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Why Is Interprovincial Trade Down and International Trade Up?

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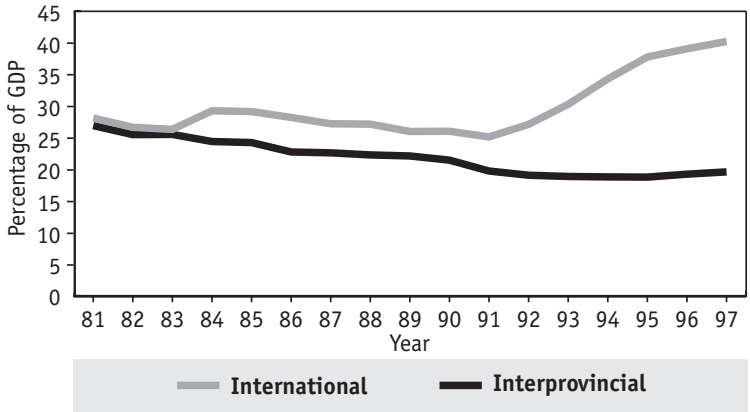
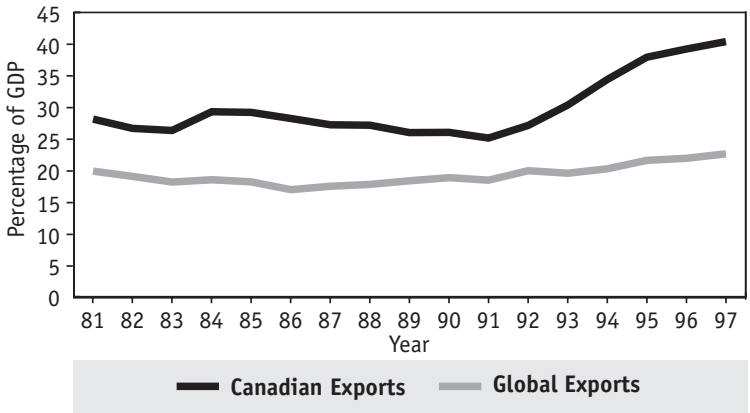
Chart 1 Growing Gap Between Interprovincial and International Exports



Note: Interprovincial and International Exports are in current dollars and include both goods and services. GDP is in current dollars.

Chart 2 Canadian Exports Outpacing Global Exports



Note: Global Exports and GDP are taken from the IMF, World Economic Outlook database, December 1997.

One of the most striking economic trends over the past two decades has been the widening gap between interprovincial and international trade (Chart 1). Between 1981 and 1989, interprovincial exports in nominal terms failed to keep pace with GDP, dropping steadily from 27 per cent of GDP to 22.2 per cent. At the same time, international exports declined, but more gradually, slipping from 28.2 per cent of GDP to 26.1 per cent. After 1989, the first year of the Canada-U.S. Free Trade Agreement (FTA), however, the trend intensified. Between 1989 and 1997, interprovincial exports slid further to 19.7 per cent, whereas international exports soared to 40.2 per cent.

The extraordinary growth of Canadian international exports stands out internationally (Chart 2). North America is the only major region to record such spectacular export growth in the 1990s. The question is "why?" Some fear the Canadian internal market is disintegrating amid federal-provincial bickering and under pressure from the forces of globalization. They point to trade and investment disputes among provinces and their failure to support a strong set of internal trade rules in the Agreement on Internal Trade (AIT).[1]

Another possible explanation is that the FTA and the North American Free Trade Agreement (NAFTA) have increased North American integration. This is supported by the spectacular growth of Canadian exports to the U.S., which rose gradually from 17.5 per cent of GDP in 1981 to 19.1 per cent of GDP in 1988 before taking off to 31.3 per cent of GDP in 1997 (Chart 3). Over the same period, Canadian merchandise exports to the rest of the world remained largely flat.

To shed some light on this conundrum, we have estimated econometric equations for interprovincial and international exports using the provincial economic accounts data from 1981 to 1997, supplemented with data on Canadian exports to the U.S.[2] We use the preferred equations to quantify the impact of the various factors we believe may have caused interprovincial exports to lag while international exports have leapt ahead. We also use the more disaggregated data on interprovincial and international exports by industry provided by Statistics Canada's input-output division to reveal industry trends buried in the aggregate data.[3]

The Approach

The specifications for the equations explaining interprovincial and international exports, which are presented in the appendix, are straightforward and reflect the standard factors thought to determine export demand.[4] Real interprovincial exports is specified as a log-linear function of real GDP, relative costs of production in Canada and the U.S., the average Canadian tariff rate, and a dummy variable for the AIT (set at 0.5 in 1995, and 1.0 in 1996 and 1997). Real international exports are specified as a log-linear function of U.S. real imports, relative production costs, and the average U.S. tariff rate on Canadian imports.

