Regional Trade Policy and the Integration of the American and Canadian Economies

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For centuries trade policy has been the almost exclusive domain of national governments. However, as national governments relinquish control over their borders, nations as spatial economic entities begin to lose their significance. In their place, many have turned to regions as a basis to understand the causes and effects of trade (Krugman 1991; Howes and Markusen 1993) and as a natural territory for the application of trade policy (Markusen 1996; Courchene 1998; Storper and Scott 1995). The purpose of this paper is to set the parameters within which we can understand the potential for economic integration across the Canada-U.S. frontier and what this implies for the role of government at the scale of states and provinces. The paper focuses on border regions because these are the places where the benefits (or costs) of greater economic integration may be felt the most, and therefore, where regional policy may be the most important.

The analysis shows that the greatest potential for economic integration is among regions that are in close geographic proximity. Furthermore, this potential varies depending on the industrial structures of the trading regions. In particular, interregional trade appears to be highest among regions with similar industrial structures where trade is driven by specialisation at the firm level. These results imply that policies developed to encourage greater integration will be most effective in border regions. Furthermore, what forms these policies might take and what sectors may be targeted depends, at least in part, on the underlying causes of regional economic development. Trade policy at the scale of regions becomes indistinguishable from regional development policy.

The paper is organised as follows. After a brief review of some of the relevant literature and how it relates to the Canada-U.S. trading relationship, the specification and basic results of a trade flow model of Canada-U.S. regional trade is presented. Following this, the predictions of the model with regards to the degree of integration among Canadian and American regions is outlined as well as a detailed description of the trading relationships within three potential transnational regions. The policy implications of the analysis are then discussed and some brief conclusions outlined.

Trade policy and the Canadian economy

As was noted above, regional trade policy comes to the fore as national governments open their borders to trade. The objectives of this section are to first briefly outline the historical development of trade policy in Canada and its economic implications, and second, to outline how trade can be understood, at least theoretically, at a regional scale.

Through much of its history, the Canadian economy developed under tariff protection that forced an east-west pattern of trade on the country. After the Second World War, however, Canada began to open its borders to trade through reciprocal reductions in the tariff and non tariff barriers. This was accomplished by way of successive rounds (Kennedy, Tokyo and Uruguay) of multilateral negotiations under the General Agreement on Tariffs and Trade (GATT) and through bilateral agreements with the United States. Of these agreements, the most prominent are the 1965 Auto Pact, which led to an integrated North American market for automobiles and parts, the 1989 Canada-U.S. Free Trade Agreement (CUSFTA) and the 1993 North American Free Trade Agreement (NAFTA), which includes Mexico.

One of the primary rationales for Canada's shift towards free trade is the detrimental effect of tariff protection on efficiency of Canadian industry, and therefore, the wealth of the nation. Eastman and Stykolt (1967) have argued that tariff protection has led Canadian manufacturing firms to produce their products at a smaller scale than their American counterparts and to produce more varieties in the same plants using less sophisticated technology (see also Baldwin and Gorecki 1983). These factors, combined with a market structure that tends towards oligopolistic conditions, explains the generally higher prices charged by Canadian firms compared to their American counterparts. In this context, the benefits of trade do not only accrue from comparative advantage, but also from the reorganisation of production within plants to take advantage of the larger American market. That is, firms specialise by producing fewer varieties with longer production runs. Harris and Cox (1983) and Cox (1994) have found these economies to be the primary benefit of free trade with the United States.

As trade barriers forced an east-west pattern of trade on Canada, the removal of these barriers is likely to result in a more north-south pattern of trade. As Wonnacott and Wonnacott (1967) realised, the impact of free trade also depends on the location of Canadian industry relative to American markets and competitors. It is still surprising the degree to which distance continues to control the flows of goods on the North American continent. Using simple gravity models, McCallum (1995) and Helliwell (1996) found the distance variable had an elasticity over one for internal Canadian trade and trade among Canadian and U.S. regions. This is substantially higher than other applications of the gravity model to world trade (McCallum 1995). In a similar analysis undertaken by Brown and Anderson (1998a), the influence of distance was found to be consistently one of the most important contributors to the model's explanation. Based on these results alone, it is clear that geographic proximity can have a strong influence on trade flows.

There is a close association between these empirical findings and the growing theoretical literature that seeks to connect many of the recent advances in trade theory to economic geography (see Ottaviano and Puga 1997 for a recent review of the literature). In general, the argument is made that when increasing returns are present and transportation costs are moderate, industry tends to agglomerate. That is, in the presence of transportation costs firms have an incentive to locate close to large markets in order to take advantage of scale economies. If transportation costs are too high, firms spread out because the costs of serving distant markets outweigh the benefits of larger scale production. On the other hand, if transportation costs are too low, location relative to markets becomes irrelevant (Krugman and Venebles 1996).

Venebles (1996) argues that downstream demand for intermediate goods is another way to explain these centripetal forces. The larger the size of downstream demand the lower the costs of upstream producers if these producers are operating under conditions of increasing returns to scale. Under these conditions, downstream producers experience external returns to scale. Furthermore, if there are transportation costs associated with the movement of intermediate goods, there is a basis for industrial agglomeration. Venebles also makes the argument that factor markets act as a centrifugal force. The benefits of agglomeration have to be balanced against the bidding up of factor costs (for example, wages) in those locations. It is the interaction among factor costs, transportation costs and scale economies that determines whether production is dispersed or concentrated.

In the context of Canada-U.S. trade, these external returns may spill over the border, inducing specialisation and trade in intermediate inputs. Therefore, if the trading regions have similar industrial structures and are in close geographic proximity, intermediate goods producers may reorganise their production to serve the larger cross-border market. On the other hand, if the regions are located far from each other, trade is less likely because distance related costs overcome the benefits of specialisation. We have found that the regional patterns and composition of Canada-U.S. trade are consistent with this perspective (Brown and Anderson 1999).

In summary, Canadian industry developed under the protection of tariff barriers, which resulted in a manufacturing sector oriented towards serving its small national market. As a consequence, Canadian industries were and are less efficient that their American counterparts (see Statistics Canada 1996 for a recent comparison of Canadian and American productivity). In the latter half of this century, Canada has become increasingly integrated into the world economy and in particular the economy of the United States. The success of this venture depends on the ability of Canadian firms to penetrate the American market by reorganising their production in order to reduce their production costs. The North American market is, however, more regional than continental in nature. The ability of Canadian firms to take advantage of larger markets depends on the economic structure of American regions that are in close geographic proximity. What this also implies is that the potential for economic integration and the influence that policy might have on that process at a regional scale are important subjects of study.

