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# Do National Borders Matter for Quebec's Trade?

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John F. Helliwell[1]

## I INTRODUCTION

Growing trade and capital mobility, and much talk of globalization, may have created the impression that national boundaries no longer matter much for trade and capital movements. John McCallum (1995) has compared trade flows among Canadian provinces with those between Canadian provinces and U.S. states, making use of a gravity model in which trade is determined primarily by the economic size of the trading partners and the distance between them, to calculate that Canadian provinces trade about 20 times as much with each other as with U.S. states of a similar size and distance. Thus the trade-generating powers of the Canadian federation are more than an order of magnitude larger than those of the European Union[2].

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[1] Department of Economics, University of British Columbia, Vancouver B.C. V6T 1Z1. I am very grateful for the research collaboration of John McCallum, the research assistance of Julie Chu and Ross McKitrick, and research support from the Social Sciences and Humanities Research Council of Canada. Philip Cross, Jim Nightingale and Claude Simard of Statistics Canada have been helpful in providing access to and understanding of the latest provincial trade and output data. Earlier versions of this paper have been presented at the Annual Meetings of the Canadian Economics Association, at the NBER (and also as NBER Working Paper No. 5215), at the University of Western Ontario Political Economy Seminar, the Harvard International Economics Seminar, and as a Laurier Lecture at Wilfrid Laurier University. In revising the paper, I have been aided by helpful suggestions from many, including three anonymous referees, Bob Allen, Paul Beaudry, Don Davis, Mick Devereux, Erwin Diewert, Marc Duhamel, Manfred Keil, Phil Neher, and Shang-Jin Wei.

[2] Frankel and Wei (1993) estimate that trade flows among the countries of the European Union are 1.6 times larger than those between EU countries and non-EU countries, after using a gravity model to allow for the effects of size and distance. Using differenced version of the gravity model, Bayoumi and Eichengreen (1995) estimate that from 1956 to 1973 trade among the six original members of the European Economic Community (EEC) grew 3.2% per annum faster than would be predicted by the gravity model. Trade among the seven largest members of the European Free Trade Association (EFTA) grew 2.3% faster over the same period. The estimated cumulative level effects amount to 88% for the EEC and 58% for EFTA.

These new results are important, as they challenge many of the presumptions often made about the relative importance of international and interprovincial trade, and about the ability of trade flows to arbitrage away international price differences. Survey results presented in this paper show that experts and non-experts alike think that trade between provinces and trade between provinces and states tend to be fairly similar in magnitude, after adjusting for the effects of distance and market size. The median respondent estimated that the factor of 20 quoted above was actually less than 1.0. Even those who thought interprovincial trade to be more active than trade from Canadian provinces to U.S. states usually guessed the extent to be between 1.0 and 1.4, more than an order of magnitude below the latest estimates presented in the next section. The vast difference between perceived and measured differences between interprovincial and international trade linkages emphasizes the potential importance of the new results, if it is fair to treat the impact of an empirical finding to be a product of how dramatically it differs from received opinion and the strength of the evidence on which it is based. If the McCallum results are confirmed, they also have important implications for the assessment of the economic effects of Quebec separation. If national boundaries are such an important determinant of trade, the ability to maintain the existing trade linkages with the rest of Canada after separation becomes both more important and more uncertain. Similarly, if interprovincial trade is so much more important than international trade, it is less easy to assume that expanded trade with the United States can be used to replace interprovincial trade now taking place.

This paper attempts to assess the importance of this new research for Quebec by first updating and extending McCallum's analysis to make use of revised and additional data and then examining the extent to which Quebec's interprovincial and U.S. trade patterns support the revised national results. The paper then tries to place the new results in the context of other studies of the differences between national and global markets. Finally, some attempt is made to assess the possible implications for trade theory and policy, as well as for the economic consequences of Quebec independence.

## II REVISED AND EXTENDED NATIONAL RESULTS

The basic explanatory equation used by McCallum (1995) embodies the long-established gravity model of trade, wherein trade flows from an exporting region i to an importing region j are a loglinear function of real GDPs in the two regions and the distance between them:

$$(1)\ \ln S_{ij} = \alpha_0 + \alpha_1 \ln GDPX + \alpha_2 \ln GDPM + \alpha_3 \ln(dist) + \epsilon_{ij}$$

where, in the present application, shipments ($S_{ij}$), and the GDPs of exporters (GDPX) and importers (GDPM) are measured in million Canadian dollars[3], distance is measured in miles between the principal cities in the respective states and provinces[4], and the error term $\epsilon_{ij}$ is assumed to be normally distributed. The gravity model of trade is an example of a long-established empirical regularity (Linneman 1966) that had no ready derivation from the standard Heckscher-Ohlin model of comparative advantage that dominated trade theory at the time. In the last fifteen years, however, there has been an outpouring of trade theory that includes one or more forms of product differentiation or market segmentation, often in the context of some type of increasing returns to scale. Helpman (1984) surveys some of the models, and shows how

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[3] Purchasing power parities for GDP, taken from version 5.6 of the Penn World Table (Summers and Heston 1991) are used to convert U.S. state GDPs to Canadian dollars. In McCallum (1995) an exchange rate of .85 $US/$C was used to convert provincial GDPs to US dollars, and the state GDPs were left in their original published form. Here we use PPPs, in terms of $C/$US, of 1.2090, 1.2087, and 1.2074 for 1988, 1989, and 1990.