To determine the effect of the various factors on interprovincial and international exports, the preferred equations for interprovincial and international exports are solved for 1997, first using the actual 1997 values of the explanatory variables and then using the 1981 values. The differences between the solutions using the 1997 and 1981 values of the explanatory variables provide estimates of their impacts.

What Caused the Divergence

We have identified three factors that account for the weak growth in interprovincial exports over the period: the reduction in the Canadian tariff, the slower growth of GDP; and the slow growth in the price deflator for interprovincial exports relative to the GDP price deflator. If the Canadian tariff had not been reduced as a result of multilateral negotiations and the FTA/NAFTA

Chart 3 Canadian Exports to the United States Outstripping Exports to the Rest of the World

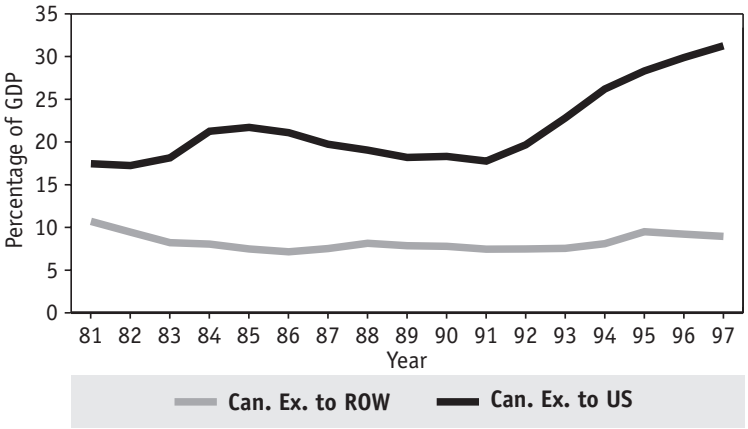
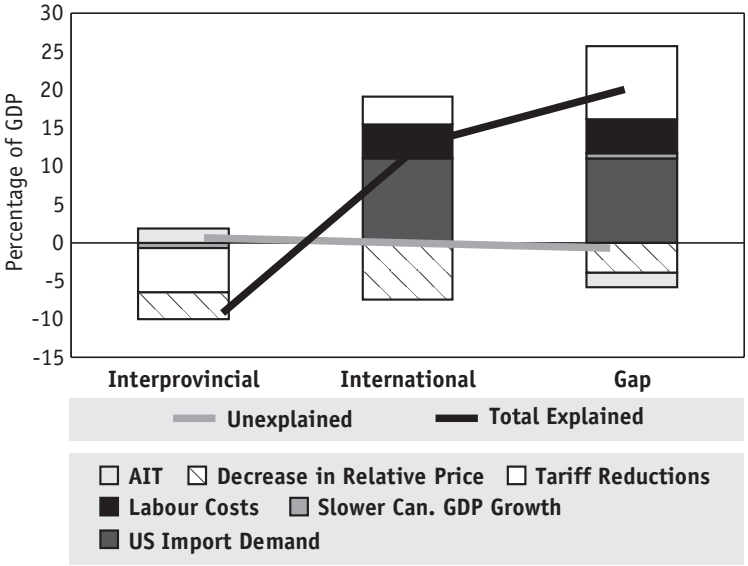


Chart 4 Factors Explaining the Change from 1984 to 1997 in Interprovincial and International Export Shares



from an average effective rate of 3.75 per cent in 1981 to 0.82 per cent in 1997, interprovincial exports would have faced less foreign competition and would have been appreciably higher. If real GDP in Canada had grown as rapidly as real GDP in the U.S., instead of the actual 4.4 per cent less in 1981-97 (with most of the slower growth coming after 1989), interprovincial export demand, which is driven by income, would have increased more.

