Borders, Common Currencies, Trade, and Welfare: What Can We Learn from the Evidence?

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- *Recent research on the effects of borders and common currencies on international trade initially found estimates that were much larger than were commonly believed. Subsequent revisions to the empirical methodology and to the interpretation of the results have substantially reduced these estimates and their significance for policy.*
- *This research finds, however, that economic linkages are much tighter within, than among, nation-states. It is incorrect, however, to interpret these findings as necessarily implying that borders and separate national currencies represent significant barriers to trade that should be removed.*
- *The empirical models employed in this research lack sufficient economic structure to discriminate between the hypothesis that national borders and separate national currencies represent trade barriers, and the alternative, that these findings are consistent with the efficient organization of production, consumption, and exchange within and across nation-states.*

Borders geographically define nation-states. Economists have discovered that the intensities of economic exchange within and across national borders are remarkably dissimilar. In particular, the differences in intensities of domestic and international (or cross-border) trade in goods, services, and assets are much larger than what was previously believed or assumed. These observed "border effects" have raised questions about the extent of globalization and the continued coherence of national economic spaces in the face of a wide range of global opportunities.

The intensities of economic exchange within and across national borders are remarkably dissimilar.

The purpose of this article is to review the evidence on the extent to which national borders lessen the intensity of international economic linkages, primarily trade in goods and services. The particular focus is on trade linkages within and between Canada and the United States. A range of explanations for the observed border effects is considered, including the use of separate national currencies. Understanding the reasons for border effects is important for determining whether they represent barriers to be removed, or rational

differences across countries that are driven by local residents' efforts to minimize costs or to maximize welfare. Although considerable uncertainty, even controversy, surrounds the estimated values of border effects, their unexpected magnitude and prevalence have led analysts to search for reasons for their existence, and policy-makers to ask what they might mean for policy. The answer for policy-makers depends, to a great extent, on the explanations found by the analysts. If, for example, policy-driven trade barriers are responsible for the border effects, and if significant gains from further trade expansion are likely, then large border effects signal that much is left to be completed in the global and North American free trade agendas. On the other hand, if the surprisingly local and national structure of economies and societies is a response to the lower costs of dealing with those close at hand who share a variety of common institutions, tastes, values, and networks, or is a reflection of local products matching local tastes (sometimes called a "home bias" in preferences), then the observed impact of the border could represent an optimal outcome.

A policy issue worthy of special attention is the effect on trade and welfare of a separate national currency. Since currency boundaries and political boundaries are generally the same for countries that are members of the Organisation for Economic Co-operation and Development (OECD), with the important new exception of the euro zone, some part of observed border effects in trade is likely the result of currency differences. A separate national currency is not a traditional trade barrier, such as a tariff, since countries maintain a national currency to ensure government control over the supply of money and domestic monetary policy, rather than to encourage domestic production. If, however, currency differences are a large part of the reason for the observed border effects, and if border effects are costly, then Canadian adoption of the U.S. dollar might increase trade, at least between Canada and the United States.[2]

How Globalized Is Canada?

Canada is normally viewed as an open economy that is integrated into global markets for goods, services, and capital. Relative to most countries, this is indeed true, because the share of exports and imports to gross

domestic product (GDP) in Canada is high. Charts 1a and 1b show Canada's ratios of exports and imports to GDP, those for Germany (the second most open G–7 country) and the United States, and the average for the G–7 countries. Canada stands out as the most trade-oriented economy. Although the ratio of exports to GDP is often used to measure trade openness, it can be misleading, because exports represent sales, not value added, whereas GDP is a measure of value added. Thus, if there is an upward trend in international
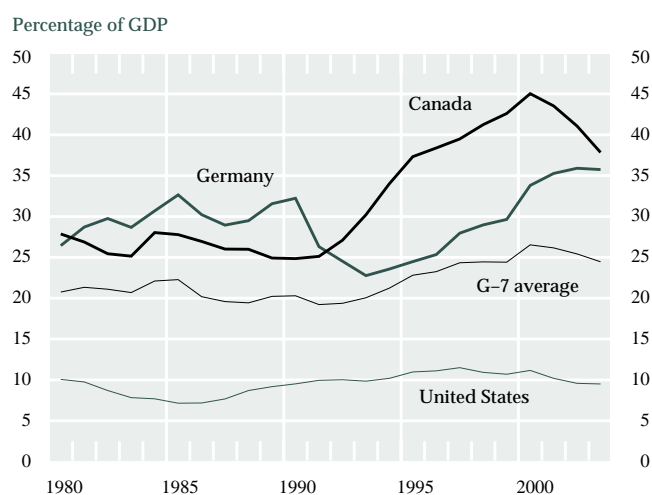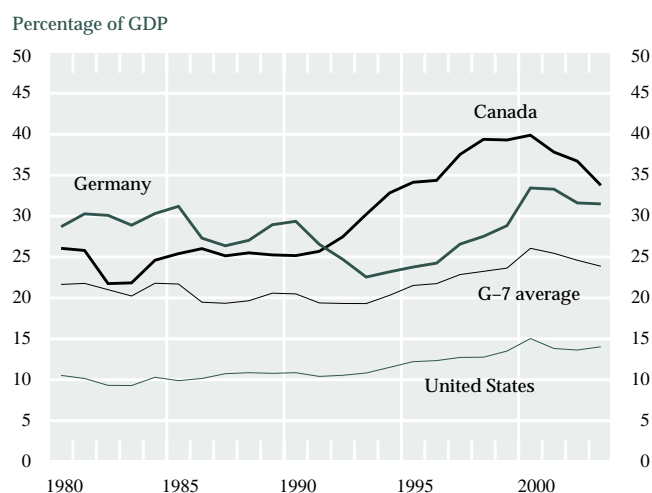
Chart 1a

Exports of Goods and Services

1980–2003

Percentage of GDP

Chart 1b

Imports of Goods and Services

1980–2003

Percentage of GDP

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2. Grubel (1999) and Courchene and Harris (1999), for example, make this argument. Laidler and Robson (1991) and Murray (2000) estimate the annual transactions costs associated with a flexible Canadian-dollar exchange rate as less than 0.2 per cent of gross domestic product (GDP).