[4] The results for the border effect are very robust with respect to changes in the specification of the distance variable. For example, adding distance and the square of distance to supplement the ln(dist) variable already in equation 1 does not alter (to three significant figures) the coefficient on the border variable. The logarithmic distance variable is statistically preferred, by a vary large margin, to the quadratic form. The loglinear distance variable could not be plausibly excluded from a general model that includes all three distance variables ($p<.00001$ using a Wald test for restricting the coefficient of ln(dist)=0 with the linear and quadratic variables still in the equation), while both the linear and quadratic terms could be removed from the general model, in any of the annual equations reported in Table 1, with an insignificant drop ($p=.15$, based on a Wald test for restricting both coefficients to zero) in the explanatory power of the equation.

differentiated products give rise to the gravity equation as the predictor for bilateral trade flows. More recently, Deardorff (1995) has shown that the gravity model is also consistent with a much wider variety of models.

Table 1 reports the latest results, using data for 1988, 1989 and 1990 to estimate separate equations for each year, and then to estimate a system of three equations using an iterative version of Zellner's SUR with the coefficients restricted to be the same in all years. The new equation for 1988 differs slightly from that of McCallum, mainly because of revisions to the shipments data for 1988, and to our current use of shipments of total goods rather than the slightly smaller manufacturing-plus-primary aggregate used by McCallum. The latest 1988 estimate of interprovincial trade as a multiple of province-state trade is 19.9 (calculated as the antilog of 2.99), compared to McCallum's original estimate of 22. The estimated trade multiple for 1989 is 18.7, while that for 1990 is 25.0. When data for all three years are combined, the estimated border effect is 21.1. Although there have been no direct measures of interprovincial trade flows since 1990, some results will be reported in Figure 1 make use of the approximate measures of interprovincial trade published in the provincial accounts for 1991-1994.

## III IS QUEBEC'S TRADE DIFFERENT?

Table 2 shows the effect of adding separate variables for covering first Quebec's trade with the thirty U.S. states (QUUS) in the study, and then Quebec's interprovincial trade (QUC). If Quebec's trading relations with U.S. states are stronger than those between other provinces and the U.S. states, then QUUS would take a positive sign. Similarly, if Quebec's trading links with other provinces are stronger than those among the anglophone provinces, then QUC will take a positive sign. The results show that Quebec's imports from and exports[5] to the thirty U.S. states are significantly below those of the other provinces. Quebec's interprovincial trade is slightly less

[5] The effects on imports and exports are identical, as revealed by splitting QUUS into separate variables for imports and exports, and finding identical values for the two coefficients.

than for the other provinces, although these latter differences are not statistically significant. If we add these Quebec effects to the national border effect, we can answer for Quebec the analogous question to that asked by McCallum for the country as a whole: How large is Quebec's trade with other provinces, compared to that with U.S. states, after adjusting for the effects of size and distance? Pooling the data for 1988-1990, the answer for Quebec is 32.1 if we include only the significant U.S. effect (32.1 is exp(3.08+.39)), or 26.8 if the coefficient on Quc is also included (26.8=exp(3.08+.39-.18). This suggests that Quebec's trading links with the rest of Canada, relative to those with the United States, are at least as strong as for other provinces.

A simpler and more conclusive way of estimating border effects for Quebec, if the data sample proves to be large enough, involves using data relating only to shipments to and from Quebec. This strategy would ensure that the Quebec results are not based on the particular situation of some other province. Since Quebec is also the second-largest trading province, the results will also help to reveal if the border effects already established are somehow due to the trade of the smaller provinces that may be unrepresentative of total national trade. Table 3 shows separate Quebec equations for each of the three years, 1988 to 1990, and then the results using data for the three years combined using the iterative Zellner technique. The layout of Table 3 is thus the same as that of Table 1, and comparison of the results reveals that the border effects follow a similar year-to-year variation for Quebec, and are for two of the three years higher for Quebec than for the average of all provinces. Comparison of Tables 2 and 3 shows that the Quebec effects are estimated to be larger using the full data set (as in Table 2) than using the shipments data for Quebec itself, as in Table 3. The Table 3 results for Quebec are very close to those in Table 1 for Canada as a whole, and for the three years taken together are exactly the same. In no case are the differences between Quebec and Canada statistically significant. Using the results from equation (iv) in each Table, the pooled three-year border effect for Quebec is 21.1 (from Table 3) or 26.8 (from Table 2) compared to 21.1 (from Table 1) for the typical province. Thus the evidence from all three years, treated separately or together, suggests that national borders probably matter at least as much for Quebec as for the rest of Canada.