The case of the price deflator for interprovincial trade relative to the GDP price deflator deserves special mention. If the price deflator for

Table 1 Factors Explaining the Change From 1981 to 1997 in Interprovincial and International Export Shares
(Per cent of GDP)

	Interprovincial	International	Gap
Level 1981	27.0	28.2	1.2
Level 1997	19.7	40.2	20.5
Change from 1981 to 1997	-7.3	12.1	19.4
Change due to:			
U.S. import demand		11.0	11.0
Slower Canadian GDP Growth	-0.7		0.7
Labour costs		4.4	4.4
Tariff reductions	-5.8	3.7	9.5
Decrease in relative price	-3.4	-7.4	-4.0
Agreement on Internal Trade	1.8		-1.8
Total explained	-8.1	11.7	19.8
Change remaining unexplained	0.8	0.4	-0.4

Note: Figures may not add exactly due to independent rounding.

interprovincial exports had kept pace with the GDP deflator, current dollar interprovincial exports would have increased more rapidly. This is because the value of interprovincial exports is the product of the price deflator and the volume of interprovincial exports determined by the equation. The fact the price deflator for interprovincial exports only increased by 44.6 per cent in 1981-97 whereas the GDP deflator increased 63.4 per cent should not be surprising. Goods, particularly manufactured goods, have a much greater weight in interprovincial exports than in GDP and services a much smaller weight, and the prices of goods have risen much less rapidly than services. The relatively slow growth of interprovincial exports is partly because of the slow growth of manufactured goods production and the rapid growth of the service sector. (This same factor, of course, all other things being equal, also tends to depress the growth of international exports.)

These three factors that tended to depress the growth of interprovincial exports between 1981 and 1997 are quantified in Table 1 and Chart 4. If Canada's real GDP had grown as fast as that of the U.S., interprovincial exports would have been 0.7 percentage points higher by 1997. If tariffs had not been reduced, the share of interprovincial exports in GDP would have been another 5.8 percentage points higher. (Note this may reflect more than just the pure tariff reductions and could also incorporate any accompanying improvements in market access.) Finally, if the price deflator for interprovincial exports had increased as much as the GDP deflator, interprovincial exports would have been 3.4 percentage points greater. These three factors together account for a 9.9-percentage-point decline in the share of interprovincial exports in GDP which is greater than the 7.3-percentage-point decline that actually occurred. Hence, in the absence of these three factors, the share of interprovincial exports in GDP would have actually increased. On the other hand, without the AIT, the share of interprovincial exports in GDP would have decreased by an additional 1.8 percentage points. This reduces the explained portion of the decline in interprovincial exports to 8.1 percentage points, pretty much in line with the actual decrease of 7.3 percentage points.

Of the factors that have influenced the growth of international exports, three have encouraged more rapid growth and one has dampened it. The three that have contributed to growth are: the strong growth of U.S. import demand relative to GDP growth; decreases in Canadian labor cost per employee relative to the U.S.; and reductions in the average effective US tariff rate on imports from Canada. In 1981-97, real imports surged by 236.4 per cent, more than four times the 52.1 per cent increase registered by real GDP in the U.S. Imports from Canada, as fast as they grew, were only able to retain their share of total U.S. imports, at 20 to 21 per cent. The ratio of U.S. labor costs to Canadian, which was largely driven by fluctuations in the exchange rate, had some ups and downs but ended the period at

1.57, up from 1.27 at the beginning. The average effective U.S. tariff rate fell from 0.97 per cent in 1981 to 0.15 per cent in 1997, with all the reduction coming after 1989 when the FTA came into effect. While the reduction is not large in percentage terms, the coefficient of the tariff rate in the equation might be capturing some additional improvement in market access resulting from the FTA/NAFTA.

The one factor that has decreased growth is the slow growth in the price deflator for international exports relative to the GDP price deflator. (Remember, the price deflator must be multiplied by the volume of international exports determined by the equation to yield the value of international exports.) The growth of the deflator for international exports was even slower because of the relatively heavy weight of depressed commodity prices in that deflator. The price deflator for international exports only increased 22.7 per cent in 1981-96, compared with 63.4 per cent for the GDP deflator.

The four factors impacting on the growth of international exports are quatified in Table 1 and Chart 4. If U.S. import demand had increased at the same rate as U.S. GDP, Canadian international exports would have been 11 percentage points lower. If Canadian labor costs in a common currency had not risen more slowly than those in the U.S. (this was largely because of the depreciation of the C$), international exports would have been 4.4 percentage points lower. If the FTA had not been implemented and the U.S. tariff on Canadian goods had remained unchanged, international exports would have been 3.7 percentage points lower. These three factors taken together explain about 19.1 percentage points of the increase in the share of international exports in GDP. On the other hand, if the prices of international exports had increased as rapidly as the GDP deflator, the share of international exports would have risen by an additional 7.4 percentage points. Thus, on balance, taking this offset into account, the four factors identified explain 11.7 percentage points, or almost all the 12.1-percentage-point increase in the share of international exports in GDP.