trade in intermediate goods (as there has been in the North American motor vehicle industry, owing to increased specialization), then the ratio of exports to GDP will rise even if the share of exports to domestic sales is unchanged. Canada's ratios to GDP of total exports and total exports less imported intermediate goods, as well as the gap representing imported intermediate goods embedded in exports, are shown in Charts 2a and 2b. In Chart 2a, both ratios are increasing at approximately the same rate over the 1981–2000 period.[3] This finding implies, as is shown in Chart 2b, that the share of imported intermediate goods in
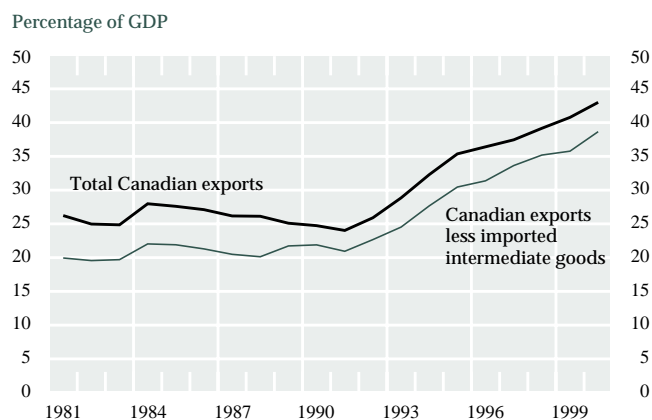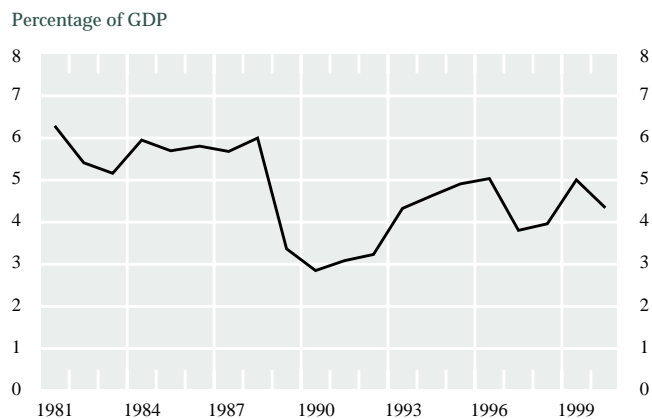
total exports has not risen over time, and thus, two-way trade in intermediate goods is not the main explanation for the rapid growth in Canadian exports, especially to the United States, in the 1990s. Interestingly, the share of imported intermediate goods has increased for motor vehicles and motor vehicle parts over this period (Charts 3a and 3b), and these products are Canada's largest manufactured export good.[4] The results in Charts 2 and 3 are reconciled by the fact that the share of manufactured goods in total exports has declined, while the share of energy and non-energy commodities, whose production does not

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3. Input-output data are used to identify the share of imported intermediate goods in exports, and these data are only available until 2000.

4. The sharp decline in imported intermediate goods in the motor vehicle industry in 1997 and 1998 shown in Chart 3b is the result of the 54-day strike at General Motors in 1998.

Chart 2a

Canadian Exports

1981–2000

Percentage of GDP

Chart 3a

Canadian Exports of Motor Vehicles and Motor Vehicle Parts

1981–2000

Percentage of GDP

Chart 2b

Canadian Exports of Imported Intermediate Goods

1981–2000

Percentage of GDP

Chart 3b

Canadian Exports of Imported Intermediate Goods for Motor Vehicles and Motor Vehicle Parts

1981–2000

Percentage of GDP
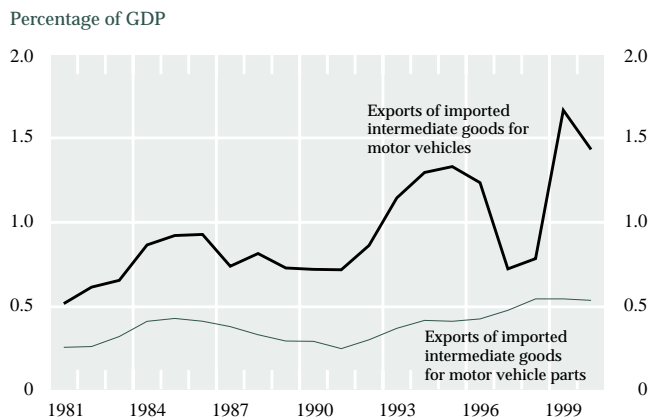
require significant amounts of imported intermediate goods, has increased.

*Canada stands out as the most trade-oriented economy within the* G–7.

Canada's relatively high level of openness to trade compared with the rest of the G–7 is primarily because Canada is the smallest economy in the G–7 and also because it is next door to the United States, the world's largest economy.[5] Small countries almost always trade more than larger countries because of the lack of alternative domestic trading opportunities.[6] Thus, smaller countries also tend to have larger estimated border effects on trade, as we shall see below.

Canada has also been very open to international flows of capital. From Confederation in 1867 until late in the twentieth century, Canada was traditionally a net borrower, or a recipient of investment from the rest of the world, which was often linked to the development of natural resources and manufacturing. More recently, Canada has run current account surpluses, with an associated net outflow of investment. Canadian firms have invested abroad to gain access to new sources of technology and natural resources, and to develop foreign markets for Canadian goods and services. Canadian investors have also increased their investments abroad in an attempt to diversify their portfolios. Chart 4 compares Canada's foreign direct investment (FDI) inflows as a percentage of GDP with the average for the G–7 countries. In both cases, FDI inflows increased dramatically over the 1991–2000 period, with strong equity markets providing the financing for many large corporate mergers and acquisitions. Historically, Canada

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5. Much of Canada's trade openness comes from its relationship with the United States. In 2003, trade to and from countries other than the United States was 15 per cent of Canada's GDP. If we exclude Canada and Mexico from U.S. trade, trade with other countries was 13 per cent of U.S. GDP. In comparison, Japan's total external trade was 20 per cent of GDP in 2003.

