (or free trade) for that industry.
2. For the country as a whole, each factor will favour either free trade or protection but not both.
3. The position taken by capital or labour in an industry on the issue of protection will be independent of whether the industry is export–– or import–– competing.

Magee's paper finds that the Stolper-Samuelson theorem is rejected in each case. However, support for the specific factor

model was not absolute. In the second test, the hypothesis that labour was a specific factor was also rejected. Nevertheless, Magee's results do suggest that the empirical evidence is more consistent with the specific factor model.

3 Problems with this type of Approach

Some authors have either explicitly or implicitly implied that Magee's results do not conclusively show that the Stolper-Samuelson model should be rejected.[3] The primary reason deals with the short life of the legislation involved. Magee, Brock and Young (1989) point out that since 1934, U.S trade bills have been subject to renewal every three to five years. Thus, it can be argued that the special interest groups had short time frames in mind when lobbying with regard to the Trade Reform Act of 1973. Despite this, some writers have gone so far as to argue that the refutation of the first two lobbying implications is a stylized fact (examples include Neil Vousden [1990] and Ludger Schuknect [1992]). Other researchers have taken less extreme views but, nevertheless, either use or support the specific factor approach. Examples include Gene M. Grossman and Elhanan Helpman (1995), Wolfgang Mayer and Jun Li (1994), Martin Richardson (1994, 1973), James H. Cassing (1991), Robert E. Baldwin (1988, 1984), Michael O. Moore and Steven M. Suranovic (1992) Bruno S. Frey (1984) and Ronald Findlay and Stanislaw Wellisz (1982). Magee's results indicate that this is fine when the legislation involved has a short life span. However, the appropriateness of this approach remains an open question when the legislation involved has a longer life span.

Additional problems involve the assumption of two factors of production[4]. The first difficulty is that there are serious

problems with generalizing the Stolper-Samuelson theorem to the multi-factor case (see, Ethier [1984]). In addition, Deardorff (1994) has pointed out that the specific factor model can be viewed as a special case of the Heckscher-Ohlin model. In the standard specific factor model, there are three factors (labour and two types of capital). Technologies are such that only one type of capital is used in an industry. The result of aggregating up to one type of capital is a misspecification of the model. The same criticism could be applied to the aggregation of different types of labour.

Christopher Bliss (1980) has offered different objections. The main one involves the case where there is an overall deficiency of demand. He also raises the possibility that imperfectly-vertically integrated industries could lead to a distortion of the lobby formation one would expect from the Stolper-Samuelson theorem.

Additional problems could be mentioned. For example, it is possible that there could be an agency problem between the representatives of factor owners and their members. In addition, it may be the case that free trade has other effects on the return to labour not captured by the real wage rate. Moreover, it is possible that the rationality of political choice axiom could be wrong. Finally, strategic behaviour on the part of the political parties makes it unlikely that the observations are randomly generated. Political parties are

likely to only invite witnesses who support their position.

This paper will attempt to investigate the effect on the results when the legislation involved has a longer life span. However, all the other caveats remain.

4 Evidence from Canada

This section will examine evidence from witness testimony found in *Minutes of Proceedings and Evidence of the* [House of Commons] *Standing Committee on External Affairs and International Trade*, issues 32-64. During 1987, the Committee heard testimony from special interest groups, and others, on the Canada-United States Free Trade Agreement. The government party was in favour of the agreement and the two opposition parties on the committee were opposed. Both the government and the opposition had a right to choose an equal number of witnesses.

In their report, the committee lists 147 witnesses[5] (Canada, December 1987). This writer has identified ninety-eight as having identifiable economic interests[6]. These include representatives of capital, labour and agriculture. They are listed in tables A1, A2 and A3 of the appendix. These witnesses are classified as principal witnesses. In addition, a number of non-principal witnesses are listed. These include:

1. Officials of other organizations who were involved in the presentations of principal witnesses.

2. A third party that a principal witness claimed had already endorsed the principal's position.

An example of the first type of non-principal witness is the Chairman and C.E.O. of Dofasco Inc. who was one of the presenters of the Canada Steel Producers Association. It seems reasonable to assume that Dofasco held the same position as the Association. An example of the second type of non-principal witness is the Mining Association of Canada which endorsed the position of the Mining Association of British Columbia. If principal and non-principal witnesses are combined, a total of 155 witnesses had an economic interest.