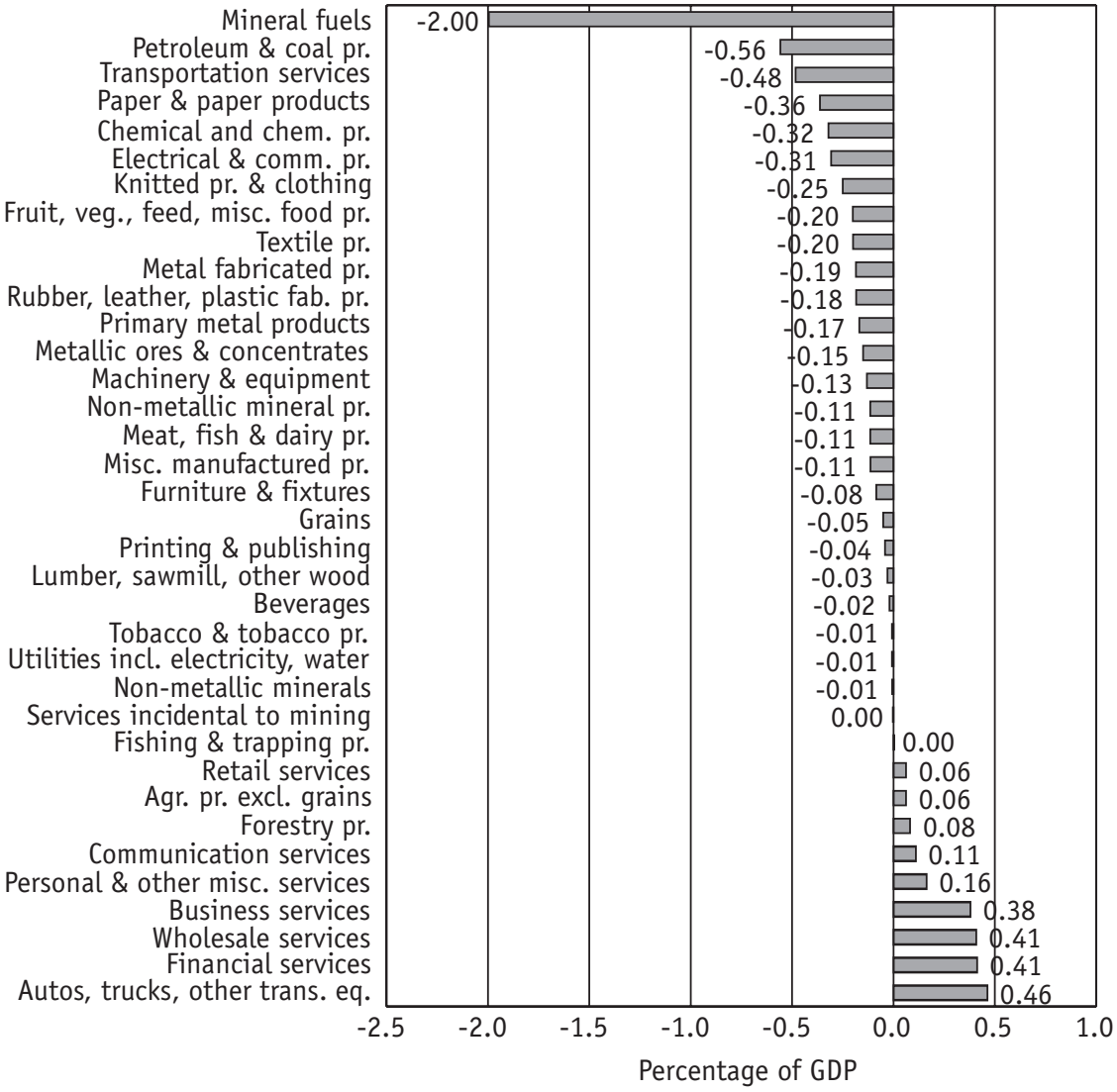
The gap between the share of international exports in GDP and the share of interprovincial exports widened from 1.2 per cent of GDP in 1981 to 20.5 per cent in 1997 (Table 1). Of this 19.4-percentage-point widening, 19.8 percentage points can be explained. The interesting conclusion for policy is that 9.5 percentage points or nearly half can be attributed to reductions in tariff rates in Canada and the U.S. largely as a result of the FTA/NAFTA.

A fuller understanding of the forces behind Canadian international and interprovincial exports can be gained by examining the more disaggregated data on interprovincial and international exports by industry provided by StatCan's input-output division (Statistics Canada, 1998). These data, which are only available in nominal terms and only up to 1996, are useful in revealing the important industry trends buried in the aggregate data.