6. In addition, when trade openness is measured as a percentage of GDP, it is tautological that smaller countries will appear more open because a given amount of trade among a group of countries of different sizes would represent a larger fraction of their GDP. Nonetheless, Head and Mayer (2004) develop a standardized measure of trade openness and find that the bilateral openness of Canada and the United Sates is much greater than that of France and Germany.

Chart 4

Foreign Direct Investment Inflows

1980–2003

Percentage of GDP

Chart 5

Canadian Capital Inflows and Outflows

1980–2003

Percentage of GDP
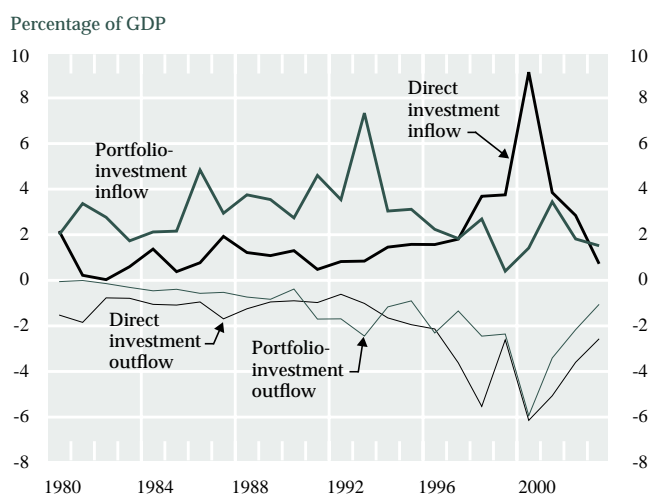
has generally remained above the G–7 average.[7] Chart 5 shows inflows and outflows of FDI and portfolio investment for Canada. Portfolio-investment outflows follow a pattern similar to the one for FDI outflows, increasing over the 1990s, and then declining after 2000. Port-

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7. Relative to Mexico and the United States, however, Canada's share in inward North American FDI has declined. See Globerman and Shapiro (2003) for more details.

folio inflows are slightly lower after 1994, in part because of the reduction in federal government borrowing.

Over the past 25 years, however, many empirical studies have shown that Canada and other countries are much less integrated into the global economy than was previously believed. Often, the methodology of these studies was to compare measures of economic integration between countries with measures of economic integration within countries, and they found that the level of international economic integration for Canada and other countries is far below that within national economies. Three studies that challenged conventional wisdom have been especially influential and have generated much research that has probed the robustness and meaning of their results. These studies examine merchandise trade, price linkages, and capital market integration, respectively.[8]

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In the early 1990s, McCallum (1995) took advantage of the development of new data for province-state trade flows that closely matched data already available for interprovincial trade. Using these data for 1988, the only year for which both sources of data were then available, McCallum found interprovincial trade intensities to be much higher (22 times) than those between Canadian provinces and U.S. states. McCallum's study, and the research which it initiated, will be the main focus of our review.

At about the same time, Engel and Rogers (1996) compared the covariability of intercity price changes for U.S. and Canadian city pairs, as well as for cross-border pairs. They also controlled for the impact of distance because they argued that the covariability of prices would be lower for cities that were farther apart. They used monthly consumer prices for 14 categories of goods and services in the consumer price index (CPI) over the period 1978 to 1994 and found a higher covariability of prices among Canadian cities than among U.S. cities, and a very low covariability among the cross-border pairs of cities. Using their estimate of the impact of distance, they calculated a border effect equivalent to a border 75,000 miles wide. This estimated border effect is much greater than that found for merchandise trade volumes, because Engel and Rogers were comparing monthly changes in consumer prices converted at current exchange rates, and exchange rates are much more variable than consumer prices. Furthermore, some of the CPI components (e.g., housing) are essentially nontradable internationally.

These findings of much tighter national than international linkages among goods markets are comparable to Feldstein and Horioka's (1980) result that national savings rates and domestic investment rates are highly correlated across countries (approximately 0.8), which leads them to conclude that capital markets are not globally integrated. Skeptics of this interpretation argue that national shocks could produce a co-movement of national savings and domestic investment even if international capital markets were tightly linked. The availability of Canadian provincial accounts on a "national accounts" basis provided the opportunity, however, to test the Feldstein-Horioka proposition, using a data sample that pooled provincial data for Canada with national data for the rest of the OECD countries. If Feldstein and Horioka were right to treat their findings as evidence that international capital mobility is far less than that within national economies, then the correlation between savings and investment rates should be much lower across provinces than across countries. The actual results were even more striking. In the pooled sample, the correlation remained strong among the national economies but was completely absent among the provinces (Helliwell and McKitrick 1999).[9] Thus, investment that takes place in one prov-

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8. Other studies also showed that migration is much more frequent within than between countries, with border effects that are much larger than for trade in either goods or services (Helliwell 1998, Chapter 5). This was not surprising to economists, whose models frequently assume that labour is an immobile factor of production. One interesting feature of the North American evidence is that long-term migration in both directions between Canada and the United States has fallen by a factor of 10 over the past century, based on census records showing the birthplaces of each country's residents. Trade linkages, in contrast, became less intense over the first half of the twentieth century and more intense over the second half, recovering by the end of the century to about the same levels as at the beginning.

9. Similar conclusions follow from more fragmentary regional data for other countries. See Sinn (1992), Bayoumi and Rose (1993), and Dekle (1996).

ince is equally likely to be financed by savings in any other province, as would be implied by the existence of a tightly linked national capital market. For national economies, however, domestic investment continues to be largely financed by national savings. This result has also been indirectly confirmed by many studies showing that investment portfolios in all countries display a strong preference for domestic securities.[10]

Borders, Trade in Goods, and the Gravity Model

Many researchers were surprised by McCallum's (1995) discovery that, in 1988, average interprovincial merchandise trade flows were about 20 times more intense than those between provinces and states. Consider an example: Ontario is approximately the same distance from California as it is from British Columbia, and California's population and GDP are about 10 times larger than those of British Columbia. If there were no systematic differences between interprovincial and province-state trade, we would expect to find two-way movements of goods between Ontario and California to be 10 times larger than those between Ontario and British Columbia. But actual merchandise flows between British Columbia and Ontario were more than twice as large as those between California and Ontario, or 20 times greater than expected. McCallum's result strongly suggests that national economies have a much tighter internal structure than previously thought; and hence, that the extent of globalization is much less than commonly supposed.