## IV HOW SURPRISING ARE THESE RESULTS?

The bilateral trade flows between Canada and the United States are the largest in the world. The two countries share an enormous land mass divided by a border that is part easily navigable water and part an unmarked line that cuts the continental divide almost at right angles. Tariffs and other border limitations to trade and capital movements are and have long been lower than almost anywhere in the world, and Canada has the largest degree of foreign ownership among any of the industrial countries, with the United States being by far the largest source country. If ever one would expect to find a national border that had relatively little effect on trade and capital movements, it would be the line between Canada and the United States. There has also been much talk about interprovincial trade barriers, which have been the focus of occasional spats and frequent meetings, with some estimates of their aggregate cost being as high as 1% of GDP[6].

When this information is combined with the fact much of the fresh produce that Canadians eat, especially in the winter, is trucked in from California, it is perhaps understandable that surveys uniformly showed no premonition of the results shown in Tables 1 to 3. When asked to estimate how much trade Canadian provinces do with each other, in comparison to how much they trade with U.S. states of similar economic size and at a similar distance, a group of faculty and graduating students in economics and political science produced a median answer of 0.8, with two-thirds of the 71 responses falling between 0.7 and 1.1. That is, some thought that trade linkages among the provinces are slightly tighter than are

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[6] Desmond Morton reminded the UBC Quebec/Canada conference in March 1995, where some of these results were presented, that it was concern about interprovincial trade barriers, and other impediments to a smoothly functioning national economy, that apparently finally decided Jacques Parizeau, in the course of travel to a meeting in Banff, that Canada could not be made to work satisfactorily, and that Quebec would be better off on its own.

the trade linkages between the Canadian provinces and U.S. states, and some thought that they are slightly weaker, with the range of answers being fairly narrow.

But the current econometric estimate of the same effect is not 0.7 or 1.1, or anything even remotely close. Figure 1 juxtaposes the survey responses with the estimated distribution of the national effect based on equation (iv) in Table 1. The survey responses are shown as unchanging from year to year, since the survey question was asked without reference to a specific year. Figure 1 also shows approximate estimates for the years 1991 through 1994, using procedures to be described later. If we ask whether the statistical results can come from the same realm as the survey results, the answer is surely not[7]. Unless there are some very large errors lurking in the measurement or modelling of interprovincial and international trade data, then previous impressions about the relative tightness of the economic union have been far off the mark.

Given the startling nature of the results, it is important to make confirming tests of these and related data to see if the results are due to some arbitrary or accidental feature of the data or the specification. Since the functional form of the distance relation might well be non-linear, we repeated McCallum's tests of alternative functional forms, including linear and squared distance terms, either separately or in addition to the log-linear term. The log-linear formulation was empirically superior, as described in a previous footnote[8]. More importantly,

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[7] More precisely, if we compare the distributions of the survey responses quoted above with the distribution of the antilogs of the estimated coefficient on the border variable for 1988, the z-value of the difference of the means is 57. This may be compared to a critical value, with a confidence limit of one-ten-millionth of 1%, of 6. Thus there is thus much less than one chance in a billion that the two distributions have the same means.

[8] Bayoumi and Eichengreen (1995) also find that changes in the functional form used for the distance variable had little impact on their estimates of the trade consequences of the EC and EFTA.

the coefficient on the border variable was unaffected by changing the functional form of the distance variable.

As in McCallum (1995), tests were done to make sure that the results did not change under instrumental variables estimation, or with weighted regression based on the geometric mean of trading partner GDPs. Additional tests have shown that trade flows are slightly better explained if the gravity model uses population and per capita GDP separately for importing states or provinces, but this does not change the border effects. Constraining the GDP coefficients to be unity would lower the Quebec border effect from 21.1 to 19.5 in the pooled equation of Table 3, but these restrictions are sharply rejected by the data ($p < .00001$).

It has been suggested that there is a risk that some of the measured bilateral trade flows from provinces to border states are then directed to other states. This was tested for by first allowing for adjacency effects in general, and then asking if there were additional trade flows from provinces to border states beyond those that could be explained by adjacency, GDP and distance. We found both sorts of adjacency effects, of slight statistical significance, but they had no impact on the estimated border effect. We also considered whether being on the ocean might affect trade linkages in such a way as to compromise the estimated border effect. We hypothesized that being on the ocean might reduce a province's continental trade, whether with other provinces or with U.S. states, since relative transport costs to and from overseas markets are lower for the coastal provinces than for the others, who are therefore induced to trade more with each other and with the United States. However, if provinces and U.S. states are both on the ocean, their trade is likely to be greater than would otherwise be indicated by their distance, since shipping costs, especially for bulk cargoes, are less for ocean transport than for surface or air modes. The results show that both of these hypotheses are borne out. Simultaneously adding the adjacency and ocean effects to the Table 1 equation (iv) system of

equations for 1988 to 1990 improves the overall fit of the gravity model, and increases rather than decreases the estimated border effects[9].