Trade model

In order to determine the potential for economic integration, a simple trade flow model will be applied. Its economic derivation can be found in a separate paper (Brown and Anderson 1998a). The purpose of the model is to statistically explain trade flows among North American regions at the scale of states and provinces. By using American internal state to state trade as a benchmark of regional economic integration, the potential for further economic integration among Canadian and American regions can be measured. Therefore, the model helps to answer the following question. If the border no longer had an influence on trade, what degree of economic integration would be expected among Canadian and American regions?

The model is specified as follows:

$$T_{Ij_{AB}} = A_{Ij} X_{j_B} \frac{\left(P_{V_A} \tau_{AB}\right)^{\varepsilon} X_{I_A}}{\sum_{A=1}^{R} \left(P_{V_A} \tau_{AB}\right)^{\varepsilon} X_{I_A}} \qquad (1)$$

where $T_{Ij_{AB}}$ is the trade in commodity I produced in region A sold to sector j located in region B, A_{Ij} is a technical coefficient, X_{j_B} is the output of sector j in region B, P_{V_A} is the price of a representative variety of commodity I, τ_{AB} is the trade cost between A and B, X_{I_A} is the output of commodity I in A and ε^{-1} is the elasticity of demand. Equation (1), which is the functional form of an attraction constrained gravity model, implies exports from region A in commodity I to sector j in region B is function of the demand for commodity I in B multiplied by the probability of sourcing I in A. This probability depends on the output of sector I in A and its c.i.f. price relative to all other potential sources of commodity I. [1]

In order to apply the model empirically two modifications are necessary. First, since we do not know the trade flows among sectors but only among regions, the demand for sector *I* in each region is summed over all sectors *j*:

$$T_{I_{AB}} = \sum_{j=1}^{M} T_{Ij_{AB}} = \sum_{j=1}^{M} A_{Ij} X_{j_B} \frac{\left(P_{V_A} \tau_{AB}\right)^{\varepsilon} X_{I_A}}{\sum_{A=1}^{R} \left(P_{V_A} \tau_{AB}\right)^{\varepsilon} X_{I_A}}. \qquad (2)$$

Secondly, prices and trade costs are unknown, and therefore it was necessary to measure their influence using a set of proxy variables. Furthermore, there are systematic influences on trade that result from such factors as the border that must also be taken into account. Therefore, the final functional form of the model is as follows,

$$T_{I_{AB}} = \sum_{j=1}^{M} A_{Ij} X_{j_B} \frac{\prod_{K=1}^{L} Z_{K_{AB}}^{\eta_K} X_{I_A}^{\phi}}{\sum_{A=1}^{R} \prod_{K=1}^{L} Z_{K_{AB}}^{\eta_K} X_{I_A}^{\phi}}. \qquad (3)$$

where the Z_Ks represent variables that influence the c.i.f. price as well as dummy variables that account for systematic effects, which will be defined explicitly in a moment.

The influence of trade costs, which include transportation costs, on the prices is accounted for by the distance (DIST)[2] between each origin and destination. In addition to distance, the model uses several other variables to measure the influence of variations in the characteristics of origins on the delivered price of their goods. These include productivity (PROD), wages (WAGE), and localisation economies (LQ) (Bureau of the Census 1996; Statistics Canada 1995). Productivity was measured as value added per worker and wages are measured as pay per employee. Finally, localisation economies, which may be interpreted as the benefits (or costs) of similar firms locating in the same state or province, were measured using location quotients.[3]

Dummy variables were used to take into account characteristics of origin-destination pairs that might have a systematic effect on trade flows. The most important for our purposes is the influence of Canada as an origin. Consequently, the difference between province to state flows and state to state flows is accounted for by a dummy variable, which is referred to here as the 'border effect' variable. The term 'border effect' does not only refer to the border as barrier in and of itself, but also those factors, such as tariff and non-tariff barriers, that impede regional economic integration. In Brown and Anderson (1998a) we used one dummy variable for all of Canada. Here a different variable is used for each Canadian origin (BC, British Columbia; AB, Alberta; SK, Saskatchewan; MB, Manitoba; ON, Ontario; QC, Quebec; AC, Atlantic Canada). There are several reasons for this. First, since at the two digit level there is considerable room for regional differentiation of production, some regions may have an industrial mix that allows them to trade more readily than others. For example, within the stone, clay and glass products sector Ontario may be relatively more specialised in automotive glass products, which are far more tradeable than other products included in the sector (for example, clay products). Consequently, Ontario may be more integrated into the American market compared to other Canadian regions.

Due to the characteristics of the trade flow data bases themselves, there are also other systematic effects that might influence the model's parameter estimates. First, the possibility exists that Canadian flows may be consolidated in border states. Therefore, flows between provinces and states with a common border are also accounted for by a dummy variable (BORD). Second, the American flow data that were used took into account internal as well as state to state flows. Since internal flows may include goods that might not typically be exported over long distances (for example, bakery products), a dummy variable was included for internal flows (INTR). The same could be true of trade between bordering states, and so we also included a dummy variable for contiguous states (CNTG) (see the Appendix for further discussion of the trade data bases).

Model results

In order to facilitate the discussion, the results of the estimation are presented below (see Tables 1 and 2). However, because these results are very similar to those presented in Brown and Anderson (1998a), the bulk of the discussion focuses on the model's predictions of economic integration at a regional scale.

The results presented in Table 1 are the parameter values for all variables except the border effect variables, which are presented in Table 2. There are several generalisations that can be taken from the results presented in Table 1.

TABLE 1 Model Estimation Results

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SECTOR	n	OUT	DIST	PROD	WAGE	LQ	INTR	CNTG	BORD	CLIM[a]	AdjR^2
Food Products	1739	**0.853** 0.000	**-1.366** 0.000	**-0.307** 0.081	**1.014** 0.002	**0.311** 0.000	**2.032** 0.000	**0.950** 0.000	**0.845** 0.000	**0.473** 0.000	**0.848**

