North American Agricultural Market Integration and Its Impact on the Food and Fiber System.
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Abstract

Economic change and market dynamics have fundamentally altered the structure and performance of agricultural markets in the United States, Canada, and Mexico within the last 25 years. Many factors have helped shape the current North American food and fiber system, including technological change, domestic farm policies, international trade agreements, and the economic forces of supply and demand. Ratification of NAFTA, for example, helped integrate the North American market, sparking a surge in trade and investment among the United States, Canada, and Mexico. In recent years, efforts to further integrate the continental market seem to have slowed. Broadening the scope of NAFTA to include institutional reforms that lead to a more unified system of commercial law, the establishment of common antitrust and regulatory procedures, harmonization of product standards, and increased coordination of domestic farm, market, and macroeconomic policies would deepen market integration and enhance market efficiency and growth within North America.

Keywords: agriculture, market integration, market segmentation, law of one price, price transmission elasticities, exchange-rate pass-through, market efficiency, bilateral trade intensity, regional trade agreements, NAFTA, CUSTA, trade policy, WTO, GATT.

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Executive Summary

Economic change and market dynamics have fundamentally altered the structure and performance of agricultural markets in the United States, Canada, and Mexico in recent years. Many events have helped shape the current North American food and fiber system, including the rapid pace of technological change, shifts in domestic farm policies, the Canada-U.S. Free Trade Agreement (CUSTA), the North American Free Trade Agreement (NAFTA), and multilateral trade negotiations in the General Agreement on Tariffs and Trade (GATT) and the World Trade Organization (WTO). As a result of these events and the forces of demand and supply, many commodity, product, and input markets on the continent now operate in a more efficient and integrated way.

The North American Agricultural Market Integration and Its Impact on the Food and Fiber System (NAAMI) Symposium was held in Washington, DC, on November 6-7, 2000, to examine market unification of U.S., Canadian, and Mexican agricultural economies[1] (see Appendix A, NAAMI Symposium Program Agenda). This report synthesizes information exchanged at the NAAMI Symposium and obtained from a review of the literature on spatial and temporal integration. It explains why more integrated markets often benefit society, identifies obstacles that continue to constrain markets in North America from functioning more in unison, gauges the progress achieved in rendering continental markets more economically unified, and identifies challenges and opportunities that could deepen market integration in North American agriculture.

Key findings:

- *Trade patterns show the growing importance of continental trade in North American agriculture.* Since the advent of CUSTA, the real (1989-91) value of agricultural trade among the United States, Canada, and Mexico increased 120 percent between 1987-88 and 2000-01, rising from $11.2 billion to $24.6 billion. This expansion is significant because the growth of intra-NAFTA agricultural trade has been more rapid than NAFTA-member exports to countries outside North America.

- *Growth in foreign direct investment (FDI) within the NAFTA region has enhanced increased continental integration of agricultural food and fiber markets.* Expansion of FDI has been particularly rapid in the food processing industry. This expansion has transferred cutting-edge technology and has increased the domestic supply of relatively scarce resources that constrained output in this industry. Even though FDI has outpaced cross-border food trade, it has not displaced overall trade in processed foods. Empirical analysis reveals that FDI has contributed positively to U.S. exports of processed foods.

- *U.S.-Canadian agricultural markets are well integrated for most, but not all, commodities.* U.S.-Canadian markets for spring wheat and feed barley are highly integrated and have become more unified following CUSTA legislation and reform of the Western Grain Transportation Act in Canada. U.S. and Canadian beef and pork product markets are also well integrated, with pork more so than beef primarily because of the lack of national grading equivalencies for beef. U.S. and Canadian poultry markets are, by contrast, segmented markets—the result of supply-management policies in Canada.

[1] Program participants included research economists, representatives from private enterprise, and government officials close to the policy formation process. The charge given these participants was to share information about the evolutionary structure of North American agriculture, reasons why change has or has not occurred, the economic consequences of a more integrated continental market, and the desired direction for future policy.

- *The increased flow of Mexican immigrants into the United States points to greater integration of the U.S.-Mexican labor market.* One in 25 Mexicans crossed the U.S.-Mexican border during the 1990s. Employment of low-wage Mexican laborers in U.S. agriculture helped to keep production costs low on U.S. produce farms and in U.S. meatpacking plants. The flow of money sent to Mexico by Mexicans working in the United States has become much larger than the inflow of both private investment and money provided by multilateral development banks. Conditions in rural Mexico would be significantly worse if Mexican migrants were unable to work in the United States.