Witnesses with identifiable economic interests were divided into three categories. These categories are (1) representatives of capital; (2) representatives of labour; and (3) witnesses with other economic interests. These are listed in the appendix in tables A1, A2 and A3, respectively. Most of those with other economic interests represented agriculture.

The positions of witnesses fall into three categories: in favour, against and neither. Witnesses fall into the last category for a number of reasons. Some, such as Centrale des syndicats démocratiques, represented member organizations with different positions and, thus, did not take explicit positions. Others, such as the Canadian Federation of Agriculture and its member organizations, stated what they liked about the agreement and then used the remainder of their time to ask for government

assistance to compensate for the areas they did not like. Since these organizations did not express either support or opposition to the overall agreement, they were difficult to classify. Whenever an organization stated that it was not expressing a position or did not state a clear position but nevertheless did seem to be leaning in one direction, it was classified as either supporting or opposing the agreement.

Section 4.1 will examine the evidence concerned with the implication of the Stolper-Samuelson theory that labour and capital in a given industry should oppose each other on trade issues. Section 4.2 and 4.3 will conduct formal tests of the remaining implications of the Stolper-Samuelson theorem.

4.1 Capital Versus Labour Within Industries

Magee's evidence so strongly refuted the first test of the Stolper-Samuelson theorem that statistical tests were not required. In nineteen out of twenty-one industries, capital and labour within each industry were on the same side of the trade issue.[7]

In Canada, the results are not as clear cut. For instance, most of the non-public sector union lobbying was done on regional rather than industry lines. Indeed, only a handful of industries had clear representations from both capital and labour. They are listed in table 1. These are clearly not enough to be statistically significant. Nevertheless, the data

will be examined as it suggests that the evidence against the Stolper-Samuelson theorem cannot be as obvious in the Canadian long run case as the outcome of Magee's study.

-Insert table 1 about here.

The identification of the labour representatives in the different sectors needs some explanation. The United Steelworkers of America has locals in many sectors of the Canadian economy. However, the witnesses who appeared on its behave announced that their representation would be concerned with the mining and steel sectors of the economy. Hence, it is assumed they were representing these sectors of the economy. The Canadian Auto Workers union's testimony could not be clearly linked to any sector of the economy. Therefore, only the main areas which the union is involved in are listed.

Of the sectors listed, by far the largest are motor vehicles, mining and steel. These clearly lend support to the Stolper-Samuelson theorem. All capital observations favoured the free trade agreement and all labour observations were opposed.

The situation in the fishing industry is not clear cut. Although all capital observations favoured free trade, the labour representations were divided. However, it should be noted that a significant proportion of the income of fishermen

could be classified as a return to capital. This is partially because of the capital which the owners have invested in their boats and equipment. Furthermore, cropsharing exists in the fishing industry (Charles Plourde and J. Barry Smith, 1989). Consequently, the fact that the only union to support free trade was in the fishing industry is not totally inconsistent with the Stolper-Samuelson theorem.

The cultural industry clearly seems to refute the Stolper-Samuelson theorem. However, it should be noted that the only capital representation does not appear to be a major player. Therefore, it may or may not be representative of capital as a whole in the industry.

Although these results do not show strong support for the Stolper-Samuelson theorem, they do show that at least in some major industries, the situation is as the Stolper-Samuelson theorem would imply.

4.2 Factor Unanimity on Policy Preference

First consider the set of capital witnesses who had a position either in favour or against the agreement. Let the proportions supporting the two alternatives be p_1 and p_2. Alternative 1 is that alternative which a majority of factor owners support. Alternative 2 is the converse. It is impossible to test the hypothesis that $p_1 = 1$ and $p_2 = 0$. Thus, we must arbitrarily set p_1 to some value close to one. Since the sample size is large we will follow Magee and assume that a binomial distribution is involved and use the following formula to get a normal approximation:

$$z = \frac{x - np_1}{\sqrt{np_1(1 - p_1)}}1 \qquad (1)$$

Magee had 65% of capital owners favouring protectionism. He tested the hypothesis that $p_1 = 0.9$ and $p_2 = 0.1$. In the Canadian case, 69 capital witnesses favoured free trade and 7 were opposed. Thus 90.8% favoured free trade. This paper will test the hypotheses that the true value of p_1 is 0.9, 0.95 and 0.99.