McCallum recognized the necessity of structuring the comparisons to permit trade intensity to be measured separately from the effects of size and distance. Choosing pairs of equal distance for comparison (e.g., trade between Ontario and California and between Ontario and British Columbia) thus takes distance into account. For this purpose, he used a popular empirical model of trade known as the gravity model, which was first used in empirical trade studies by Tinbergen (1962), and is a straightforward application of a bilateral version of the Newtonian model of gravity, wherein the attraction (trade) between two bodies is directly proportional to their masses (measured by GDP for trade purposes) and inversely proportional to the distances between the bodies. The basic bilateral log-linear form of the gravity model for trade used by McCallum to study the impact of the border is

$$ln T_{ij} = \alpha + \beta_1 ln Y_i + \beta_2 ln Y_j + \rho ln d_{ij} + \gamma D_{ij} + \varepsilon_{ij},$$

where T_{ij} is the value of trade from location i to location j;

and Y_i and Y_j are the GDPs of i and j;

d_{ij} is the distance between i and j;

D_{ij} is an indicator (dummy) variable that takes a value of 1 for internal trade and 0 for international trade; and the Greek letters, α, β_1, β_2, ρ, and γ are parameters to be estimated.[11]

McCallum (1995) estimated the border effect, which is measured by the ratio (or relative intensity) of interprovincial to province-state trade flows, from the estimated coefficient on the internal trade indicator variable.[12] Hence, a border-effect value of 1.0 means that, after adjusting for the effects of size and distance, transborder and interprovincial trade intensities are equal. Using data for 1988, McCallum (1995) finds that interprovincial trade was 22 times greater than transborder trade, holding all other variables constant. This result is consistent with total transborder flows being as large as interprovincial shipments because of the much larger size of the U.S. economy, and the fact that most major Canadian centres of population and production are as close to U.S. markets as they are to each other.

Subsequent research has lowered this estimate of the border effect for three main reasons. Most importantly, McCallum's estimate was produced in 1988, before the Canada-U.S. Free Trade Agreement (FTA) in 1989; since then, there has been a large increase in transborder trade (see Chart 1). Second, several data revisions have also slightly reduced the estimates. Finally, moving from a bilateral to a multilateral version of the gravity model has lowered the estimated border effect as well (as will be discussed in further detail below). Estimates for trade in services, based on more fragmentary data, are several times larger than for merchandise trade (Helliwell 1998, Chapter 2). This is not unexpected, because the international barriers to trade in services are normally thought to be larger than for merchandise,

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10. French and Poterba (1991) and Baxter and Jermann (1997), for example, find evidence of substantial home bias in financial investment across countries.

11. Box 1 and Feenstra (2004, Chapter 5) discuss the derivation of the gravity equation from a theoretical trade model.

12. The border effect is the anti-log of the estimated coefficient. Thus, a border effect of 1.0 arises when the estimated coefficient on the dummy variable D_{ij} is zero.

owing to the heavier regulation of the provision of services. In addition, the intensity of domestic trade in services is likely to be higher because services are generally more idiosyncratic and thus require more contact between the provider and consumer; this necessity would generate home bias in both demand and supply, since transactions would likely occur via local networks, where information is better. Estimates of border effects for merchandise trade for other industrialized countries of similar size are comparable with those for Canada. Estimated border effects are much larger, however, when developing countries are included in the sample (Helliwell 1998, Chapter 3), presumably because differences in institutions are greater and the information and transportation networks are less effective between developing and industrialized countries.

It is worth noting as well that coefficient estimates of the distance variable in the gravity equation are generally much larger than would be predicted from transport costs alone (e.g., Grossman 1998). Hence, there must be other costs that increase with distance, such as communication and information. Interestingly, Helliwell (1998) finds that these distance-related costs are similar for both interprovincial and transborder trade. This finding implies that the estimated border effect cannot be associated with differences in such distance-related costs for trade within and between countries, but it must capture either the costs of cross-border trade associated with international transactions or the cost (or welfare-improving) advantage of domestic transactions. This critical issue is discussed in more detail below.

Multilateral versions of the bilateral gravity model

Both Newtonian physics and empirical trade equations become more complicated when we recognize that the universe contains more than two bodies. Two people are not inevitably drawn to one another. That is because both are more firmly rooted to the (much larger) earth. Following Feder (1980) and others, many researchers estimating border effects have attempted to account for the extent to which trade between two countries or regions is affected by each country's opportunities to trade with third parties. The simplest method uses the theory of the gravity model to construct, for each bilateral trading partner, separate variables that reflect the combined attraction of their trading possibilities with all other trading partners. This was done in Helliwell (1998) and Helliwell and Verdier (2001), and

was shown to reduce estimates of the border effect in the Canadian case.[13]

Anderson and van Wincoop (A&vW) (2003) use a formal trade model that assumes fixed endowments of differentiated goods to derive a multilateral version of the bilateral gravity model. The multilateral model includes an explanatory variable that represents the magnitude of alternative trading opportunities faced by the members of the bilateral trading pair. This derivation represents an improvement over previous definitions of such variables in empirical gravity models because, by including the border effect itself in the definition of alternative trading opportunities, it is possible to derive a more consistent prediction of what would happen to trading patterns in the absence of border effects. It also permits the same model to explain why, in the presence of border effects, smaller countries are likely to have relatively more intense domestic versus external trade than larger countries. The reason for this, as emphasized by A&vW (2003) and Feenstra (2004), is that larger countries have within their borders a greater range of alternative products, and are hence less likely than smaller countries to significantly alter their internal trading patterns if and when new international opportunities become available.