For interprovincial exports, the only industry that experienced a large drop in its nominal share of GDP was mineral fuels (Chart 5). Its interprovincial exports fell from $13,263 million in 1984 (2.98 per cent of GDP) to $7,836 million (0.98 per cent) in 1996. This two-percentage-point drop was the result of two factors: the slump in mineral fuel prices; and policy developments in the energy sector, most notably the introduction, then cancellation of the National Energy Program, which influenced the relative attractiveness of international and interprovincial markets for oil and natural gas. In the early 1980s, most mineral fuel exports went to markets in the rest of Canada, whereas by 1996, mineral fuel exports to international markets were almost two times the level of interprovincial exports.

Looking at international exports by industry, the increases were broadly based and only one industry stands out (Chart 6). The share of exports of autos, trucks and other transportation equipment in relation to GDP jumped by 1.79 percentage points. This reflects the expanded trade in semi-finished autos and parts as the North American auto sector became more integrated and tougher rules of origin for producers claiming Auto Pact status were introduced under the FTA and tightened under NAFTA. Other industries with increases in export shares of more than 0.5 of a percentage point were: machinery and equipment; electrical and communications products; lumber sawmill and other wood products; chemical and chemicals products; personal and other miscellaneous services; and business services. Those increases are not sufficiently large to distort aggregate trends.