Textiles	646	**1.160** 0.000	**-0.536** 0.000	**0.013** 0.108	**0.735** 0.012	**-0.220** 0.000	**1.821** 0.000	**0.555** 0.000	**0.642** 0.054	--	**0.785**
Apparel	1234	**1.067** 0.000	**-0.747** 0.000	**1.321** 0.000	**-2.386** 0.000	**-0.535** 0.000	**1.719** 0.000	**0.837** 0.000	**1.318** 0.000	--	**0.698**
Lumber & Wood Prod.	1377	**0.683** 0.000	**-0.939** 0.000	**0.535** 0.047	**1.143** 0.000	**0.145** 0.000	**2.806** 0.000	**1.321** 0.000	**0.688** 0.002	--	**0.741**
Furniture and Fixtures	1047	**0.990** 0.000	**-0.874** 0.000	**-0.400** 0.012	**0.202** 0.456	**0.057** 0.130	**1.849** 0.000	**0.598** 0.000	**0.379** 0.060	--	**0.780**
Paper Products	1314	**0.837** 0.000	**-1.166** 0.000	**-0.181** 0.270	**1.552** 0.000	**-0.018** 0.694	**1.367** 0.000	**0.606** 0.000	**0.297** 0.185	--	**0.716**
Chemicals	1498	**0.946** 0.000	**-1.175** 0.000	**-0.022** 0.833	**1.038** 0.000	**-0.343** 0.000	**1.719** 0.000	**0.824** 0.000	**0.899** 0.000	--	**0.783**
Petro. and Coal Prod.	291	**1.074** 0.000	**-1.338** 0.000	**0.572** 0.104	**-2.485** 0.058	**0.020** 0.898	**3.661** 0.000	**1.728** 0.000	**0.782** 0.084	--	**0.774**
Rubber and Misc. Plast.	1425	**0.958** 0.000	**-1.047** 0.000	**0.339** 0.075	**-1.098** 0.000	**-0.156** 0.001	**1.405** 0.000	**0.567** 0.000	**0.443** 0.048	--	**0.779**
Leather Products	274	**0.591** 0.018	**-0.132** 0.420	**-1.251** 0.006	**2.273** 0.000	**0.005** 0.949	**1.985** 0.000	**0.832** 0.002	**0.601** 0.315	--	**0.463**
Stone, Clay and Glass	2744	**1.059** 0.000	**-1.115** 0.000	**-0.889** 0.001	**-0.104** 0.759	**-0.013** 0.846	**2.338** 0.000	**0.769** 0.000	**0.767** 0.003	--	**0.754**
Primary Metals	1247	**0.975** 0.000	**-1.193**	**-0.309** 0.039	**-0.16** 0.595	**-0.251** 0.000	**1.254** 0.000	**0.568** 0.000	**0.126** 0.644	--	**0.752**

			0.000								
Fabricated Metals	1652	**0.950** 0.000	**-1.132** 0.000	**-0.275** 0.041	**-0.507** 0.006	**-0.254** 0.000	**1.496** 0.000	**0.601** 0.000	**0.281** 0.180	--	**0.820**
Machinery and Equip.	1703	**1.035** 0.000	**-0.776** 0.000	**-0.615** 0.000	**0.403** 0.068	**-0.304** 0.000	**2.219** 0.000	**0.797** 0.000	**1.245** 0.000	--	**0.811**
Electronic Equipment	1579	**1.038** 0.000	**-0.667** 0.000	**-0.830** 0.000	**0.987** 0.000	**-0.230** 0.000	**2.040** 0.000	**0.690** 0.000	**1.076** 0.000	--	**0.784**
Transport Equipment	1134	**0.954** 0.000	**-0.964** 0.000	**0.196** 0.176	**0.113** 0.639	**-0.456** 0.000	**1.524** 0.000	**0.594** 0.000	**0.149** 0.578	--	**0.763**
Instruments	1163	**1.230** 0.000	**-0.595** 0.000	**-0.858** 0.000	**-1.217** 0.000	**-0.199** 0.002	**2.314** 0.000	**0.719** 0.000	**1.026** 0.001	--	**0.760**
Misc. manuf. products	1136	**1.195** 0.000	**-0.772** 0.000	**0.445** 0.000	**-1.806** 0.000	**-0.340** 0.000	**1.639** 0.000	**0.680** 0.000	**0.454** 0.105	--	**0.769**

Note: 1. Bolded figures are elasticities and the plain text below are p-values.
2. [a]CLIM is a dummy variable for states with large winter and citrus crop production (Florida, Texas, New Mexico, Arizona and California).

First, OUT, which accounts for aggregated levels of supply, is always positive and significant. DIST is always negative, and with the exception of leather products, significant. The signs of the other price related variables (PROD, WAGE and LQ) are often inconsistent, but in many cases significant. The expectation is that PROD would be positively associated with trade, WAGE negatively associated and LQ, which can represent positive or negative localisation economies, may take on either sign. The positive association between the WAGE and trade is not particularly surprising given that the WAGE variable may be picking up variations in marginal revenue products over space. The negative and significant values for the PROD variable is more surprising. However, because productivity is measured as value added per employee, it may be picking up variations in the rental rate of capital and land as well as variations in tax rates over space. Finally, the results for the LQ variable are of interest because in those sectors where we would most expect positive localisation economies to exist (for example, machinery and equipment and electronic equipment) the elasticities are negative. This implies that the regional concentration of production may lead to congestion effects or the concentration of production in one sector may mean necessary supporting and related sectors are not present.

Taken as a whole, the price related variables are a function of degree to which inputs are substitutable. That is, if the goods within each commodity classification are easily substituted for each other, then variations in price due to trade costs, productivity, wage and localisation economies may have a substantial influence on demand. However, if inputs are not easily substituted and production is differentiated over space their elasticities will be much smaller. Therefore, the distance variable's elasticity, for example, may be as much a reflection of the substitutability of varieties in production and consumption as variations in the cost of moving these goods across space.

The other three variables (INTR, CNTG and BORD) control for the influence of internal trade, contiguous states and trade that is consolidated in border states. As expected, the INTR variable is positive and highly significant, which is an indication that state internal trade is different than external trade. The positive and significant value of CNTG is also an indication that some goods are only traded locally and may be a reflection of the same factors influencing INTR. Finally, the BORD variable was in all cases positive and in many instances significant. Therefore, in some cases trade may be consolidated in border states before it is exported to other regions of the United States. However, the BORD variable may also be picking up some of the trade that the INTR and CNTG variables are taking into account.

For the purposes of this paper, the primary point to be drawn from the analysis is that the model is able to control for those factors that influence the supply and demand of traded goods. Therefore, any measurable effect of the border as a barrier to trade should be a measure of trade potential if all artificial barriers to trade are removed. The influence of the border on province to state flows as compared to state to state flows are outlined in Table 2. It should also be noted at this time that only the border's influence on Canadian exports to American regions is measured by the model. The influence of the border on American exports to Canada was excluded because of essentially technical issues associated with the linear transformation of (3) (see Appendix).

The first point to be drawn from Table 2 is that the border's influence varies considerably across sectors. For example, without the border exports of food products might rise by between 10 and 32 fold[4] depending on the origin. While for lumber and wood products the influence of the border variable is much smaller and, with the exceptions of Quebec and Alberta, its parameter estimates are insignificantly different from zero. What is also striking about Table 2 is the degree to which the border's influence varies depending on the region in question. For example, in the case of chemicals the estimated border effect parameter is positive and significant for Saskatchewan, but negative for all other provinces. It is unlikely that these results can be attributed to missing variables that might account for variations in provincial competitiveness. Rather, the results are more likely a reflection of the very aggregate sectors used in the analysis. Staying with the chemicals example, Saskatchewan is a major potash producer, but doesn't produce or export many other types of chemical products. If the model were estimated for potash alone, the positive border effect may very well disappear. Therefore, variation in the industrial composition of regions within the sectors used in the analysis may explain variations in the border effect.