In Magee's sample, 76% of labour favoured protectionism and 24% favoured free trade. In the Canadian case 97% of labour favoured protectionism and 3% (one observation) favoured free trade.

The results are given in table 2. Unlike Magee's study,

here the hypothesis that labour is a mobile factor cannot be rejected. The situation with respect to capital is less clear. The hypothesis that $p_1 = 0.9$ is not rejected. However, the hypothesis that $p_1 = 0.95$ is just rejected at the 5% significance level and the hypothesis that $p_1 = 0.99$ is utterly rejected. Hence, the statistical evidence implies that in the long run p_1 is closer to unity than Magee's results implied. Nevertheless, the hypothesis that capital is perfectly mobile is statistically rejected.

-Insert table 2 about here

4.3 Independence of Industry Location and Policy Preference

The H.S. chapter numbers and sectoral trade balances of witnesses who had definite positions are presented in table A4 of the appendix. It will be noted that in many cases, the H.S. chapter numbers of an entire H.S. section are listed. It could be argued that in many cases, the witness is involved in only some of the chapters listed. Nevertheless, the full range has been used for two reasons:

1. A finer division would be subject to errors.
2. Many commodities in these chapters are close substitutes for each other. Thus, the trade balances of the range seems more appropriate.

The results of test 3 are presented in table 3. Following

Magee, in the case of capital, the odds ratio and standard deviation are calculated with equations 2 and 3, respectively:

$$o = \frac{p_{11}/p_{12}}{p_{21}/p_{22}} = \frac{p_{11}p_{22}}{p_{21}p_{12}} \quad (2)$$

$$s.e.(o) = \left(\frac{o}{\sqrt{n}}\right)\left[\left(\frac{1}{p_{11}} + \frac{1}{p_{12}} + \frac{1}{p_{21}} + \frac{1}{p_{22}}\right)^{\frac{1}{2}}\right] \quad (3)$$

Note that p_{11}/p_{12} is the odds of a factor favouring protectionism relative to free trade, if it is in the import-competing sector. If the factor is in the export sector, the odds are p_{21}/p_{22}. If the odds are same, then knowledge of the factor's sectoral location gives no information about the factor's most likely policy preference. In this case, the odds ratio will be equal to one. This would be consistent with the Stolper-Samuelson theorem. Factor specificity implies o > 1.

- Insert table 3 about here

These formulae are undefined in the labour case. Joseph L. Fleiss (1981, p. 64) has suggested the following formulae be used in cases such as this:

$$o' = \frac{(p_{11} + 0.5)(p_{22} + 0.5)}{(p_{12} + 0.5)(p_{21} + 0.5)} \quad (4)$$

$$s.e.(o') = o'\sqrt{\frac{1}{p_{11}+0.5} + \frac{1}{p_{12}+0.5} + \frac{1}{p_{21}+0.5} + \frac{1}{p_{22}+0.5}}\,5 \qquad (5)$$

Joseph L. Fleiss (1973, 1981) states that although the standard error is useful in gauging the precision of the estimated odds ratio, it should not be used in testing for significance or in constructing confidence intervals. Therefore, following Magee this paper will use the following chi squared variable with one degree of freedom:

$$Y = \left[\frac{(o - o^h)}{s.e.(o)/\sqrt{n}}\right]^2 \,6 \qquad (6)$$

where o^h = the hypothesized value of o

In the case of capital, the Stolper-Samuelson theorem is clearly rejected. In the case of labour, the sample size is too small to put much faith in the results. The results indicate that the hypothesis that o = 1 should be rejected. However, here o < 1, not o > 1 as suggested by the factor specific model. Therefore, these results should not be considered as a rejection of the hypothesis that labour is a mobile factor.