To further investigate the possible sources and structure of the strong interprovincial trade linkages, we also considered the hypothesis that there are economies of scale in importation, with products from the United States being shipped to one province for subsequent distribution to the other provinces. Since location and corporate structure make Ontario the most obvious candidate to play such an entrepôt role, a variable was constructed taking the value of 1.0 for all trade flows from U.S. states to Ontario and equal to a higher value (to balance the estimated Ontario entrepôt trade) for observations covering shipments from Ontario to other provinces[10]. If this distribution channel is an important part of the story, we would expect to find a significant positive coefficient on the variable and a related drop in the estimated border effect. Although the coefficient is positive in two of the three years, it is small and insignificant, and does not influence the estimated border effect. One reason why this effect does not show up in the equation may be that the raw data themselves may not fully track imports to their province of final use (just as was found for exports, which did not appear to be fully tracked to their state of final use). If so, then further work on the data could

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[9] The coefficient on Cdummy rises from 3.05 to 3.14 (t=26.3), corresponding to an increase in the estimated border effect from 21.1 to 23.2. The GDP elasticities are unchanged, while the distance elasticity drops from -1.38 to -1.23, reflecting the trade-increasing effects of adjacency (+.31, t=1.5), the additional shipments to U.S. border states (+.78, t=2.5), the negative North American trade effects of being on an ocean (-.88, t=8.6), and the partially offsetting positive effects of both North American partners being on the ocean (+.16, t=1.8). The standard errors of estimate are 1.04, 1.07 and 1.11 for 1988, 1989 and 1990, respectively, lower than those of the simpler model in Table 1.

[10] Given the log-linear formulation of the equation, the dummy variables must adjust for differences in the size as well as the number of states and provinces. The values of the dummy variable are 1.0 for flows from states to Ontario, and are about 8 for the flows from Ontario to the provinces. In each year the number is calculated as (30/10)*(mean state GDP)/(mean provincial GDP).

increase the relative importance of interprovincial compared to international trade. In any event, it would seem that the current estimates of high interprovincial trade densities are not due to an Ontario entrepôt effect.

Although weighted regression using the geometric mean of GDPs did not alter the results, weighted regression using shipments data themselves as the weights reduces the coefficients on the border variable sharply, from about 3.0 to about 2.2. This is what one might expect, since the largest trade flows are among the states and provinces heavily involved in the auto industry, which makes up a substantial part of total goods trade, and where a high level of industry integration has existed for many years. However, it is important to remember that separate estimation using just data for Quebec, the second-largest trading province, gives very similar border effects to those estimated using the full data set. Thus the large estimated border effects cannot be due to some peculiarity of the data or trading patterns of one or more of the smaller provinces.

There are now several further lines of thought to follow. One is to ask what other evidence there may be that could support or weaken the finding that interprovincial trade linkages are much tighter than those between countries. A second is to ask why it can have been, if the result stands up to scrutiny, that prior beliefs were so out of line with the data. A third is to ask what downward trends are likely to occur in the estimated border effects when interprovincial trade data become available for the 1990s, and to assess the less complete data for trade in services. A final question is to ask what might be the implications for future research and policy.

Starting with the first question, the related literature in international economics should help to reveal from different perspectives the relative strength of interprovincial and

international linkages. A useful starting point is provided by recent papers comparing price variability within and between countries. Since one of the incentives for and consequences of trade is to arbitrage spatial differences in prices, one would expect to find this arbitrage process being faster and more complete where trade is more active. In particular, if trade within a nation is much denser than that among nations, purchasing power parity should be much more quickly and completely evident within than between countries. This is exactly what recent comparisons of price differences for tradeable goods seem to show. Wei and Parsley (1995) find that half of international differences in the prices of tradeable goods are removed in four to five years[11], while among U.S. cities Parsley and Wei (1995) estimate the comparable time to be four to five months, after adjusting for differences in distance. This is consistent with the results of Engel and Rogers (1994), who have studied the variability of prices among cities in the United States and Canada, with allowance for distance and a border effect. Comparing the border and distance effects, they found that the border reduced the covariability of prices by as much as would two thousand or more miles of distance.

If domestic markets for goods are much tighter than international markets, then one would expect to find something similar for capital markets, despite the frequent assumption that global capital markets are completely integrated. In an important but controversial paper first presented more than fifteen years ago as a Mackintosh Lecture at Queen's University, Feldstein and Horioka (1980) showed that national savings and investment rates were highly correlated, which they took to imply that international capital markets were not anything like as tightly integrated as was commonly assumed. Other researchers argued that the Feldstein and Horioka results could be consistent with high capital mobility, although subsequent

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[11] This is similar to the four-year half life estimated for 150 countries and 45 annual observations by Frankel and Rose (1995). As noted by Froot and Rogoff (1994), the use of panel data covering a large number of countries is required to get reliable estimates of PPP reversion times against the alternative random walk hypothesis.

research has gradually led researchers to treat the Feldstein and Horioka results as being consistent with a number of other studies, using quite different methods, implying that international capital markets are much less integrated than are national ones[12]. If the Feldstein/Horioka interpretation of the cross-country results is correct, and if the new results about the tightness of the Canadian economic union are correct, then correlations of savings and investment rates across provinces should be far lower than across countries. This seems to be the case, as private savings appear to flow sufficiently fluidly from one province to another to remove any cross-sectional correlation between savings rates and investment rates on a province-by-province basis[13]. Bayoumi and Klein (1995) also use the provincial trade balance data to test and compare interprovincial and international capital mobility, employing a somewhat different specification than Feldstein and Horioka, and conclude that capital mobility is much higher among Canadian provinces than between Canada and other countries.