TABLE 2 The Influence of the Border on Canadian Exports to the United States

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SECTOR	BC	AB	SK	MB	ON	QC	AC
Food Products	**-3.4680** 0.0000	**-2.3538** 0.0000	**-2.8625** 0.0000	**-2.5457** 0.0000	**-2.8659** 0.0000	**-3.0119** 0.0000	**-2.6925** 0.0000
Textiles	**-1.5637** 0.0811	--	**1.7985** 0.0279	**1.7077** 0.0043	**-1.9120** 0.0000	**-1.9040** 0.0000	**0.3303** 0.4583
Apparel	**-1.2964** 0.0000	**-1.8514** 0.0013	--	**-1.0235** 0.0047	**-2.7582** 0.0000	**-2.8377** 0.0000	**-1.6489** 0.0014
Lumber & Wood Products	**-0.1266** 0.4116	**-1.1413** 0.0000	**-0.2408** 0.1926	**0.1020** 0.5844	**-0.1291** 0.3814	**-0.3656** 0.0046	**0.2317** 0.1540
Furniture and Fixtures	**-0.5747** 0.0150	**-0.1646** 0.3141	--	**-0.3684** 0.0506	**-0.8370** 0.0000	**-1.1588** 0.0000	**0.9651** 0.0092
Paper Products	**-1.4789** 0.0000	**0.2435** 0.1679	**-2.7397** 0.0791	**-0.5052** 0.0111	**-0.8346** 0.0000	**-0.4653** 0.0010	**0.0070** 0.9690
Chemicals	**-1.4202** 0.0000	**-0.3809** 0.0075	**0.9326** 0.0000	**-0.5339** 0.0214	**-1.3542** 0.0000	**-1.5297** 0.0000	**-0.3657** 0.1221
Petroleum and Coal Products	**-1.6292** 0.0096	**1.0953** 0.0274	**0.4345** 0.8522	**2.0103** 0.4681	**-0.8125** 0.0061	**-0.3687** 0.3287	**1.4808** 0.3355
Rubber and Misc. Plastics	**-1.3810** 0.0000	**-1.1931** 0.0000	--	**-0.7236** 0.0101	**-1.3754** 0.0000	**-1.2539** 0.0000	**1.3483** 0.0000
Leather Products	**-1.5085** 0.3775	--	--	**-2.3724** 0.1072	**-3.1383** 0.0000	**-2.9632** 0.0000	--
Stone, Clay and Glass	**-1.1942** 0.0000	**-0.8312** 0.0010	--	**-0.7270** 0.2479	**-1.4799** 0.0000	**-1.2238** 0.0000	**-0.4213** 0.2188
Primary Metals	**-0.1595** 0.3990	**-1.5450** 0.0000	**-3.0201** 0.0296	**-0.9239** 0.0000	**-1.1741** 0.0000	**-0.4739** 0.0007	**-2.0312** 0.2645
Fabricated Metals	**-2.0476**	**-1.8599**	--	**-1.6840**	**-1.9536**	**-1.9748**	**-0.3725**

	0.0000	0.0000		0.0000	0.0000	0.0000	0.2894
Machinery and Equipment	**-1.1701**	**-1.4356**	**-1.1096**	**-0.5174**	**-0.8400**	**-0.9720**	**-0.9823**
	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000
Electronic Equipment	**-1.3514**	**-1.2228**	**-1.3221**	**-0.9978**	**-2.1346**	**-2.2209**	**-1.4250**
	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0001
Transportation Equipment	**-0.8382**	**-1.0943**	**-0.4061**	**-0.6962**	**0.4103**	**0.1219**	**-2.4132**
	0.0000	0.0002	0.2110	0.0022	0.0203	0.4132	0.0000
Instruments	**-0.3779**	**-0.3839**	**--**	**-0.9001**	**-1.6648**	**-1.3840**	**-3.8272**
	0.0945	0.1245		0.1438	0.0000	0.0000	0.1491
Miscellaneous Manuf. Prod.	**-2.1325**	**-1.5352**	**--**	**-0.1225**	**-2.4014**	**-2.0377**	**-2.6761**
	0.0000	0.0053		0.7802	0.0000	0.0000	0.3116

Note: 1. Bolded figures are elasticities and the plain text below are p-values.

This conclusion might imply that the border effect measured by the model is due to aggregation problems rather than the influence of Canada as an origin. However, when the model is estimated with a dummy variable for Canada as a whole, in all sectors the influence of the border is significant and negative (Brown and Anderson 1998a). Therefore, if Canadian exports to the U.S. on aggregate are similar to U.S. internal trade, the border's influence is valid. Furthermore, Ontario and Quebec, which arguably have the most diversified manufacturing sectors, consistently have significant and negative parameter estimates. The only exception is transportation equipment which is positive and significant for Ontario. However, in Ontario this sector is heavily influence by the Auto Pact which has been in place for over thirty years. We would expect, therefore, the influence of the border to be at least neutral in this case. Nonetheless, the model's predictions should be treated with caution in those sectors where the border effect varies significantly across regions.

The influence of the border on the model's predictions can be tested by setting the value of the border effect dummy variables to zero and comparing the results to the model's original predictions. The affect of setting the dummy variable to zero is to increase the attractiveness of each Canadian region as an origin. Therefore, from the perspective of each American region the probability of sourcing goods from Canada rises. Since the total value of each region's imports must remain the same, this implies internal American trade falls. This does not mean, however, that American GDP will decline because the elimination of the border's influence works in both directions.

Before moving on to the discussion of the model's predictions, there is one further point regarding the estimation of the border effect. For all sectors the border effect parameters were only set to zero if they were negative. Therefore, we are assuming the border's influence can only be negative. This also means that for those regions where the border effect is positive the model may predict a fall in trade for the same reason that internal American trade falls. Therefore, in those cases the predictions are ignored; trade is assumed to remain at the same level. This is an admittedly *ad hoc* solution and points to some of the difficulties of working with aggregate sectors.