Magee reports to have conducted formal tests for significant differences in trade balances in industries containing free traders verses industries containing protectionists. However, it is possible that a simple comparison of means could be misleading. The pertinent variable

would be the trade balances weighted by the total size of the industry. However, since Statistics Canada's S.I.C. method of classifying industries differs from the H.S. system of classifying export and import commodities, this would be a difficult undertaking. This extension will not be undertaken here.

5 Conclusions

This essay has found fairly convincing evidence that labour is a mobile factor of production. Moreover, it has found that labour is a scarce factor of production and, therefore, is hurt by trade liberalization. This result differs from econometric studies which have found that the real wage rate for labour would increase under free trade[8].

The results for capital are not as strong. The second test finds that Magee's hypothesis that 90% of capital lobbyists support the preferred alternative cannot be rejected. Nevertheless, the hypothesis that 95% of capital owners support free trade is rejected. The third test rejects the hypothesis that the positions of capital owners are independent of the trade balances of the sectors capital is employed in. Despite these results, it would be premature to reject the hypothesis that capital is a mobile factor of production. This is because of the methodological problems discussed in section two.

In conclusion, unlike Magee's study, this paper finds strong support for the hypothesis that labour is a mobile factor of production. The evidence in the case of capital was mixed. Unlike Magee's study, in the case of the second implication of theorem, this paper finds some evidence in favour of the proposition that capital is a mobile factor of production. In the case of the third implication, this paper finds no statistical evidence of the mobility of capital. Despite this, for reasons outlined above, this paper concludes that the Stolper-Samuelson theorem should not necessarily be rejected.

Table A1: Witnesses Representing Capital

Obs.[a]	Witness	Position[b]	Principal
Principal Witnesses			
1	Atlantic Provinces Chamber of Commerce	F	
2	Board of Trade of Metropolitan Toronto	F	
3	Britex Limited	F	
4	Business Council of British Columbia	F	
5	Business Council on National Issues	F	
6	Canadian Alliance for Trade and Job Opportunities	F	
7	Canadian Bankers' Association	F	
8	Canadian Chamber of Commerce	F	
9	Canadian Chemical Producers' Association	F	
10	Canadian Exporters' Association	F	
11	Canadian Federation of Independent Business	F	
12	Canadian Independent Computer Services Association	A	
13	Canadian Life and Health Insurance Association	F	
14	Canadian Manufacturers' Association	F	
15	Canadian Meat Council	F	
16	Canadian Organization of Small Business Inc.	F	
17	Canadian Petroleum Association	F	
18	Canadian Printing Industries Association	A	
19	Canadian Steel Producers Association	F	
20	Canadian Textiles Institute	N	

Table A1: (cont.)

Obs.[a]	Witness	Position[b]	Principal

21	Council of Forest Industries of British Columbia	F
22	Dominion Textile Inc.	F
23	Electronic Manufacturers Association of British Columbia	F
24	Falconbridge Limited	F
25	Fishery Products International	F
26	Greater Summerside Chamber of Commerce	F
27	Grocery Products Manufacturers of Canada	N
28	Halifax Board of Trade	F
29	Inco Ltd., Manitoba Division	F
30	Independent Petroleum Association of Canada	F
31	Independent Shake and Shingle Producers Association of British Columbia	F
32	International Minerals & Chemicals Corporation (Canada) Ltd.	F
33	IPSCO Inc.	F
34	J.M.L. Shirt Co. Ltd.	F
35	Key Lake Mining Corporation	F
36	Manitoba Trucking Association	A
37	Manufacturers Life Insurance Company	F
38	Mining Association of British Columbia	F
39	Mining Association of Manitoba	F
40	Motor Vehicles Manufacturers' Association	F
41	National Sea Products Limited	F
42	New Brunswick Fish Packers' Association	F

Table A1: (cont.)