Thus there is some evidence of different types supporting the idea that the economic linkages within a nation are much tighter than those between nations. But why? The answers are simply not known at this stage, and in the meantime the result stands as a challenge to conventional views of trade that assume that international trade will be as dense as national trade in the absence of any special barriers or costs. The difference between domestic and international trade densities now appears to be much higher than could easily be explained by

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[12] For example, there is much evidence, recently surveyed by Engel (1995), of a negative correlation between the forward exchange premium and future movements of the spot rate. There is also strong evidence, surveyed by Lewis (1994), of a 'home bias' in equity investment. Both of these types of evidence imply that international capital markets are significantly less integrated than domestic markets.

[13] Brown (1992, especially Figures B-1 and B-2) compares the international and interprovincial correlations between savings and investment, and shows that the correlations apparent among countries do not appear among the provinces. There are similar results, using less complete data, for US states (Sinn (1992) and for Japanese regions (Dekle 1995).

usual estimates of the effects of tariff barriers, exchange rate uncertainty, tax differences and other costs that may apply differently to domestic and international shipments. The separate role of each of these factors needs to be assessed, but there is likely to remain a tendency for firms and individuals to trade more intensively with others in the same country. The reasons for this may lie in a whole mix of educational, cultural, historical, political, associational, emotional, and geographical links based on migration and family ties, and supported by networks of transportation, communication, and education. The relative importance of these and other possible explanations remains to be established.

Turning to the second question, as to how such an important fact, if it is that, could have avoided earlier discovery, the most likely reason is the lack of comparable data for trade flows within countries[14]. The Statistics Canada interprovincial trade data are probably unique, are relatively recent, and are only available for a few years. Only in a fairly decentralized federation are there likely to be serious efforts to put together accounts for the provincial economies, yet data collection needs to be either centralized or well-coordinated if the data are to be collected on a sufficiently complete and thorough basis. In addition, only since 1988 have the Canadian international trade statistics been expanded to include exports and imports to and from each province and each U.S. state, permitting a geographically oriented model of province-state trade flows to be estimated with a reasonable sample size and sufficient geographic detail. When McCallum did his first estimates, there was only one year, 1988, for which both the interprovincial and international shipments data were available to permit the

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[14] Another possibility, suggested by recent research by Wei (1996) using international trade among OECD countries, in combination with approximations for of internal trade volumes and distances for each of the countries, is that the national border effect is larger for Canada than for other countries. It may in the future prove possible to do a three-level analysis, using a combination of the approach of this paper and that of the Wei paper, to estimate the comparative importance of provincial and national borders, by making use of the existing Canadian data for within-province shipments and developing estimates of typical within-province shipment distances.

model of trade flows among provinces, and between provinces and states, to be estimated. Even now, there are only three years of data available, so the possibility for the research to be done is relatively recent. Only in late 1995 did funds become available to update the interprovincial shipments surveys and data into the 1990s, so that survey-based data for the 1990s are not likely to be available until 1997.

A second reason for perceptions to diverge from the new results is that there are trade data published showing international trade to be large and growing, and showing international trade to be larger than interprovincial shipments for a number of provinces. Data drawn from the provincial accounts show international shipments of goods rising faster than interprovincial shipments from 1990 through 1994[15]. Since there are no post-1990 direct measures of interprovincial trade data, the subsequent interprovincial trade flows are based on the assumption that total interprovincial exports grow at the same rate as domestic final demand. These interprovincial export figures are allocated among importing provinces, on a commodity-by-commodity basis for 300 commodities, according to the 1990 exports from each province to each other province. The directly measured data for foreign trade show sharp increases since 1990, while the method used to estimate interprovincial trade has it growing in line with domestic final demand, which was sluggish during the early 1990s. To derive the regression estimates for 1991 through 1994 shown in Figure 1, the total interprovincial export estimates from the provincial accounts were allocated among importing provinces using the measured 1990 export shares, thus replicating in the aggregate the same assumptions used by Statistics Canada at a disaggregated level. Since the data thereby derived for each province's total interprovincial imports diverged from the numbers published in the interprovincial accounts, alternative estimates were also prepared starting with the aggregate interprovincial

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[15] The ratio of interprovincial to international trade in services is always much higher than for goods, and shows no downward trend in the 1990s. The ratios are shown separately for goods and services in Helliwell and McCallum (1995).

import figures and allocating them among the exporting provinces using the 1990 import shares. The results were so similar that only the results of the first procedure are shown in Figure 1.