Chart 5 Change in Interprovincial Exports from 1984-1996 as a Percentage of GDP



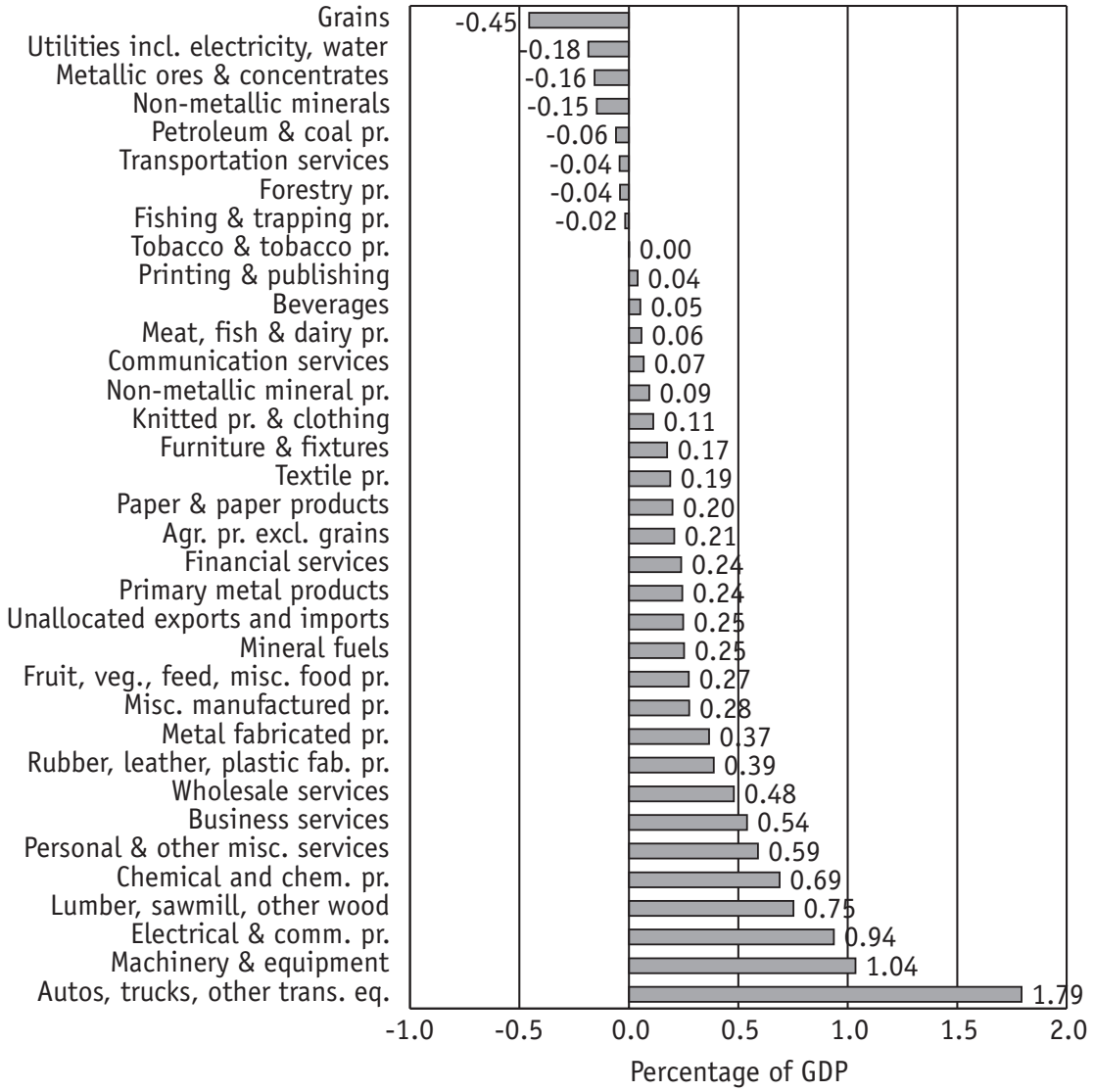
Conclusions

The drop in the share of interprovincial exports in GDP can be fully explained by several factors: the reductions in Canadian tariffs that have opened up the domestic market to foreign competition; the slower growth of that market compared with the U.S.; and relatively low increases in the prices of goods traded interprovincially. Those concerned about the weakening of the Canadian internal market should take some comfort that, except for the relatively small increases in the prices of interprovincial exports, these factors should have run their course and are unlikely to cause any further declines in the share of interprovincial exports in GDP. Even more encouraging, there is some evidence the AIT has helped to increase interprovincial exports.

The jump in international exports can be fully explained by improved Canadian labor costs relative to the U.S., reductions in tariffs paid on U.S. imports from Canada almost entirely as a result of the FTA/NAFTA, and, most importantly, the U.S.'s prodigious growing appetite for imports, some of which may be unsustainable given the recent magnitude of the U.S. current account deficit. The increase in Canada's international exports, remarkable as it was, would have been even larger if it had not been for the decline in their price relative to the price of GDP.

An interesting conclusion for policy emerging from our analysis is that nearly half of the in-

Chart 6 Change in International Exports from 1984 to 1996 as a Percentage of GDP



crease in the gap between interprovincial and international exports can be attributed to reductions in tariff rates in both countries, which resulted mainly from the FTA/NAFTA. If we reduce our tariffs and the Americans reduce theirs, it should come no surprise we trade more with the Americans and less among ourselves. The Canadian internal market may not have disintegrated, but North American economic integration has definitely taken a quantum leap under the FTA/NAFTA.[5]

Appendix

Specifications of Export Equations

Two sets of equations must be estimated: one for interprovincial exports; the other for international exports. Although the equations are to explain exports, they can be specified as import demand equations, recognizing that one juridiction's exports are another's imports. The standard assumption behind import equations that goods can be distinguished by place of production is made (Armington, 1969). The calculations are for 1981-97 for which comparable data are available.

Interprovincial Exports

The equation for real interprovincial exports is specified as a function of Canadian real GDP, the relative costs of production in Canada and the U.S., and the Canadian tariff rate:

$$\ln(xprov) = \alpha + \beta \ln(ycan) + \gamma\,(e\,cus/ccan) + \delta\, tcan$$

The coefficient β is the income elasticity of the interprovincial exports. The coefficient γ measures the sensitivity of interprovincial exports to relative costs as measured by labor costs per employee in Canada and the U.S. converted into Canadian dollars using the exchange rate. The coefficient δ measures the impact of the Canadian tariff on interprovincial exports.

International Exports

In analysing the determinants of international exports, an equation is specified for real Canadian exports to the U.S.[6] Canadian real exports to the rest of the world are taken as exogenous as they have been relatively stable as a share of GDP. In the analysis, total Canadian real exports are calculated as the sum of Canadian exports to the U.S. and to the rest of the world. Real exports to the U.S. are specified as a function of total U.S. real imports from all countries, the relative costs of production in Canada and the U.S. in a common currency, and the average US tariff rate on Canadian imports:[7]

$$\ln(xus) = \omega + \psi \ln(mtotus) + \varphi\,(e\,cus/ccan) + \kappa\, tuscan$$

The coefficient Ψ is the elasticity of the exports to the U.S. for total U.S. import demand from all countries. The coefficient φ measures the sensitivity of exports to the U.S. to relative prices (proxied by relative costs in the U.S. and Canada measured in Canadian dollars). The coefficient κ measures the impact of the U.S. tariffs levied on Canadian imports.

Estimation Results

Interprovincial Exports

Before estimating the equation, a Johansen cointegration test was applied to a group of the relevant variables including the log of interprovincial exports, real GDP, relative costs and the Canadian tariff rate. This was done to make sure error terms in the estimated equations would be stationary and the results would not be spurious. Under the assumption of no deterministic trends in the data and no lags, the test indicated the null hypothesis of no cointegrating equation could be rejected at a 1 per cent level of significance. This means that it is appropriate to proceed to estimate the equations.