Obs.[a]	Witness	Position[b]	Principal
43	North Canadian Oils Limited	F	

44	Northwest Territories Chamber of Mines	F	
45	Prince Edward Island Seafood Processors Association	F	
46	Regroupement Pour le Libre-échange	F	
47	Repap Enterprises Corporation Inc.	F	
48	Saskatchewan Manufacturers	F	
49	Small Explorers and Producers Association of Canada	N	
50	Texturon Inc.	A	
51	Tourism Industry Association of the Northwest Territories	F	
52	Universal Exploration Ltd.	A	
53	Vancouver Board of Trade	F	
54	Video Atlantic Inc.	A	
55	Weyerhaeuser Canada Ltd.	F	
56	Winnipeg Chamber of Commerce	F	
57	Yellowknife and Northwest Territories Chambers of Commerce	F	
Non-Principal Witnesses			
58	B.C. and Yukon Chamber of Mines	F	38
59	Celenese Canada Inc.	F	9
60	Coho Resources Limited	N	49
61	Cominco Metals	F	38
62	Crown Life Insurance Company	F	13
63	Dofasco Inc.	F	19
64	DuPont Canada Inc.	F	9
65	Ford Motor Company Limited	F	40

Table A1: (cont.)

Obs.[a]	Witness	Position[b]	Principal
66	H.L. Blachford Ltd.	F	9
67	Hunter's Manufacturing	F	48
68	Intercontinental Packers	F	48
69	Landucci Lumber Ltd.	F	21

70	Lunenberg Printing	A	18
71	Merrill-Lynch Canada Inc.	F	46
72	Mining Association of Canada	F	38
73	Noranda Inc.	F	5
74	Northwest Territories Chamber of Commerce	F	57
75	Polysar Ltd.	F	9
76	Prairie Implement Manufacturers Association	F	48
77	R.E. McLennon & Associates Ltd.	N	49
78	Scotia Investments	N	27
79	Scott Paper Limited	F	21
80	Seafood Producers Association of Nova Scotia	F	41
81	Weldwood Canada Limited	F	21
82	Yellowknife Chamber of Commerce	F	57
83	Yukon Chamber of Mines	F	38

[a]The Yellowknife and Northwest Territories Chambers of Commerce is listed under principal witnesses. Each member is also listed under non-principal witnesses. Thus, to avoid double counting, one should be subtracted from the total number of observations.

[b]Positions in favour of the free-trade agreement are represented by an "F". Those against are represented by an "A". Those without a clear position are represented by an "N".

Table A2: Witnesses Representing Labour

Obs.[a]	Witness	Position[b]	Principal
Principal Witnesses			
1	ACTRA (Alliance of Canadian Cinema, Television and Radio Artists)	A	
2	Alberta Federation of Labour	A	
3	Atlantic Federations of Labour	A	
4	British Columbia Federation of Labour	A	
5	Canadian Auto Workers Union	A	
6	Canadian Labour Congress	A	
7	Canadian Union of Public Employees	A	
8	Centrale des Syndicats démocratiques	N	
9	Coalition Against "Free" Trade and Victoria Coalition on Free Trade	A	
10	Coalition Québécoise d'opposition au Libre-échange[c]	A	
11	Coalition Régionale de Montréal d'opposition au Libre-échange	A	
12	Fishermen, Food & Allied Workers	A	
13	Manitoba Coalition Against Free Trade[c]	A	
14	Manitoba Federation of Labour	A	
15	Northwest Territories Federation of Labour	A	
16	Ontario Federation of Labour	A	
17	Prince Edward Island Fishermen's Association Ltd.	N	
18	United Steelworkers of America	A	

Table A2: (cont.)

Obs.[a]	Witness	Position[b]	Principal
Non-Principal Witness			
19	ACTRA Performers Guide	A	1
20	Alliance des Professeurs du Montréal	A	11
21	Centrole de l'Enseignement du Québec	A	10
22	Confederation of Canadian Unions	A	9
23	Conseil Central d'Montréal	A	11
24	Conseil des Travailleurs(euses) du Montréal-Métro	A	11
25	Conseil des Syndicats Nationaux	A	10
26	Eastern Fisherman's Federation	F	41 (table A1)
27	Féderation des Travailleuse et Travailleurs du Québec	A	10
28	IWA Woodworkers	A	4
29	Manitoba Coalition Against Free Trade (Labour Coordinator)	A	13
30	New Brunswick Federation of Labour	A	3
31	Newfoundland and Labrador Federation of Labour	A	3
32	Nova Scotia Federation of Labour	A	3
33	Prince Edward Island Federation of Labour	A	3
34	Small Business and Professional Association (of Coalition Against "Free" Trade and Victoria Coalition on Free Trade)[d]	A	9
35	Vancouver and District Labour Council	A	9

Table A2: (cont.)