What is likely to happen to estimates of the border effect if and when directly measured interprovincial trade data are available for the 1990s? The sharp growth in international trade suggests that we might expect a downward trend to emerge during the 1990s. However, our results for 1990 caution a wait-and-see attitude. We also need to consider also whether the approximations used in the provincial accounts are likely to be confirmed by subsequent direct estimation. The current series for the 1990s are likely to be underestimates of directly measured flows if there are substantial interprovincial trade flows associated with international trade (exports were growing faster than domestic demand in the early 1990s) or if there are trend increases in interprovincial trade for some of the same reasons that international trade has grown relative to world GDP. The directly estimated numbers, when they become available, are likely to show interprovincial trade growing less fast than trade with U.S. states in the early 1990s. One reason for this is that foreign demand has risen faster than domestic demand for cyclical reasons, with Canada facing a larger recession than that in the United States. However, the cyclical increase in exports would be offset, in part or whole, by the cyclical reduction in imports, so the net foreign trade effect of the cyclical asymmetry is not certain. More importantly, there is ample evidence of post-NAFTA increases in trade with the United States. This may entail some facilitating expansions of interprovincial trade, although some of the new U.S. shipments may reflect diversion of what might otherwise have been interprovincial shipments. The net NAFTA effect is likely to be to increase province-state trade relative to province-to-province trade. Thus the downward trend shown for the 1990s in Figure 1 are likely to be right, at least in direction. However, there seems to be little likelihood that 1990s data, if and when they become available, will to give mid-1990s

estimates of the border effect that are much less than fifteen for merchandise trade, and much more for services, for either Canada or Quebec.

The final question relates to the implications of the new results for trade theory and policy, and for the consequences of possible Quebec separation. Dealing first with trade theory and policy, the results pose a puzzle for existing estimates of the quantitative effects of trade liberalization. The implication of these estimates is that international trade flows would remain much less dense than national trading ties even after all tariffs were removed. Why, and with what consequences for economic and social welfare? Does the relatively undeveloped state of international trade mean that there are many future gains from specialization and comparative advantage still to come? Are the border effects similar for different types of merchandise trade, or are they concentrated in particular industries? How much of the border effect is a currency effect[16]? Could there be multiple equilibria with very different trading patterns but fairly similar aggregate welfare effects, as might be the case if some of the additional variety provided by intra-industry trade leads to consumption bundles that differ more in brands than in basic characteristics? Could the information and other ties implicit in the political and information structure of most nation states provide lower transactions costs than would a more globally diversified set of trading links? If so, then the much greater relative density of national trade may be likely to persist even in the long run.

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[16] Attempts to estimate the trade level effects of exchange rate variability have shown mixed results. One of the higher estimates is by De Grauwe (1988), who estimated that 1986 trade among the large industrial countries was about 1.5% lower than it would have been if exchange rate variability had not increased after 1973. This is very small compared to the twenty-fold border effects. Caporale and Doroodian (1994) find a significant effect of conditional real exchange rate variance on U.S. imports from Canada, but their functional form is such as to imply infinite imports if the real exchange rate were unchanging, so their equation cannot be used to estimate how much of the border effect might be explained by exchange rate variance. Frankel and Wei (1994), using data for 63 countries for 1980, 1985 and 1990, do not find systematic negative effects of exchange rate variability on bilateral trade flows.

Another question for theoretical and empirical work can be put in the form of three propositions and a resulting puzzle. If: (i) much of the observed convergence is related to the transfer of technologies from the more to the less advanced countries or regions, (ii) the speed of convergence depends positively on a region's openness to trade, and (iii) trade is twenty times as dense within as between countries; then the puzzle is how to explain the apparent fact that inter-regional convergence within countries does not appear to be much faster than that between countries.

Finally, if it should be found, as suggested by the preliminary results of Wei (1996), that border effects are higher for Canada than for other OECD countries, there will arise the need to explain why such a decentralized federation should have such a high density of internal trade.

Turning to the implications for Quebec, the current results show that Quebec is even more enmeshed in the fabric of Canada, relative to its ties to the United States, than are the anglophone provinces. One line of thinking about separation is based on the assumption that Quebec already has equally close trading ties with the ROC and the United States, so that there could not be much at stake in moving from treating the ROC as other provinces to another country. But since the assumption is wrong by a factor of more than twenty, there is clearly more at stake than is commonly assumed. Since the welfare implications of high national trade densities have not been fully assessed, and since the ability of Quebec and Canada to maintain existing trade patterns after separation is not known, the trade-related costs of breaking up the political union cannot be fully assessed. The central point is that the fabric of the Canadian economic union is much tighter and more closely woven than anyone had previously believed. Since the discovery of the relative tightness of the economic union is relatively recent, a full understanding of what factors make the economic linkages among provinces so much stronger

than those with the United States has not yet been developed. Thus it is not easy to tell which of these factors would be most likely to be put at risk if Quebec became an independent country. As shown by the gap between the survey results and the new evidence, there is a large gulf between perception and reality. This paper has been a small attempt to fill the gap.