TABLE 3 Change in the Predicted Level of Exports from the Removal of the Border Effect (%)

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	BC	AL	SK	MN	ON	QC	ATL	CDN
New England	102.8	82.2	126.5	180.5	100.5	237.1	125.1	144.3
Mid Atlantic	87.8	135.1	90.5	150.2	119.1	209.3	99.7	143.6
South Atlantic	96.1	172.8	76.6	140.2	91.5	190.6	135.7	111.5
Great Lakes	108.1	133.2	67.7	145.4	109.2	174.7	86.3	114.8
South Central	98.5	189.4	23.9	129.4	94.6	178.6	112.4	110.0
Plains	100.2	145.8	54.9	157.3	118.0	163.4	110.5	124.6
Rocky Mountains	122.5	137.3	109.5	211.6	92.2	166.7	360.9	114.8
South West	110.5	174.4	102.2	148.0	81.6	173.8	143.3	103.1
West	191.6	131.7	69.5	135.0	78.0	160.8	107.7	133.7
United States	150.0	143.9	71.9	149.9	103.9	193.3	112.5	123.1

As one might expect based on the results presented in Table 2, when the influence of the border is removed the predicted level of exports from Canadian regions to American regions[5] increased significantly and vary across regions (see Table 3). According to the model, Saskatchewan has the least potential (72%) and Quebec the highest (193%). Ontario has the second lowest predicted increase of just over 100%. However, as measured as exports as a percentage of manufacturing shipments, in 1993 Ontario was the most dependant of all the provinces at 38% on the American market. Doubling exports implies, at current levels of output, 78% of Ontario's manufactured shipments would go to the United States.

What is also evident in Table 3 is that for each region the potential for trade also varies across its trading partners. What this implies is that the demand for manufactured goods varies considerably across regions and because the border effect differs across sectors so does the potential for increased trade. Although the potential for increased trade may seem significant, some inter-regional flows are very small, and therefore, they have little influence on the aggregate levels of trade. Table 4, which breaks down export growth by region, gives a far better perspective on which regions account for most of the export growth.

Broadly speaking, Table 4 demonstrates that the largest potential for increased trade is between regions that are in close geographic proximity. This is, of course, a reflection of the strong influence that the distance parameter has on trade flows (see Table 1). Therefore, the most important source of export growth for British Columbia and Alberta is the West, while for

Ontario it is the Great Lakes states and Quebec the Mid Atlantic states. The exception is Atlantic Canada. Here the Mid Atlantic and South Atlantic states combined account for 40% of the region's export growth. Although the continued importance of New England should not be discounted, what the model appears to imply is that given the economic weight of these regions, and potentially their industrial structures, their influence is stronger.

TABLE 4 Breakdown of Current Export Shares (CU) and Growth Shares(GR) by Region (%)

TABLE 4 Breakdown of Current Export Shares (CU) and Growth Shares (GR) by Region (%)

	BC		AL		SK		MN		ON		QC		ATL		CDN	
	CU	GR	CU	GR	CU	GR	CU	GR	CU	GR	CU	GR	CU	GR	CU	GR
New Eng.	3.6	4.8	2.8	0.8	0.8	1.4	3.4	1.8	4.9	4.4	20.0	13.7	34.3	18.1	8.3	6.8
Mid Atl.	7.0	2.5	8.5	6.0	3.8	8.1	7.4	8.0	19.6	20.7	28.1	35.2	23.3	23.9	19.8	22.3
South Atl.	10.3	2.7	3.7	8.2	3.2	9.1	5.5	8.8	11.8	10.6	9.9	12.4	10.6	16.1	10.8	10.3
Grt. Lakes	14.7	7.7	24.1	12.7	39.0	14.4	18.6	19.1	33.5	37.1	18.5	13.4	15.5	14.1	28.5	27.2
Sth Central	4.0	1.8	5.9	6.0	5.7	1.9	5.3	5.4	6.6	6.5	6.6	6.1	4.8	5.8	6.3	5.9
Plains	7.4	3.3	11.3	11.1	37.8	20.7	40.1	31.5	6.4	8.4	4.1	5.5	1.8	4.6	6.8	7.6
Rocky Mts.	8.8	7.0	10.2	15.8	2.8	16.7	2.5	5.3	1.6	2.2	1.1	2.2	0.6	2.4	2.3	3.0
South West	5.7	4.5	6.3	13.1	1.3	10.8	4.2	9.8	6.6	5.6	6.2	6.3	3.0	8.7	6.3	6.0
West	38.5	65.7	27.2	26.4	5.7	16.8	12.9	10.2	9.0	4.5	5.5	5.2	6.1	6.4	10.9	10.9
US	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

What is also presented in Table 4 is the current regional distribution of exports. By comparing the current pattern of trade with the pattern of growth, it is possible to see whether the regional distribution of flows will shift as the two countries integrate further. In general, the results presented in the table indicate the distribution of trade flows will tend to concentrate in regions that are in close proximity. For example, 65% of British Columbia's export growth is in the West, which accounts for only 38% of British Columbia's current trade.[6] Although British Columbia is the most prominent example, this pattern is repeated across the country. Again, the one exception is Atlantic Canada. Here the model indicates the distribution of exports will shift away from New England and towards the South Atlantic and South West regions.

Transnational Regions

This paper began with a discussion of trade policy. Since then, it has focussed on explaining the model and the influence of the border. Now I would like to begin the transition back to policy. In order to do so, it is helpful to look in detail at the trading patterns of the three transnational regions: Atlantic Canada-New England, Ontario-Great Lakes and Cascadia. The regions will be discussed in this order below.

TABLE 5 Atlantic Canada-New England Trade (1993)

TABLE 5 Atlantic Canada-New England Trade (1993)

	Atlantic Canada **Exports to New England** ($US 000's)					New England	
	Actual	Predicted	Border Effect	Change	Output ($US 000's)	**Demand** ($US 000's)	**G-L Index** (%)
Food Products	149,177	13,516	157,706	144,190	3,852,503	25,402,080	14
Textiles	0	0	--	--	84,251	3,703,657	--
Apparel	731	1,227	4,678	3,451	55,495	8,646,612	3.1
Lumber & Wood	110,938	24,587	24,587	--	630,600	3,611,337	12
Furniture and Fix.	1,504	3,722	3,722	--	49,295	3,339,919	18.2
Paper Products	334,587	48,759	48,759	--	757,402	7,630,561	5.1
Chemicals	20,547	10,252	12,622	2,370	181,445	14,239,732	6.3
Petro. and Coal	451,015	--	--	--	--	10,306,059	4.6
Rubber & Plastics	6,458	21,983	21,983	--	110,448	5,887,826	16.8
Leather Products	430	--	--	--	--	1,729,224	24.4
Stn. Clay & Glass	7,462	4,344	5,604	1,260	188,653	2,956,554	1.3
Primary Metals	1,099	--	--	--	--	8,426,655	17.3
Fabricated Metals	9,326	8,910	11,551	2,642	235,855	8,180,907	2.1
Mach. and Equip.	6,402	4,319	10,759	6,440	94,636	13,918,708	17
Electronic Equip.	1,373	741	2,335	1,593	132,848	14,789,905	8
Transport. Equip.	8,169	2,290	25,455	23,165	916,990	26,388,380	18.9
Instruments	605	--	--	--	--	7,676,474	7.8
Misc. Manuf.	3,718	--	--	--	--	3,786,664	4.8
Total (disclosed sectors)	657,701	144,650	329,761	185,111	7,290,420	138,696,178	9.2

Sources: Statistics Canada (1995), Bureau of Economic Analysis (1994, 1997), Bureau of the Census (1994a, 1994b, 1994c, 1995a, 1995b, 1995c,1996a and 1996b).