The results of estimating the basic specification are shown as equation 1 in Appendix Table 1. The coefficient on real GDP is an elasticity, which shows the percent change in interprovincial exports resulting from a percent change in real GDP. The coefficient on relative cost shows the percent change in interprovincial exports resulting from an absolute change in relative costs, which could be due either to a depreciation of the C$ or U.S. wages outpacing Canadian ones. The coefficient on the tariff rate is a semi-elasticity, which shows the percent change in interprovincial exports resulting from a one-percentage point change in the average effective tariff rate. (These same interpretations apply to all subsequent results for U.S. as well as interprovincial exports.)

In Equation 1, the log of real GDP and the tariff rate are highly significant. The coefficient of real GDP indicates an elasticity close to unity. But the coefficient of the relative cost variable has the wrong sign. The Durbin-Watson statistic suggests the estimated equation exhibits autocorrelation.

To explore the impact of the FTA, Equation 2 introduces a dummy variable (set at 1 in 1989, 2 in 1990, 3 in 1991, and so on) designed to capture any effects of the FTA that might not be fully measured by the average tariff rate. This includes increased market access and any impacts on business psychology.

Equation 2 also introduces a dummy variable for the AIT, which took effect on July 1, 1995 (set at 0.5 in 1995, 1 in 1996, and 1 in 1997). This is to see if there is any early empirical evidence the AIT is affecting interprovincial trade flows. Surprisingly, the AIT dummy turns out to be significant, indicating a positive impact on interprovincial exports. This preliminary result should provide some food for thought for critics of the AIT and spark interest in further research as more data become available. The FTA dummy, on the other hand, is insignificant and has the wrong sign. Thus, there is no evidence this agreement reduced interprovincial trade ex-

cept by lowering tariffs. The dummy variable for the FTA and the relative cost variable, which both have wrong signs, are dropped in Equation 3. The tariff rate and AIT dummy become more significant.

As the Durbin-Watson statistic indicated auto-correlation could be a problem, its importance is examined using the Hildreth-Liu correction (Equation 4). The coefficient of the lagged residual turns out not to be significant. This leaves Equation 3 as the preferred variant to be used in our analysis of the factors explaining the declining share of interprovincial exports in GDP.

U.S. Exports

Again before estimating the equations for real U.S. exports, a Johansen cointegration test was applied to the group of the relevant series including real exports to the U.S., real U.S. imports, relative costs and the U.S. tariff on imports from Canada. This test also indicated the null hypothesis of no cointegrating equation could be rejected at a 1 per cent level of significance.

In estimating the equations for exports to the US., an additional complication arises because of the use of total real U.S. imports as the demand variable. Since this variable includes U.S. imports from Canada, its use introduces a simultaneity bias into the equation. To deal with this bias, real U.S. GDP is used as an instrumental variable and the fitted value of U.S. real imports is used in the equation for Canadian exports to the U.S. rather than the actual value. The equation used to calculate the fitted value is shown as Equation 8 in Panel 3.

The basic results for real exports to the U.S. (Panel 2) reveal highly significant coefficients for U.S. real imports, and relative costs (Equation 5). The coefficient on U.S. real imports is less than unity. On the other hand, the U.S. tariff rate on Canadian imports and the FTA dummy are not significant because of multicollinearity. The FTA dummy even has the wrong sign.

The FTA dummy is dropped in Equation 6 in favor of the U.S. tariff rate on Canadian imports, which specifically measures the tariff reductions resulting from the FTA. This more soundly based variable turns out to be highly significant. But it is quite possible its coefficient is capturing trade liberalization effects resulting from the FTA that go beyond merely tariff reductions, such as the heightened awareness of the U.S. market as a result of the trade negotiations and later agreement.

As auto-correlation could be a problem, a Hildreth-Liu correction is applied (equation 7). The coefficient of the lagged residual turns out not to be significant. Hence Equation 6 is used to analyse the factors explaining the rising share of international exports in GDP.

Notes

* This paper came out of a longer study carried out for the Internal Trade, Consultations & Federal-Provincial Relations Branch of Industry Canada. The authors are grateful to Tom Wallace, Roman Staranczak, Raynald Létourneau, John Helliwell and an anonymous referee for their helpful comments and suggestions and to Jack Selody for some advice on econometric methodology.