## REFERENCES

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

Bayoumi, T. and M.W. Klein (1995) "A Provincial View of Capital Mobility." **NBER Working Paper** No. 5115 (Cambridge: National Bureau of Economic Research).

Brown, D.M. (1992) "Efficiency, Capital Mobility and the Economic Union." In D.M. Brown, F. Lazar, and D. Schwanen, **Free to Move: Strengthening the Economic Union**. (Toronto: C.D. Howe Institute) 38-98.

Caporale, Tony and Khosrow Doroodian (1994) "Exchange Rate Variability and the Flow of International Trade." **Economics Letters 46**(1):49-53.

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

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

Dekle, R. (1995) "Savings-Investment Associations and Capital Mobility: On the Evidence from Japanese Regional Data." **International Finance Discussion Papers** No. 496 (Washington: Board of Governors of the Federal Reserve System)

Engel, C. (1995) "The Forward Discount Anomaly and the Risk Premium: A Survey of Recent Evidence." **NBER Working Paper** No. 5312. (Cambridge: National Bureau of Economic Research)

Engel, C., and J.H. Rogers (1994) "How Wide is the Border?" **NBER Working Paper** No. 4829 (Cambridge: National Bureau of Economic Research)

Feldstein, M., and C. Horioka (1980) "Domestic Saving and International Capital Flows." **Economic Journal 90** (June 1980): 314-29.

Frankel, Jeffrey A. and Andrew K. Rose (1995) "A Panel Project on Purchasing Power Parity: Mean Reversion Within and Between Countries." **NBER Working Paper** No. 5006. (Cambridge: National Bureau of Economic Research).

Frankel, J. and S.-J. Wei (1993) "Trade Blocs and Currency Blocs." **NBER Working Paper** No. 4335. (Cambridge: National Bureau of Economic Research)

Frankel, J. and S.-J. Wei (1994) "Yen Bloc or Dollar Bloc? Exchange Rate Policies of the East-Asian Economies." In Takatoshi Ito and Anne O. Kreuger, eds. **Macroeconomic Linkage: Savings, Exchange Rates, and Capital Flows.** (Chicago: University of Chicago Press) 295-333.

Froot, Kenneth A. and Kenneth Rogoff (1994) "Perspectives on PPP and Long-Run Real Exchange Rates." **NBER Working Paper** No. 4952. (Cambridge: National Bureau of Economic Research).

Helliwell, John F. and John McCallum (1995) "National Borders Still Matter for Trade." **Policy Options/Options Politiques 16** (July/August 1995):44-8.

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

Lewis, Karen (1994) "Puzzles in International Financial Markets." **NBER Working Paper** No. 4951. (Cambridge: National Bureau of Economic Research).

Linneman, H. (1966) **An Econometric Study of International Trade Flows.** (Amsterdam: North-Holland).

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

Parsley, David C. and Shang-Jin Wei (1995) "Convergence to the Law of One Price Without Trade Barriers or Currency Fluctuations." (working paper, Owen Graduate School of Management, Vanderbilt University, and Kennedy School of Government, Harvard University).

Sinn, S. (1992) "Savings-Investment Correlations and Capital Mobility: On the Evidence From Annual Data." **Economic Journal 102**: 1162-70.

Summers, R. and A. Heston (1991) "The Penn World Table (Mark 5): An Expanded set of international comparisons, 1950-88." **Quarterly Journal of Economics 106**: 327-68.

Wei, Shang-Jin (1996) "How Stubborn Are Nations in Global Integration?" (Paper presented at the Annual Meetings of the American Economic Association, San Francisco, January 1996).

Wei, Shang-Jin and David C. Parsley (1995) "Purchasing Power *Dis*-Parity During the Floating Rate Period: Exchange Rate Volatility, Trade Barriers and other Culprits." **Working Paper** No. 5032. (Cambridge: National Bureau of Economic Research).

**Table 1**
**Revised Estimates of the Effects of the Border on Trade Flows**

| Equation | (i) | (ii) | (iii) | (iv) |
|---|---|---|---|---|
| No. of Observations | 678 | 678 | 678 | 3x678 |
| Estimation Method | OLS | OLS | OLS | SUR |
| Dependent Variable | ln(ship) 1988 | ln(ship) 1989 | ln(ship) 1990 | ln (ship) 1988,1989,1990 |
| Constant | -4.36 (6.2) | -4.25 (5.9) | -5.70 (7.5) | -4.66,-4.75,-4.92 (7.0,7.2,7.4) |
| Coefficients: | | | | |
| lnGDPX | 1.19 (38.0) | 1.19 (37.3) | 1.24 (36.5) | 1.20 (40.9) |
| lnGDPM | 1.05 (34.1) | 1.03 (32.7) | 1.05 (31.7) | 1.05 (36.1) |
| ln(dist) | -1.39 (22.5) | -1.41 (22.1) | -1.33 (19.7) | -1.38 (23.5) |
| Cdummy | 2.99 (23.3) | 2.93 (22.1) | 3.22 (23.0) | 3.05 (25.1) |
| $\bar{R}^2$ | .806 | .797 | .784 | .81,.80,.79 |
| S.E.E. | 1.09 | 1.12 | 1.19 | 1.09,1.12,1.18 |
| | | | | P of restrict=.114 |
| Border Effect | 19.9 | 18.7 | 25.0 | 21.1 |