To illustrate A&vW's key finding that the effect of the border is much greater for smaller countries, consider the following hypothetical example, taken from Feenstra (2004), as loosely representative of the relationship between the Canadian and U.S. economies, with Canadian GDP assumed to be 10 per cent of U.S. GDP. Assuming a frictionless world in which all goods are equally tradable, products differ by location, and consumers love variety (i.e., they wish to spread their expenditures over all available goods), Canada would export 90 per cent of its GDP to the United States and sell only 10 per cent internally. Suppose that border effects, whether arising from cross-border trade costs or simply from taste differences, reduce international trade by one-half. This implies that 45 per cent of Canada's GDP would be sold to the United States, and

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13. Helliwell (1998) and Helliwell and Verdier (2001) also use data for the years following the U.S.-Canada FTA. The combined effect of post-FTA data and the inclusion of a variable representing the strength of alternative trading opportunities reduces the estimated border effect for merchandise trade to a value of about 12 for 1993 and approximately 10 for 1996. Unpublished research indicates that more recent estimates may be even lower. The evidence indicates that most of the decline in the estimated border effect is owing to the increase in Canada-U.S. trade in the aftermath of the free trade agreements, rather than to the introduction of the explanatory variable representing alternative trading opportunities.

55 per cent internally. Comparing the scenario with border effects to one with no frictions, we find that internal trade in Canada increases by 5.5 times, and cross-border trade declines by half, which implies that internal trade is 11 times more intense than cross-border trade in the world with border effects. The impact for the United States is obviously much less, as internal trade rises from 90 per cent to 95 per cent, and cross-border trade declines from 10 per cent to 5 per cent if trade is cut in half. In this scenario, the estimated border effect would be 11 for Canada and approximately 2.1 for the United States. Hence, any factor that increases intranational trade at the expense of international trade will create a much larger estimated border effect for the smaller country.

A&vW (2003) derive their version of the gravity equation from a theoretical model of trade similar to the one given in the example above, in which consumer utility in both countries depends on the variety as well as the amount of goods consumed. Hence, goods are traded between countries because each good is different, and consumers value variety. Although they recognize that their theoretical model is but one of many that could be used to derive a gravity equation (see Box 1 for more details), A&vW (2003) use this specification to estimate the impact on trade and welfare of removing border effects caused by trade costs. As shown in the example, border effects are bigger for smaller countries than for larger ones. Thus, removing trade costs that limit consumer access to product varieties would shift consumer expenditure and trade patterns much more for Canada than for the United States, with a correspondingly larger rise in Canadian welfare. A&vW find that eliminating trade costs and the border effects in their model would increase Canada-U.S. trade by 79 per cent (A&vW 2002, Table 1), and welfare by an incredible 52 per cent (A&vW 2002, Table 2).[14] It is noteworthy that this huge estimated increase in Canadian trade and welfare does not depend on greater levels of efficiency in production, because the levels of production

are held constant in their model.[15] The result is almost entirely determined by the assumptions that variety is valuable, all tastes are the same, and products differ by location. It is, however, more plausible to assume that, if products differ across North America, then some of these differences reflect local (and national) preferences, incomes, and climates. Thus, if most product differences are generated by attempts to match local tastes, then the removal of border barriers will not shift consumption patterns towards international goods, and interprovincial trade will remain much tighter than province-state trade.

There are two alternative explanations of the observed border effects: trade barriers or costs that limit cross-border transactions; or some combination of differences in tastes and more efficient local transactions networks that generate more intranational trade.

Thus, for policy analysis, it is important to know why the estimated border effects exist. Unfortunately, the A&vW model cannot discriminate empirically between the two alternative explanations of the observed border effects: trade barriers or costs that limit cross-border transactions; or some combination of differences in tastes and more efficient local transactions networks that generate more intranational trade. Fortunately, the advent of the Canada-US FTA in 1989 provides a strong test of the otherwise untested A&vW hypothesis that the border effect reflects cross-border trade costs. The FTA reduced border barriers by eliminating tariffs and many non-tariff barriers. If the A&vW model of tastes and cross-border trade costs were correct, then the FTA would have led to a proportionate reduction in interprovincial trade that was greater than the increase in north-south trade. For example,

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14. Based on the Rose and van Wincoop (2001) estimate of the border barrier that is associated with a separate national currency, A&vW calculate that almost 30 percentage points of the 52 per cent welfare improvement comes from dollarization alone (A&vW 2002, Table 3).

15. This result stands in contrast to the work of Harris (1984), who predicted that the gains from the FTA would come from trade creation, increased competition and specialization, and productivity improvements. Head and Ries (1997) and Trefler (2004) have confirmed that some of these gains have been realized, although not all, as the gap between Canadian and U.S. manufacturing productivity levels has remained almost unchanged.

Box 1

The Gravity Equation: Theoretical Basis

Although the gravity equation is often successful in explaining bilateral trade flows among a wide range of countries, its theoretical basis has been the subject of debate. In a two-country setting, the bilateral gravity equation is consistent with several international trade models (e.g., Ricardian, Heckscher-Ohlin, or Imperfect Competition-Increasing Returns) because these models generally predict that the larger the economic size of the bilateral trading partners and the lower the bilateral impediments to trade, the greater will be the volume of bilateral trade. In a *multi-country* setting, however, the theory becomes less definitive, because theoretical models that can generate the gravity equation are often at odds with the evidence the gravity model produces.

The standard derivation of the gravity model (e.g., Feenstra 2004, Chapter 5) is based on the monopolistic competition model of trade that assumes increasing returns to scale and product differentiation at the firm level, and consumer preferences that dictate that consumers will spread their expenditures equally over all available goods.[1] This model implies that each country will completely specialize in a set of goods and that consumers will demand some of all the goods that each country produces. Clearly, the larger the two countries, the more goods they will produce and the larger their bilateral trade volume will be. Although the predictions of this model are loosely consistent with the empirical results of the gravity equation for trade among industrialized countries, which primarily consists of intraindustry trade in differentiated products, the model has three main weaknesses: it cannot explain the success of the gravity model in explaining North-South trade, which is primarily interindustry trade; it overpredicts the volume of trade; and it underpredicts the impact of distance- and other frictions, relative to the empirical results of the gravity model.[2]

More recently, Evenett and Keller (2002) and Haveman and Hummels (2004) have argued that these anomalies can be partly explained using the Heckscher-Ohlin factor-endowment model. In particular, countries in the North and South may specialize in different goods because of differences in factor endowments. Also, this model typically generates incomplete specialization (i.e., countries produce an overlapping set of traded goods), which may explain the observation that the actual volumes of bilateral trade are not as large as most theoretical models based on complete specialization would predict. Incomplete specialization would imply that some domestic demand could be satisfied locally. Haveman and Hummels also maintain that a home bias in consumers' preferences may also be part of the explanation for this observation. In reality, this so-called home bias may not be an accident; it is likely the natural consequence of local producers being better placed to see and respond to local tastes and opportunities.