Obs.[a]	Witness	Position[b]	Principal
36	Winnipeg Film Group	A	13

[a]The Atlantic Federation of Labour is listed under principal witnesses. Each member is also listed under non-principal witnesses. Thus, to avoid double counting, one should be subtracted from the total number of observations.
[b]Positions in favour of the free-trade agreement are represented by an "F". Those against are represented by an "A". Those without a clear position are represented by an "N".
[c]These entries appear in both this table and table A3.
[d]Here it is assumed that the primary investment of the small businessmen is their labour.

Table A3: Witnesses With Other Economic Interests

Obs.	Witness[a]	Position[b]	Principal
Principal Witnesses			
1	Association of British Columbia Grape Growers	A	
2	British Columbia Fruit Growers' Association	A	
3	British Columbia Vegetable Marketing Commission	A	
4	Canadian Cattlemen's Association	F	
5	Canadian Federation of Agriculture	N	
6	Canadian Pork Council	F	
7	Coalition Québécoise d'opposition au Libre-échange[c]	A	
8	Coalition Régionale de Montréal d'opposition au Libre-échange	A	
9	Consumers Association of Canada (Northwest Territories Branch)	F	
10	Co-op Atlantic	A	
11	Fédération nationale des Associations de consommateurs du Québec	F	
12	Flax Growers of Western Canada	F	
13	Manitoba Coalition Against Free Trade[c]	A	
14	National Farmers Union[d] (4)	A	18,11
15	New Brunswick Federation of Agriculture	A	
16	Prince Edward Island Egg Commodity Marketing Board	A	
17	Prince Edward Island Potato Marketing Board	F	
18	Saskatchewan Canola Growers Association	F	
19	Saskatchewan Pork Producers Marketing Board	F	
20	Saskatchewan Pro-Canada Network	A	
21	United Grain Growers Limited	F	

Table A3: (cont.)

Obs.	Witness[a]	Position[b]	Principal
22	Western Barley Growers Association	F	

23	Western Canadian Wheat Growers Association	F	
Non-Principal Witnesses			
24	Association coopérative d'économie familiale de Québec	F	11
25	British Columbia Grape Marketing Board	A	1
26	Canadian Chicken Marketing Agency	N	5
27	Canadian Egg Producers Council	N	5
28	Canadian Horticulture Council	N	5
29	Canadian Turkey Marketing Agency	N	5
30	Dairy Farmers of Canada	N	5
31	Family Farm Federation	A	20
32	Keystone Agriculture Producers	N	5
33	Prairie Pools Inc.	N	5
34	Saskatchewan Seed Growers	F	12
35	Student's Union, University of Regina	A	20
36	Union des Producteurs Agricoles (2)	A	7,8

[a]Witnesses who appeared before the committee on multiple occasions have the number of appearances in brackets, following their name.
[b]Positions in favour of the free-trade agreement are represented by an "F". Those against are represented by an "A". Those without a clear position are represented by an "N".
[c]These entries appear in both this table and table A2.
[d]The National Farm Union was a principal witness on two occasions and a non-principal witness on two occasions.

Table A4:Labour and Capital Witnesses and Their Trade Balances

Witness	H.S.[a] Chapters	Pos.[b]	Bal.
Principal Capital Witnesses			
Britex Limited	50-63	F	-
Canadian Chemical Producers' Association	28-38	F	-
Canadian Manufacturers' Association		F	+
Canadian Meat Council	2,16	F	+
Canadian Petroleum Association	27	F	+
Canadian Printing Industries Association	49	A	-
Canadian Steel Producers Association	72-73	F	+
Council of Forest Industries of British Columbia	44-48	F	+
Dominion Textile Inc.	50-63	F	-
Electronic Manufacturers Association of British Columbia	85	F	-
Falconbridge Limited	74-83	F	+
Fishery Products International	3,16	F	+
Inco Ltd., Manitoba Division	74-83	F	+
Independent Petroleum Association of Canada	27	F	+
Independent Shake and Shingle Producers Association of British Columbia	44-48	F	+
International Minerals & Chemicals Corporation (Canada) Ltd.	74-83	F	+
IPSCO Inc.	72-73	F	+
J.M.L. Shirt Co. Ltd.	50-63	F	-

Table A4: (cont.)