1. For a discussion of the problems with the existing agreement, see the study the authors prepared for the Canadian Chamber of Commerce (1998).

2. The recently released provincial economic accounts data, which were revised significantly, only covered 1992-97. The revised historical data will not be available until the middle of next year. To get a consistent time series going back to 1981 in current and 1992 dollars, it was consequently necessary to splice the earlier released data for 1981-91 on to the new series using 1992 as an overlap year.

3. Taking a different perspective, McCallum (1995) and Helliwell, Lee and Messenger (1998) have examined interprovincial and international trade using a gravity model and cross-sectional data that specify trade flows between two regions as a function of distance between the two and their GDPs. Helliwell, Lee and Messenger's (1998, p.1) striking results were that interprovincial trade densities declined from 18 to 20 times denser than those between provinces and states before the FTA to a still high 12 times after. Using aggregate data, they estimate if the trade structure in 1996 had remained the same as in 1988 interprovincial trade would have been 13 per cent higher than it actually was. This is one estimate of the effect of the FTA on interprovincial trade. Using more disaggregated data for 47 commodities, they calculate that 7 per cent or about half the shortfall calculated using aggregate data can be attributed to FTA-related reductions in tariffs.

4. The equations explaining exports take the form of import demand equations taking advantage of the fact that interprovincial exports are identical to interprovincial imports and exports to the U.S. are the same as U.S. imports from Canada.

5. Our conclusion differs from that of Helliwell and McCallum in that we emphasize the trend towards increasing North American integration after the FTA while they emphasize the greater density of interprovincial trade flows relative to international even after the FTA. These conclusions are not inconsistent.

Ours focuses on the trend while theirs focuses on the level of trade.

6. As no official Statistics Canada series exists, real U.S. exports in 1992 dollars had to be calculated. Real merchandise exports to the U.S. were calculated by deflating nominal merchandise exports with a deflator made by splicing together three Paasche price deflators available on CANSIM with 1981, 1986 and 1992 bases (D447379, D752672 and D131071). Real non-merchandise exports were calculated by deflating the five nominal categories of non-merchandise exports to the U.S. by the overall deflators for the particular categories. Total real U.S. exports was calculated as the sum of merchandise and non-merchandise exports.

7. The series for duties paid on Canadian imports was that prepared by U.S. agencies at the request of Statistics Canada for 1993-97 provided by Shenjie Chen of the Department of Foreign Affairs & International Trade. The data for 1981 and 1982 were estimated by assuming the rates were the same as 1983. This was consistent with the lack of trend in the overall U.S. effective tariff rate.

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Appendix Table 1

Regression Results for Interprovincial Exports

Dependent variable: Logarithm of real interprovincial exports

Eq. No	Intercept	Log of real GDP	Relative cost	Tariff rate	FTA dummy	AIT dummy	Lagged residual	Adjusted R^2	D.W.
1	-1.578897 (-0.81)	0.987554 (7.03)	-0.006401 (-0.09)	0.065116 (3.17)				0.867	0.94
2	-3.533003 (-1.56)	1.128401 (7.13)	-0.087373 (-1.40)	0.123613 (2.37)	0.008431 (0.72)	0.073855 (2.36)		0.914	1.84
3*	-2.890615 (-1.81)	1.078958 (9.27)		0.093447 (5.05)		0.063696 2.462032		0.909	1.31
4	-3.633014 (-1.84)	1.135209 (7.87)		0.087388 (4.48)		0.049320 (1.83)	0.291788 (1.01)	0.936	2.15

Dependent variable: Logarithm of real exports to the U.S.

Eq. No.	Intercept	Log of U.S. real imports (with real GDP used as instrumental variable)	Relative cost	U.S. tariff rate on Canadian imports	FTA dummy	Lagged residual	Adjusted R^2	D.W.
5	5.375955 (15.24)	0.909491 (19.84)	0.521375 (5.31)	-0.258860 (-1.22)	-0.009257 (-0.41)		0.995	1.67
6*	5.338871 (16.20)	0.908060 (20.54)	0.494132 (7.11)	-0.174888 (-3.49)			0.995	1.54
7	5.669707 (12.57)	0.862701 (14.44)	0.481714 (6.33)	-0.203988 (-3.53)		0.127832 (0.40)	0.996	1.96

Dependent variable: Logarithm of U.S. real imports

Eq. No.	Intercept	Log of U.S. real GDP					Adjusted R^2	D.W.
8	-16.20029 (-19.33)	2.604345 (26.95)					0.978422	0.382066

Note: t statistics are shown below estimated equations.

* indicates the equations used in estimating the impact of various factors.