Although no single theoretical trade model can completely explain all of the results obtained by the gravity equation, it is nonetheless clear that in order to derive a gravity equation in a multi-country setting, a theoretical model must generate some degree of product specialization across countries on the supply side (if products and the output mix were homogeneous across countries, then the goods would be purchased locally to avoid incurring the transportation costs). It must also assume that consumer utility is sufficiently similar across countries, but also positively related to the consumption of these specialized outputs as final goods or as intermediate products (i.e., variety in terms of final goods must increase utility or variety in terms of intermediate inputs must lower production costs); otherwise there would be insufficient demand for the specialized products that each country produces.

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1. Anderson (1979), Bergstrand (1985), and Helpman (1987) are early references for this approach.

2. See Evenett and Keller (2002) and Haveman and Hummels (2004) for more details.

A&vW (2003, Table 5) estimate that eliminating the border effect caused by the trade costs would reduce interprovincial trade by 83 per cent, and cause north-south trade to increase by slightly less, 79 per cent.[16] In fact, north-south trade increased by more, not less, than the decline in interprovincial trade. Charts 6 and 7 show that north-south trade increased by larger amounts in the years after the introduction of the FTA than the models had predicted (based on the reductions in tariffs), and that interprovincial trade did not dramatically decline. Helliwell, Lee, and Messinger (1999) conduct a more formal analysis and find, after using an estimated gravity model to adjust for changes in GDP, that interprovincial trade fell by, at most, 13 per cent between 1988 and 1996, while Canada-U.S. trade increased by 22 per cent.[17] Thus, the two observations, that the major effect of the FTA was to create new international trade (generating, as its proponents had hoped, corresponding increases in GDP per capita, especially in Canada), and that interprovincial trade flows were only moderately affected by the FTA, cast doubt on the validity of the A&vW model, its maintained assumptions about tastes and product differentiation, and its hypothesis that border effects reflect transborder trade costs. It is thus more likely that national producers are better able to satisfy domestic tastes and that transactions can be more efficiently executed among individuals who share similar national values; institutions; and information, communications, and transportation networks.[18] If this is correct, then a substantial piece of the border effect, (i.e., the portion that cannot be explained by traditional cross-border trade costs) does not represent a reduction in welfare, as asserted by A&vW (2003), but may instead reflect the greater ability of domestic producers to satisfy the needs of local consumers.

Recent research, most notably by Combes, Lafourcade, and Mayer (2004), finds strong evidence of the trade-

Chart 6

Canadian Exports to and Imports from the United States

Goods and Services

Can$ billions
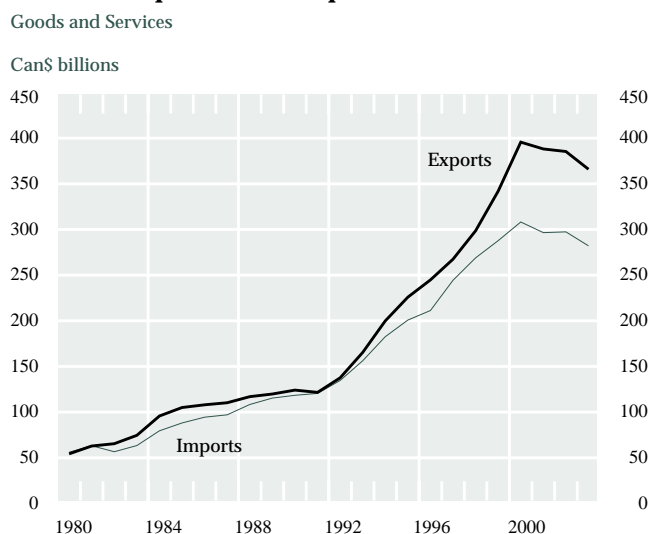
Chart 7

Canadian International and Interprovincial Trade

Goods and Services

Can$ billions
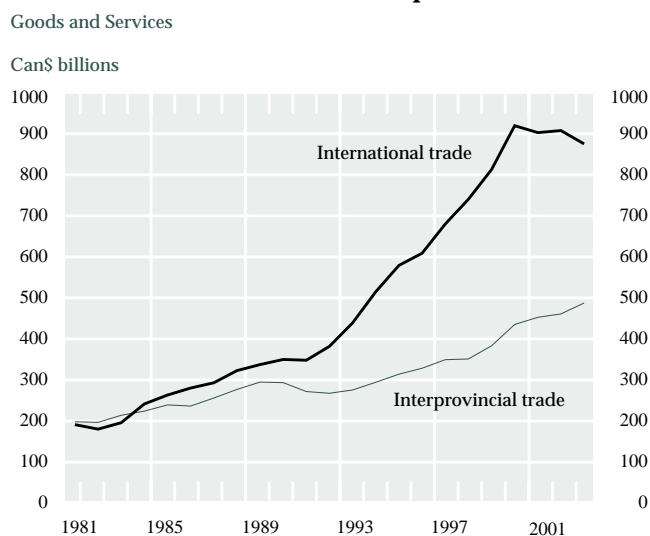
creating effects of business and social networks. Business networks consist of firms with shared control or enduring buyer-seller relationships (e.g., the Japanese *keiretsu*). Social networks consist of individuals with similar traits, most notably ethnicity, language, and religion (e.g., Chinese immigrants in North America), who also have ongoing economic relations. Such networks create trade because they reduce information costs, improve contract enforcement, and lead to a diffusion of similar preferences. Although networks have

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16. A&vW (2003, Table 5) estimate that if the border were removed, interprovincial trade would fall from a relative intensity of 5.6 to 1.0, whereas Canada-U.S. trade would increase from 0.56 to 1.0.