New England has long been perceived by Atlantic Canadians as a potential market for their goods that was cut off through the implementation of high tariffs under the National Policy in 1879. One of the more interesting questions that we can answer using this analysis is whether this perception is reflected in reality.

First, however, some comment should be made regarding the quality of the predictions for Atlantic Canada-New England trade. Of the sectors where data were available (those that are not shaded in Table 5), the model only predicted 23% of the actual level of trade. There are several possible reasons for this. First, since New England is accessible by sea as well as land and because sea transportation is typically cheaper than land transportation, the distance parameter may be overestimated. The sectors that are underestimated the most (Food Products, Lumber and Wood Products and Paper Products) tend to be significantly influenced by the distance variable (see Table 1). Second, and probably more likely, given the large size of the New England market relative to Atlantic Canada's output, one or two strong inter or intra firm relationships can lead to very large trade flows. Finally, in the case of food products Atlantic Canada exports are dominated by fish products. Many of these products are shipped to New England and are then distributed to other parts of the United States.

Returning to the issue of trade potential, the elimination of the border effect has the most significant influence on food products and transportation equipment. Combined, both sectors account for 90% of the predicted increase in trade between the two regions. On the other hand, for lumber and wood products and paper products the border variable was insignificant, and therefore, we would expect little change in these sectors. Furthermore, since the model underestimates these flows significantly, there would appear to be little unexploited demand. Therefore, for the third and fourth most important manufacturing sectors covered in the analysis the potential for increased trade is minimal.

What is also evident in Table 5 is that the industrial structures of the two regions are very different. Outside of food products and transportation equipment, the highest levels of demand in New England are in sectors where output in Atlantic Canada is fairly small (for example, electronic equipment, chemicals and machinery and equipment).[7] Atlantic Canada has found comparative advantage in other sectors. Over time, the proximity of the New England market may draw investment to these sectors in Atlantic Canada. However, because the results presented here depend on the current industrial structure of Atlantic Canada and New England, no predictions can be made in this regard.

Compared to Atlantic Canada-New England, the Ontario-Great Lakes region's trade is spread across a far broader range of sectors. Furthermore, the model is also considerably more successful at predicting the aggregate level of trade (see Table 6). There are several other characteristics of the Ontario-Great Lakes relationship that are of note. First, the border effect has a strong influence on a broader selection of sectors (see Table 6) and when its influence is removed the predicted level of trade is almost always higher than its actual level. The two exceptions are lumber and wood products, for which the border effect is small, and furniture and fixtures, whose level of actual trade far outweighs the predicted level. At least in part, this is due to trade in seats which are used as car parts, and therefore, are covered under the Auto Pact.

Second, despite the fact that the border's influence on transportation equipment has been excluded, the predicted level of trade after the border effect has been removed is doubled. Therefore, at current levels of output, Ontario's fully integrated level of trade with the Great Lakes states would account for 28% of its total manufactured output. Furthermore the significance of transportation equipment, by necessity, would decline from 69% of the original predicted level of trade to 33% of the fully integrated level. The potential for economic integration is much broader than the auto sector.

Finally, also included in Table 6 (and Table 5) is the Grubel and Lloyd index (G-L Index), which is a measure of intra-industry trade.[8] A value of zero indicates that there is no cross-trade in the same types of goods and a value of 100 indicates all trade is in the same kinds of commodities. As indicated in Table 6, a fairly high proportion of the current Ontario-Great Lakes trade is of the intra-industry type. Therefore, it would appear that this trade is being driven by specialisation at the firm level, rather than in the case of Atlantic Canada where specialisation appears to have taken place at the industry level. In a similar vein, it is also evident in Table 6 that in most sectors where the Great Lakes states have a high level of demand output already exists in Ontario. Therefore, increased trade is more likely to involve reorganised production within the firm (the Eastman-Stykolt hypothesis) rather than a shift in resources across sectors.

TABLE 6 Ontario-Great Lakes Trade (1993)

TABLE 6 Ontario-Great Lakes Trade (1993)

	Ontario **Exports to Great Lakes** ($US 000's)				Great Lakes		
	Actual	Predicted	Border Effect	Change	Output ($US'000)	Demand ($US '000)	G-L Ind. (%)
Food Products	539,305	411,775	6,520,991	6,109,216	18,975,585	80,366,440	25.9
Textiles	61,398	46,591	288,005	241,414	1,868,160	8,518,396	17
Apparel	55,571	102,174	1,478,067	1,375,893	1,435,049	25,595,060	22.3
Lumber & Wood	564,756	278,848	313,604	34,756	2,216,478	13,016,786	11.5
Furn. & Fixtures	597,618	157,146	354,137	196,991	1,745,466	10,061,180	60.2
Paper Products	853,962	669,630	1,479,632	810,002	5,422,415	24,789,937	15.4
Chemicals	986,541	851,436	3,123,666	2,272,230	11,855,836	54,292,407	20.1

Petro. and Coal	149,804	292,349	643,767	351,418	5,316,695	31,287,572	43.5
Rub. & Plastics	557,635	421,616	1,590,067	168,451	5,700,744	24,008,517	46.4
Leather Products	5,644	12,870	263,777	250,907	403,503	4,485,292	13.5
Stn, Clay, Glass	297,092	135,285	564,772	429,488	2,596,187	12,506,418	41.2
Primary Metals	1,440,562	923,648	2,866,453	1,942,805	8,373,198	49,131,619	26.1
Fabricat. Metals	599,261	342,483	2,302,279	1,959,796	7,529,298	37,646,946	42.4
Mach. & Equip.	1,835,438	1,066,225	2,379,100	1,312,875	7,372,810	51,881,765	26
Elect. Equip.	620,944	397,049	3,038,868	2,641,819	7,947,760	45,722,909	21.3
Transp. Equip.	10,261,502	13,897,556	13,897,556	--	60,817,315	100,313,455	56.7
Instruments	246,441	124,183	630,085	505,902	1,634,630	22,196,586	21.5
Misc. Manuf.	33,914	46,969	496,768	449,799	948,070	10,291,867	16.6
Total	19,707,387	20,177,834	42,231,594	22,053,760	152,159,199	606,113,152	43.2

Sources: Statistics Canada (1995), Bureau of Economic Analysis (1994, 1997), Bureau of the Census (1994a, 1994b, 1994c, 1995a, 1995b, 1995c,1996a and 1996b).