Witness	H.S.[a] Chapters	Pos.[b]	Bal.
Key Lake Mining Corporation	74-83	F	+
Mining Association of British Columbia	74-83	F	+
Mining Association of Manitoba	74-83	F	+
Motor Vehicles Manufacturers' Association	87	F	+
National Sea Products Limited	3,16	F	+
New Brunswick Fish Packers' Association	3,16	F	+
North Canadian Oils Limited	27	F	+
Northwest Territories Chamber of Mines	74-83	F	+
Prince Edward Island Sea Food Producers Association	3,16	F	+
Repap Enterprises Corporation Inc.	44-48	F	+
Saskatchewan Manufacturers		F	+
Texturon Inc.	50-63	A	-
Universal Exploration Limited	27	A	+
Weyerhaeuser Canada Ltd.	44-48	F	+
Non-Principal Capital Witnesses	74-83	F	+
B.C. and Yukon Chamber of Mines			
Celenese Canada Inc.	28-38	F	-
Cominco Metals	74-83	F	+
Dofasco Inc.	72-73	F	+
Ford Motor Company Limited	87	F	+
H.L. Blachford Ltd.	28-38	F	-
Hunter's Manufacturing		F	+
Intercontinental Packers	2,16	F	+
Landucci Lumber Ltd.	44-48	F	+

Table A4: (cont.)

Witness	H.S.[a] Chapters	Pos.[b]	Bal.
Lunenberg Printing	49	A	-
Mining Association of Canada	74-83	F	+
Noranda Inc.	74-83	F	+
Polysar Ltd.	28-38	F	-
Prairie Implement Manufacturers Association		F	+
Scott Paper Ltd.	44-48	F	+
Seafood Producers Association of Nova Scotia	3,16	F	+
Weldwood Canada Limited	44-48	F	+
Yukon Chamber of Mines	74-83	F	+
Labour Witnesses			
Canadian Auto Workers Union	3,16,87	A	+
Eastern Fisherman's Union	3,	F	+
Fisherman, Food & Allied Workers	3,16	A	+
United Steelworkers of America	72-74	A	+

[a]The H.S. chapter numbers for manufacturing are not listed. Instead this data is taken from the 1988 *Statistical Abstract of the United States.*
[b]Positions: F = in favour; A = against.

Notes

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Table 1: Industries represented by both Capital and Labour

SIC	Industry	Capital Representative	Position[a]		Labour Representative
			Capital	Labour	
4	Mines	Falconbridge Limited	F	A	United Steelworkers of America
		Inco Ltd., Manitoba Division			
		International Minerals & Chemicals Corporation (Canada) Ltd.			
		Key Lake Mining Corporation			
		Mining Association of British Columbia			
		Mining Association of Manitoba			
		Northwest Territories Chamber of Mines			
		B.C. and Yukon Chamber of Mines			
		Comico Metals			
		Mining Association of Canada			
		Noranda Inc.			

SIC	Industry	Capital Representative	Position[a]		Labour Representative
			Capital	Labour	
		Yukon Chamber of Mines			
323	Motor Vehicles Manufact-urers	Motor Vehicles Manufacturers' Association	F	A	Canadian Auto Workers Union
291	Iron and Steel Mills	Canadian Steel Producers Association	F	A	United Steelworkers of America
		Dofasco			
3	Fishing[d]	Fishery Products International	F	M	Fishermen, Food & Allied Workers (A)
		National Sea Products Limited			Eastern Fisherman's Federation (F)
		New Brunswick Fish Packers' Association			Canadian Auto Workers Union (A)
		Prince Edward Island Seafood Processors Assoication			
		Seafood Producers Association of Nova Scotia			
10: 04	Amusement & Recreation	Video Atlantic Inc.	A	A	ACTRA

[a]F = in favour; A = against; M = Mixed.