17. Note that the Helliwell, Lee, and Messinger (1999) study ends in 1996, before all of the adjustment to the FTA had taken place. Brox (2001), using provincial expenditure data from 1981 to 1998, maintains that the FTA reduced interprovincial trade by almost one-third. Grady and Macmillan (1998) and Coulombe (2003) find results similar to those of Helliwell, Lee, and Messinger (1999), but they also demonstrate that interprovincial trade began falling relative to international trade in the early 1980s, well before the FTA in 1989.

18. Although national institutions reflect the preferences of a country's citizens, they may also represent a barrier to international trade; for example, different legal and regulatory frameworks can increase the cost of performing international transactions.

been found to facilitate international trade (Rauch 2001), such networks are likely to be stronger within nations than across international boundaries, because local firms and individuals are more likely to share similar traits and values and common economic institutions. Hence, a country's business and social networks serve to reduce transactions costs and to diffuse similar preferences, and thus provide a plausible alternative to trade costs as an explanation for the higher density of intranational to international trade that is captured by estimated border effects.

Common-Currency Effects

If the estimated border effects are, in part, the result of trade barriers, then one possible barrier is the use of separate national currencies. Different currencies create an additional friction to trade because cross-border transactions require currency conversion and, in some cases, hedging of the exchange rate risk. In addition, price discrepancies are less transparent, and arbitrage is hindered. These costs would be proportional to the volatility of the exchange rate.

Rose (2000) also employs the gravity model to estimate the impact of a common currency on bilateral trade flows and thereby test the hypothesis that a common currency would reduce the cost of cross-border transactions and, hence, increase trade. He uses essentially the same specification of the empirical gravity model as McCallum (1995), but with two key differences: the model is estimated with a data set consisting of bilateral trade flows for 186 countries over time, and the indicator variable included in the model takes a value of one if the two countries have a common currency, and zero if they do not.[19] He finds that having a common currency between two countries increases their trade by more than 300 per cent. As with McCallum's result, the magnitude of Rose's finding was most unexpected. Within the framework of the gravity model, Rose tries to control for a number of other variables, such as a shared border, a common language, a colonial relationship, and a free trade agreement, that could also explain the intensity of bilateral trade, but the estimated impact of a common currency on trade flows is not greatly affected. Moreover, he includes the variability of the exchange rate in the model and finds that, although a volatile exchange rate reduces trade flows, the impact of reducing

exchange rate volatility on trade is much smaller than that of adopting a common currency.

Rose's research, like McCallum's, generated many further studies that probed, extended, and questioned his findings. Rose (2004) reviews many of these studies and concludes that the estimated effects of a common currency on trade flows are statistically and economically significant, and that estimates of the long-run impact of between 30 and 90 per cent are reasonable. Nevertheless, this additional research produced three compelling criticisms that seriously limit the applicability of his findings. The first is that the sample of countries with a common currency is not representative of most industrialized countries of interest (e.g., the United Kingdom, Sweden, or Canada) because it consists almost exclusively of countries that are small and poor, or both, and they represent roughly one per cent of Rose's sample and even less of world trade.[20] Nitsch (2002) classifies Rose's common-currency countries into three different groups: (1) small, poor, and distant dependencies (typically islands) that use the currency of their former colonial power or existing parent country (e.g., Guadeloupe and France, Guam and the United States); (2) small countries that unilaterally adopted the currency of a larger neighbouring country (e.g., Brunei and Singapore, San Marino and Italy); and (3) multilateral currency unions among regional neighbouring countries (e.g., the Eastern Caribbean Currency Union and the CFA [communauté financière africaine] franc zone in Central and West Africa). Indeed, Rose (2000, 15) is sympathetic to this critique when he writes, "(A)ny extrapolation of my results to the EMU may be inappropriate since most currency union observations are taken from countries unlike those inside Euroland."[21]

Borrowing from the medical literature on testing the treatment effects of pharmaceuticals, Persson (2001) and Kenen (2002) address this criticism (that the sample of countries with a common currency is not representative of the entire population) by constructing a comparison group that emulates the main characteristics of the countries with a common currency. By econometrically comparing the countries with a common currency with the comparison group, they find

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19. Rose also includes per capita income as an explanatory variable to measure approximately the standard of living in the two countries. The time dimension of Rose's data consists of observations at 1970, 1975, 1980, 1985, and 1990.

20. Of the 22,948 bilateral observations used in Rose (2000), only 252 have a common currency.

21. This concern, however, did not stop Rose and his co-authors [Frankel and Rose (2002) and Rose and van Wincoop (2001)] from conjecturing large effects of a Canada-U.S. common currency on bilateral trade flows, output, and welfare in Canada.

that the treatment effect of a common currency does not have a statistically significant impact on trade.

The second criticism is that Rose interpreted his results to imply that the use of a common currency by two countries caused increased bilateral trade, when, in most cases, a high bilateral trade intensity was likely already present (as a result of economic or political dependence), and the currency of the "parent" country was adopted by the smaller country in recognition of this dependence in order to facilitate the relatively high volume of trade (e.g., the Bahamas and Bermuda and the U.S. dollar; Liechtenstein and the Swiss franc).[22] Hence, the causality probably runs from trade dependence to a common currency, not the other way around. Recognizing this possibility, Rose (2000) tries to address the potential simultaneity bias by using instrumental variable estimation. Although this modification to the estimation technique does not significantly alter the estimated effect of a common currency, it is not clear that it adequately resolves the problem. Glick and Rose (2002, 11) also consider the reverse causality criticism, but they admit that "we have been unable to devise a convincing set of instrumental variables for bilateral currency union incidence that would allow us to quantify this effect."