TABLE 7 Cascadia Trade (1993)

TABLE 7 Cascadia Trade (1993)

	Canadian Cascadia **Exports to American Cascadia** ($US 000's)				American Cascadia		
	Actual	Predicted	Border Effect	Change	Output ($US 000's)	Demand ($US 000's)	G-L Index (%)
Food Products	200,773	113,027	2,584,881	2,471,854	8,077,042	17,113,442	11.3
Textiles	1,186	1,573	6,983	5,410	127,655	1,408,342	12
Apparel	30,251	54,585	192,556	137,970	315,610	5,328,231	13.8
Lumber & Wood	916,788	1,276,222	1,465,429	189,206	8,706,687	7,873,177	23.9

Furn. & Fixtures	9,202	44,764	69,041	24,278	369,168	2,132,008	33.8
Paper Products	340,944	329,615	1,076,639	747,024	4,296,543	4,761,687	9.4
Chemicals	155,061	275,681	754,392	478,710	3,462,254	7,661,920	5.9
Petro. & Coal	45,456	104,927	258,191	153,264	3,721,981	6,686,892	25.1
Rub. & Plastics	30,588	57,739	209,919	152,179	622,152	3,628,038	40.1
Leather Products	909	2,298	7,496	5,198	26,973	885,289	34.9
Stn, Clay, Glass	53,427	94,970	241,202	146,232	1,253,217	2,399,846	30
Primary Metals	53,817	211,766	270,928	59,162	1,308,712	4,613,202	12.7
Fabricat. Metals	38,287	85,146	586,608	501,462	1,977,135	6,488,403	28.8
Mach. & Equip.	100,293	167,525	524,340	356,812	1,675,942	8,964,097	34.2
Elect. Equip.	59,947	73,842	262,433	188,591	918,462	8,311,378	21.6
Transp. Equip.	43,198	196,607	452,111	255,504	778,561	18,456,250	24.9
Instruments	10,493	27,671	39,699	12,028	204,542	4,503,504	18.7
Misc. manuf.	5,401	7,487	58,170	50,683	289,878	2,188,477	18
Total	2,096,021	3,125,445	9,061,018	5,935,567	38,132,693	113,404,183	20.5

Sources: Statistics Canada (1995), Bureau of Economic Analysis (1994, 1997), Bureau of the Census (1994a, 1994b, 1994c, 1995a, 1995b, 1995c,1996a and 1996b).

Turning finally to Cascadia, which is defined as Alberta, British Columbia, Washington State, Oregon, Idaho and Wyoming, we see a different relationship again. Cascadia appears to occupy the middle ground between the resource related manufactured outputs of Atlantic Canada and the broad based exports of Ontario. The model indicates that trade will increase significantly overall (see Table 7) and in most sectors. In particular, it predicts a larger absolute increase in trade in food products, chemicals and fabricated metal products.

Although there is a considerable basis for the integration of these two regions' economies, for several of the key sectors located in American Cascadia there is little output on the Canadian side. These sectors include electronic equipment and transportation equipment. Therefore, like Atlantic Canada, Canadian Cascadia appears to have specialised in sectors where some comparative advantage, typically resource based, exists.

What is again unclear is whether there will be a shift of resources away from these sectors to take advantage of other types of demand. That is, if the high level of demand on American side of the border is large enough for Canadian firms to organise their production to take advantage of increasing returns, the marginal revenue products of labour and capital may be high enough to attract resources to these sectors.

That being said, Canadian Cascadia does not have the advantage of a highly developed industrial economy as that found in Ontario. There large investments had already been made in plants and equipment and the broader public and private infrastructure is in place to support these industries. Therefore, Ontario would find it much easier to reorganise production to serve the large regional and continental market across the border. Furthermore, of the three regions the model predicts Ontario is the best positioned to take advantage of economic integration.

Regional Trade Policy

The final section of the paper outlines the role of regional governments in the implementation of trade policy. At least on the surface, regional governments have little control over trade since they do not regulate the flow of goods across their borders[9] and they have little influence over the monetary policies of central banks or the fiscal policies of national governments, which can both influence trade (Krugman and Obstfeld 1994). However, as I have demonstrated above, it is at a regional scale where integration is taking place, and therefore, where the underlying causes and effects of trade are to be found. Consequently, the avenues left for government to influence trade are regional. Whether states and provinces are the best vehicle for trade policy is a matter of debate (see Markusen 1996 and Porter 1996). Nevertheless, as Courchene (1998) has pointed out, in Canada and in Europe sub-national regions are increasingly taking greater control of their economic destinies, which are often tied to markets outside of their own countries. Therefore, trade is integral to their economic policies.

The question is, therefore, what form might these policies take? The discussion to this point in the paper suggests that trade depends on each region's relative factor endowment (comparative advantage) and its geographic proximity to large markets (increasing returns). Theoretically, if trade is driven by factor endowments there is little room for government policy. Specialisation that is driven by comparative advantage will ensure an optimal allocation of resources (Wong 1995). If increasing returns are driving trade, there is a theoretical basis for intervention. In the presence of increasing returns there is the potential for a process of cumulative causation to develop (Myrdal 1957). That is, if a region has an initial advantage in a particular industry its market will grow, which will in turn lead to lower production costs and a rising market share. Some have argued that this is a basis for the application of what might be loosely termed strategic trade policy (Howes and Markusen 1993). That is, regions may be able to identify high growth, highly productive industries and encourage their development through the application of subsidies as well as other policy instruments. This approach, however, has been strongly criticised by Krugman (1996). He argues that, although theoretically strategic trade policy may work, in practice the ability of governments to identify winning industries is limited and the benefits are, in a general equilibrium sense, small. Porter (1996) takes a similar perspective and argues that in Japan, where strategic trade policy may have been applied the most, the government record is at best mixed.

There is an additional argument against strategic trade policy. The underlying causes of competitiveness are so broad that it would be difficult for government to identify and create all the necessary conditions for development. Porter (1996: 87) argues that growth occurs "... because of several factors: concentration of highly specialised knowledge, inputs and institutions; the motivational benefits of local competition; and the presence of sophisticated local demand for a product or service". It is difficult to envisage how government could create these advantages where they did not to some extent already exist.

What is apparently left to regional government is the control that they exercise over the environment in which economic activity occurs (Courchene 1998; Porter 1990, 1996; Storper and Scott 1995). The point here is that although comparative advantage and increasing returns may be necessary conditions for trade they may not be sufficient conditions. In this context, the role of regional policy becomes a question of how governments can enhance the economic advantages that regions already possess. There is an important difference between this approach and that of strategic trade policy. Strategic trade policy is based on the identification of sectors where rents can be accumulated. Through the application of export subsidies a nation's or region's firms may be able to achieve enough market power that their rents outweigh the costs of subsidising the industry. Here I am arguing that government policy may be effective where a region's advantage has already been revealed. This is similar to the argument made by Porter (1990, 1996) and Bröcker (1997), among others.