Notes: Absolute values of t statistics are in parentheses. The dependent variable is the logarithm of total shipments of goods from province or state i to province or state j, with lnGDPX being the logarithm of i's GDP and lnGDPM of j's GDP. The data include province-to-province trade for ten provinces plus trade between each province and each of the thirty largest states. Observations with zero shipments in any of the three years (13 in total) are excluded. Cdummy takes the value 1 for each observation recording trade from one province to another.

**Table 2**
**Effects of the Border on Quebec Trade Flows**

| **Equation** | **(i)** | **(ii)** | **(iii)** | **(iv)** |
|---|---|---|---|---|
| Observations | 678 | 678 | 678 | 3x678 |
| Estimation Method | OLS | OLS | OLS | SUR |
| Dependent Variable | ln(ship) 1988 | ln(ship) 1989 | ln(ship) 1990 | ln(ship) 1988,1989,1990 |
| Constant | -4.53 | -4.44 | -5.91 | -4.84,-4.94,-5.11 |
| | (6.4) | (6.1) | (7.7) | (7.3,7.4,7.6) |
| Coefficients: | | | | |
| lnGDPX | 1.21 | 1.22 | 1.26 | 1.22 |
| | (37.3) | (36.7) | (35.9) | (40.2) |
| lnGDPM | 1.07 | 1.05 | 1.08 | 1.07 |
| | (33.5) | (32.2) | (31.3) | (35.6) |
| ln(dist) | -1.42 | -1.44 | -1.37 | -1.41 |
| | (22.5) | (22.2) | (19.9) | (23.6) |
| Cdummy | 3.00 | 2.97 | 3.25 | 3.08 |
| | (21.0) | (20.1) | (20.9) | (22.8) |
| Quc | -.12 | -.23 | -.24 | -.18 |
| | (0.4) | (0.8) | (0.7) | (0.6) |
| Quus | -.37 | -.36 | -.42 | -.39 |
| | (2.3) | (2.2) | (2.5) | (2.6) |
| $\bar{R}^2$ | .807 | .798 | .786 | .808,.799.787 |
| S.E.E. | 1.09 | 1.12 | 1.18 | 1.08,1.11,1.18 |
| Border Effect | 25.8 | 22.2 | 30.9 | 26.8 |
| | | | | P of restrict= .317 |

Notes: Quus is 1 for trade between Quebec and a state, and Quc is 1 for Quebec's trade with another province. The border effect shown includes the effects of both Quus and Quc. For example. for equation iv the border effect is exp(3.08+(-.18)-(-.39)).

**Table 3**
**Border Effects Using Quebec Data Only**

| Equation | (i) | (ii) | (iii) | (iv) |
|---|---|---|---|---|
| Observations | 78 | 78 | 78 | 3x78 |
| Estimation Method | OLS | OLS | OLS | SUR |
| Dependent Variable<br>Quebec only | ln(ship)<br>1988 | ln(ship)<br>1989 | ln(ship)<br>1990 | ln (ship)<br>1988,1989,1990 |
| Constant | -5.26<br>(3.2) | -4.75<br>(3.0) | -6.70<br>(4.2) | -5.25,-5.35,-5.50<br>(3.7,3.7,3.8) |
| Coefficients: | | | | |
| lnGDPX | 1.09<br>(12.7) | 1.06<br>(13.0) | 1.15<br>(13.9) | 1.09<br>(14.5) |
| lnGDPM | 0.95<br>(11.1) | 0.95<br>(11.7) | 1.06<br>(12.8) | 1.00<br>(13.3) |
| ln(dist) | -0.96<br>(9.8) | -1.00<br>(10.7) | -1.08<br>(11.4) | -1.04<br>(12.0) |
| Cdummy | 3.02<br>(14.3) | 2.85<br>(14.2) | 3.31<br>(16.2) | 3.05<br>(16.4) |
| $\bar{R}^2$ | .814 | .822 | .847 | .821,.829,.851 |
| S.E.E. | 0.67 | 0.64 | 0.65 | 0.66,0.62,0.64<br>P of restrict=.010 |
| Border Effect | 20.5 | 17.3 | 27.4 | 21.1 |

Notes: Same as for Table 1, except that all data refer to shipments to and from Quebec. The border effect is the antilog of the coefficient on Cdummy.

# Fig 1 Internal vs External Trade

## Survey vs Model Estimates, 1988-94