The third criticism concerns the statistical significance of the common-currency indicator variable, which comes from variation across countries in the sample at points in time and not from variation across a given country over time.[23] In other words, of the 23,000 observations in the original Rose (2000) sample, only 7 (0.03 %) represent countries that joined or withdrew from a common-currency arrangement.[24] Hence, based on this small number of observations, it is invalid to assume that if countries A and B at time t decided to adopt a common currency, then trade between these two countries at time $t + 20$ years

would increase by 300 per cent, other things unchanged. Glick and Rose (2002) attempt to address this concern by extending the sample from 1948 to 1997 to include 16 switches into and 130 switches out of a common currency. They find that the impact of a common currency over time increases trade by approximately 200 per cent. It should be noted, however, that the majority of the switches out of a common currency took place before 1975 and represent the (sometimes violent) end of a colonial relationship (e.g., Algeria and France, India and Pakistan). Thus, it is not surprising that trade between two such countries fell dramatically. An interesting and more relevant case study is Ireland, which abandoned the use of the pound sterling in 1979. Thom and Walsh (2002) find that the change in currency regime had no significant impact on trade between Ireland and the United Kingdom. Thus, the empirical research using time-series data has not definitively answered the question of what impact a common currency has on trade.

Despite these criticisms, which raise serious doubts about the validity of these estimates for policy, Frankel and Rose (2002), Rose and van Wincoop (2001), and A&vW (2002) claim that, if Canada, for example, were to adopt a common currency with the United States, trade between the two countries would greatly expand and welfare would rise. Frankel and Rose (2002) assert that if Canada were to dollarize, Canada's volume of trade as a percentage of GDP would rise from an already high 76 per cent to an astounding 186 per cent, and output would eventually rise by 36 per cent.[25] Rose and van Wincoop (2001) use an empirical version of the A&vW (2003) multilateral gravity model and find that, if Canada were to adopt the U.S. dollar, its total trade flows would increase by 38 per cent, and welfare would rise by 15 per cent. As noted earlier, A&vW (2002) estimate that dollarization would increase welfare by 30 per cent. Clearly, given the concerns already discussed, these numbers cannot be taken at face value. They are best interpreted as motivating the importance of finding more directly applicable models and evidence.

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22. For example, Nitsch (2002) notes that Guadeloupe receives 50 per cent of its gross national product (GNP) and 70 per cent of its imports from France, and that, for almost 175 years (1776–1950), Denmark imposed a monopoly on trade with Greenland.

23. Glick and Rose (2002, 1) concede that Rose's original data set and results better address the cross-sectional question, "How much more do countries within a currency union trade than non-members?" than they do the more interesting time-series question, "What is the trade effect of a country joining or leaving a currency union?"

24. Pakko and Wall (2001) use a fixed-effects specification to deal with the issue of possible endogeneity and omitted variables, rather than Rose's set of dummy variables tied to specific country attributes, because they argue that there are time-invariant effects (such as the unique historical relationship between Panama and the United States) that are not properly captured by the dummy variables. They find that changes in currency status had no significant impact on trade.

25. To obtain their predicted effects, Frankel and Rose (2002) combine estimates of the trade-increasing effects of a currency union and the GDP-increasing effects of expanded trade. They maintain that countries in a currency union would significantly increase their per capita GDP. The Frankel and Rose estimates, however, are too great because the large size of the common currency (and border) effects implies that GDP per capita should be much higher in larger industrialized countries (under the Frankel and Rose reasoning), but in fact this is not true. The difference in per capita incomes between small and large OECD countries is much less than their estimates would predict.

The advent of the euro in 1999 offers an almost ideal controlled experiment to test Rose's hypothesis. Fifteen countries were members of the European Union in 1999, but only 12 adopted the euro. Thus, three countries, the United Kingdom, Sweden, and Denmark, have conveniently designated themselves the control group, which should permit the identification of the impact of the euro. Several studies, most notably Micco, Stein, and Ordoñez (2003) and Flam and Nordström (2003), have already been completed using data for the four-year period 1999 to 2002, and none find an effect consistently larger than 10 per cent. These estimates are much lower than those previously obtained by Rose and others in the general currency-union case. Moreover, the robustness of these estimates also needs to be verified. Preliminary testing by Gomes et al. (2005) reveals that, if the sample is extended back to 1980 from 1993, as in Micco Stein, and Ordoñez, the increase in intra-euro zone trade commences in 1986 (the year of the Single European Act), not in 1998 (the year before the euro was adopted) as Micco et al. and Flam and Nordström find. Hence, this evidence suggests that the increase in intra-euro zone trade has more to do with the economic integration associated with the EU than with the adoption of the euro, per se. This evidence is loosely consistent with that of Engel and Rogers (2004), who use price data on a variety of items and find that most price convergence in Europe was completed by the mid-1990s, well before the adoption of the euro. Thus, the early evidence on the effects of adopting the euro is mixed at best.

Conclusions

Although the recent research on the effects of borders and common currencies on trade, output, and welfare initially produced eye-opening estimates that were at least an order of magnitude larger than commonly believed, a careful review of the methodologies employed and of the interpretation of the results has significantly reduced the size of the estimates and raised questions that preclude drawing firm conclusions for policy. In the main, this research finds that economic linkages are far tighter within, than among, nation-states. These findings were interpreted as implying that borders and separate national currencies represent significant barriers to trade, but, in fact, this research was unable to provide completely convincing explanations for either set of facts. In particu-

lar, the empirical model most often used (the gravity model) lacks sufficient economic structure to permit discrimination between the hypothesis that these estimates represent trade barriers to be removed and its alternative, that these results are consistent with the efficient organization of production, consumption, and exchange within and among nation-states. For example, relatively high domestic trade intensities may reflect the appropriate matching of local products to local tastes and the cost advantages associated with using local information and transportation networks.

Initial estimates of the effects of borders and common currencies on trade were larger than commonly believed; subsequent research has reduced the size of these estimates and raised questions that preclude drawing firm conclusions for policy.

The observation that, among the OECD economies, the smaller countries do not have significantly lower per capita incomes than the larger ones implies that shared national values, institutions, and networks are important for achieving relatively high standards of living, and that there are unlikely to be significant increases in GDP per capita from further increases in trade intensities among the industrialized countries. This in turn suggests that border effects do not represent costly barriers to be removed.[26] The same logic would also apply to currency unions among these countries; they are not likely to produce significant increases in GDP per capita for similar reasons.

In summary, recent research on the effects of borders and common currencies on trade has been useful because it has spawned many additional studies of these important policy questions; nonetheless, this research has not yet matured to the point where it can provide a solid foundation for the decisions of policy-makers.

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26. Helliwell (2003) makes a similar argument based on cross-country comparisons of well-being.

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