Table 2: Test 2 of the Stolper-Samuelson Theorem (Canadian Data)

	Number of Observations (1)	Proportion of Cases (2)	Value of z in a Normal Approximation of the Binominal (the hyothesis is rejected at this level of significance) Hypothesis Tested		
			$P_1=0.9$	$P_1=0.95$	$P_1=0.99$
Capital's Position:					
Free Trade	69	$p_1=0.91$	0.229416	-1.68421	-7.19383
Protectionism	7	$p_2=0.09$	(0.4093)	(0.0461)	($\approx$0.0)
Labour's Position:					
Free Trade	1	$p_2=0.03$	1.334595	0.51917	-1.1722
Protectionism	32	$p_1=0.97$	(0.0910)	(0.3018)	(0.1206)

Table 3a: Results of Test 3 for Capital (n = 50)

Position of Capital

Sector of Industry	1.Protectionist	2.Free Trade	Odds Ratio (stand,error)	χ^2 (sig. level)
1.Import-Competing	$n_{11} = 3$ ($p_{11} = 0.06$)	$n_{12} = 8$ ($p_{12} = 0.16$)	14.25	9.12
2.Export	$n_{21} = 1$ ($p_{21} = 0.02$)	$n_{22} = 38$ ($p_{22} = 0.76$)	(17.36)	($\approx$0)

Position of Labour

Sector of Industry	1.Protectionist	2.Free Trade	Odds Ratio (stand,error)	χ^2 (sig. level)
1.Import-Competing	$n_{11} = 0$	$n_{12} = 0$	0.43	4.81
2.Export	$n_{21} = 3$	$n_{22} = 1$	(4.95)	(0.0164)

*.The author would like to thank Sam Bucovetsky, Ruvin Gekker, Eli Katz, J. Barry Smith and an anonymous referee for their helpful comments. Any errors remaining are those of the author.

1. Their models assume that labour is mobile between industries in both the short and long run but capital is not perfectly mobile in the short run. Therefore, their papers are basically applications of Ronald W. Jones's (1971) essay. Consequently, their models differ from Stephen P. Magee (1980) who finds that the hypothesis that labour is a mobile factor is rejected. Other authors who have examined the effects of differing degrees of factor mobility from a traditional trade theory approach (as opposed to an endogenous policy approach) include F.R. Casas (1984), Gene M. Grossman (1983), Michael Mussa (1982), J. Peter Neary (1982, 1978a, 1978b), Stephen P. Magee (1976), Ronald W. Jones (1975) and Gottfried Haberler (1950).

2. There are other factors which can alter this conclusion (for example, imperfect competition). For a general discussion of these other issues see Jagdish Bhagwati (1995).

3. Examples of such writers include Magee (Forthcoming), Magee, Brock and Young (1989), and Michael C. Munger (1991).

4. An anonymous referee made the author aware of these problems.

5. It should be noted that there are errors in the listing. Thus, the figure of 147 should be treated as an approximation.

6. Witnesses without identifiable economic interests included expert witnesses, churches, groups such as the Coalition of Citizens Against Pornography, provincial governments and general

umbrella groups such as Citizens Concerned About Free Trade. Although these groups may have represented parties with economic interests it is not clear what these interests were. Thus, these groups were excluded from the sample.

7. Somewhat surprisingly, even the two exceptions do not seem to fall in line with the Stolper-Samuelson theorem. In the tobacco industry, labour supported free trade and capital was opposed. However, in the petroleum industry, the positions of capital and labour were the reverse.

8. David J. Cox (1994) has found that the real wage rate would increase by 5.629 percent and the Economic Council of Canada (1988) estimated that the real wage rate would increase by between 1 and 3 percent depending on the simulation used. For general discussions of some of the problems involved in estimating the effects of trade on wages see Richard B. Freeman (1995), J. David Richardson (1995), Adrian Wood (1995) and Jagdish Bhagwati (1995).