At this juncture, it is helpful return to a discussion of the data presented above. As was noted above, in the case of Atlantic Canada-New England trade, Atlantic Canada appears to have specialised in resource related manufacturing sectors where it benefits from comparative advantage. However, at present, Atlantic Canada has only a fairly small presence in those sectors where there is a considerable amount of demand in New England (for example, machinery and equipment and electronic equipment). Given New England's proximity and the size of its market, this would appear to be an important area for public investment of resources. However, why should resources be directed towards these sectors? Even if, for example, electronic equipment pays a wage premium over that of food products, it is unlikely the benefits would outweigh the costs of government intervention. This does not mean that development in these sectors should be discouraged. However, the model's prediction that trade in food products may increase substantially from their predicted level implies this may be a more productive area of public investment. The same argument might be made regarding food products and paper products in Canadian Cascadia.

To gain an additional perspective, it is useful to look at the relationship between Ontario and the Great Lakes region. Here Ontario's manufacturing sector that developed to serve the national market has and continues to reorient itself to serve the Great Lakes market, especially in intermediate inputs (Courchene 1998; Brown and Anderson 1999). Given the large amount of intra-industry trade between Ontario and the Great Lakes states, it would appear that trade is being driven by specialisation at the firm level. That is, the data are consistent with the Eastman-Stykolt hypothesis. What then is the role of regional policy in this case?

In the instance of Atlantic Canada-New England trade, the argument is that Atlantic Canada could specialise to serve the New England market. However, this specialisation would tend to enhance their economic differences since it would take place at the sectoral level. This also implies the room for policy coordination among the Atlantic provinces and New England states is fairly narrow. Atlantic Canada acts as a supplier to New England but there is little economic integration beyond that.

As I have noted, in the case of Ontario-Great Lakes trade, specialisation appears to be taking place at the firm level: that is, the economic similarities of these regions are driving trade. To a lesser degree this is the case in Cascadia as well. To the extent that economic integration increases the economic efficiency of producers on both sides of the border, both regions will benefit; external returns spill over the border (Brown and Anderson 1998b, 1999). For Ontario-Great Lakes and Cascadia there is considerably more latitude for regional trade policy in the form of intergovernmental cooperation.

For example, given that intra-industry trade in intermediate goods appears to more sensitive to the friction of distance (Brown and Anderson 1999), it is in the interest of all parties that the flows of goods across their borders be as frictionless as possible. Therefore, efforts to reduce any delays at the border or to harmonise their regulations that might impede trade are very practical measures that can be taken. This would also have the added benefit of increasing the competitive pressures on local firms, which Porter (1990, 1996) argues is one of the main drivers of competitive success.

Conclusions

Over the last half century, Canada has moved from an economy that was focussed on supplying its national market to one that is oriented towards serving a continental market. This move in the direction of more open trade has been driven by the benefits that accrue from comparative advantage but also the benefits of specialisation at the level of the firm. What the analysis indicates is that the trading relationship between the United States and Canada is very much a regional one. Regions that are in close geographic proximity are the most integrated. Furthermore, it is these regions where the potential for increased trade is the greatest, and therefore, where efforts on the part of governments to increase trade may be the most effective.

What the analysis also shows is that the potential for trade among these transnational regions varies significantly and the bases for economic integration also differs across regions. Therefore, regional trade policy will also vary. In Atlantic Canada-New England the role of government may be limited to enhancing the region's resource related manufacturing sectors, which in turn would tend to enhance the differences between the two regions. Therefore, their latitude for economic cooperation is limited. On the other hand, the economic integration of Ontario with the Great Lakes states is based on intra-industry specialisation. Here the fortunes of regions on both sides of the border are tied much more closely together, and therefore, the basis for regional cooperation is broader.

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Appendix

Estimation procedure

In order to estimate (3), it can be linearized as follows:

$$ {}_{i,AB} - \frac{1}{R}\sum_{A=1}^{R} LNT_{i,AB} = \sum_{K=1}^{L}\eta_K\left(LNZ_{K_{AB}} - \frac{1}{R}\sum_{A=1}^{R} LNZ_{K_{AB}}\right) + \phi\left(LNX_{i_A} - \frac{1}{R}\sum_{A=1}^{R} LNX_{i_A}\right) \quad (A1) $$

The proof of (A1) can be found in Fotheringham and O'Kelly (1989). One important characteristic of (A1) is that if we wish to account for the influence of the border on trade using a dummy variable for province-state flows, it is only applicable to Canadian exports to American regions. This is due to the fact that the model is estimated based on the value of each variable minus the average for each destination. Consequently, if a dummy variable is used for Canadian destinations, the value of the variable would be zero. Therefore, in the analysis it is only possible to measure the influence of the border on Canadian exports to the United States.

The predicted level of interregional trade flows are determined by the probability that commodity *i* will be sourced from region *A*:

$$P_{I,AB} = \frac{\prod_{K=1}^{L} Z_{K_{AB}}^{\eta_K} X_{I_A}^{\omega}}{\sum_{A=1}^{R} \prod_{K=1}^{L} Z_{K_{AB}}^{\eta_K} X_{I_A}^{\omega}}, \qquad (A2)$$

multiplied by the total imports into region *B*:

$$\hat{T}_{I,AB} = \sum_{A=1}^{R} T_{I,AB} P_{I,AB}. \qquad (A3)$$

Data Requirements

The data required to estimate (A1) includes trade flows, manufacturing output, cost data, and nominal data (dummy variables). A detailed overview of the sources of these data can be found in Brown and Anderson (1998a, 1999). Consequently, I will review the sources of the data very briefly below.

In the analysis we use internal American trade as a benchmark of economic integration. These trade flows are compared with province to state trade to determine the potential volume of trade between Canadian and American regions. Internal U.S. trade flows are measured using the Bureau of Transportation Statistics' Commodity Flow Survey (CFS)(Bureau of the Census 1997) and province to state flows are derived from Statistics Canada's TIERS (1996) data base.[10]

Manufacturing output data are provided by Statistics Canada (1995) and the Census Bureau's (1996) 1993 survey of manufacturers. Data regarding industrial output and demand outside of the manufacturing industries, which are only required for American regions, were covered by the economic census in 1992 (Bureau of the Census, 1994a, 1994b, 1994c, 1995a, 1995b, 1996a, and 1996b). When data at the state level were not available, the sector's output was allocated by state using the County Business Patterns (Bureau of the Census 1995c) employment statistics. In the few instances where employment data were reported only by intervals, we took the average of the interval as the level of employment. Finally, in most instances state level data was only available for 1992. These data were inflated to 1993 level using gross output at the national level for those sectors (Bureau of Economic Analysis 1997).