- *Recent shifts in policy and changes in technology have facilitated structural unification within certain industries.* CUSTA/NAFTA removed obstacles that were responsible for segmentation of national fruit and vegetables markets in North America. The establishment of innovative contractual and institutional arrangements efficiently linked produce farmers in all three countries to retailers throughout the continent. Greater integration of the continental fruit and vegetable industry is likely to have generated increasing returns because per–unit variable costs typically increase little, if at all, with market expansion.

- *Larger and freer agricultural markets in North America have generated substantial benefits to society.* The post-CUSTA/NAFTA rise in bilateral complementarities—complementarities that link one country's export specializations with its partner's import shares across the spectrum of all traded goods—provides empirical evidence that change in the United States, Canada, and Mexico has increased the efficient use of available agricultural resources. Mexican farmers are now exporting, for example, more papaya, strawberries, grapes, watermelon and other fruits in which Mexico has comparative advantages to the United States and Canada, where demand for fresh produce is rapidly expanding. And American and Canadian farmers are better able to meet Mexico's demand for corn and oilseeds by offering Mexican consumers lower prices for these staple commodities.

- *More could be done to deepen market integration within North America.* National boundaries continue to segment country markets. The continental market remains less integrated than the national economies of the United States, Canada, and Mexico. Prior to the formation of CUSTA/NAFTA, within-country trade was about 20 times larger than between-country trade in North America, after controlling for the influence of distance and market size. By 2000-01, within-country trade was about 12 times greater than between-country trade. The discrepancy still remaining between internal and cross-border trade in North America suggests that continental markets would become more integrated if all artificial barriers inhibiting cross-border trade and investment were removed.

- *The pace of CUSTA/NAFTA-induced market integration in agriculture shows signs of slowing.* Bilateral trade intensities reflect the importance of trade between two partners. Indicators of intensity for U.S. agricultural trade with its neighbors rose in the early years post-CUSTA and post-NAFTA, providing evidence that these North American free trade agreements helped deepen continental market integration. Recently, however, the importance of trade between the United States and Canada has reached a plateau, and the significance of trade between the United States and Mexico has declined.

- *A common North American currency would increase price transparency, lower transaction costs, and promote integration of continental markets.* However, the choice between retaining flexible exchange rates among the NAFTA countries or creating a monetary union between and/or among the United States, Canada, and Mexico has

far-reaching ramifications that transcend the single issue of market integration. Policymakers are faced with a tradeoff in making this decision. Is the enhanced efficiency of a single currency worth surrendering the use of national monetary policy to address domestic economic shocks?

- *Broadening the CUSTA/NAFTA agenda to include institutional reform would advance the cause of market integration across national borders in North America.* The initial focus of CUSTA/NAFTA was the conversion of nontariff barriers to tariffs and the lowering and eventual removal of all tariffs. The adoption of a more universal system of commercial law, common antitrust and regulatory procedures, harmonization of product standards based upon sound science, and better coordination of domestic farm, marketing, and macroeconomic policies would mitigate institutional obstacles that continue to segment markets in North America.

North American Agricultural Market Integration and Its Impact on the Food and Fiber System

Thomas L. Vollrath

The Quest for More Integrated Markets

Agricultural markets in the United States, Canada, and Mexico have changed markedly within the last two decades as the food and fiber system in North America has become more economically unified. The U.S., Canadian, and Mexican agricultural economies function increasingly like a single market due to the passage of time and the interaction of domestic and continental forces of supply and demand. These market forces became less encumbered with the passage of the Canada-U.S. Free Trade Agreement (CUSTA) in 1989, the North American Free Trade Agreement (NAFTA) in 1994, and the Uruguay Round Agreement on Agriculture (URAA) in 1995. The movement toward a more integrated North American agricultural economy has enlarged the market for U.S., Canadian, and Mexican producers and has transmitted more accurate price signals across national borders, increasing economic activity and productivity. Information that better reflects consumer demand and producer supply has enabled specific commodity and product markets to function more efficiently and to grow more rapidly.

In more integrated markets, farmers specialize in production activities in which they are comparatively proficient, consumers pay lower prices for purchased goods, and society is better able to reap increasing returns from technological innovations and economies of scale. The benefits of integrated markets explain the creation of the European Union (EU), participation by many countries in regional trade agreements, and the genesis of the General Agreement on Tariffs and Trade (GATT) and its successor, the World Trade Organization (WTO).

The URAA established a framework of rules for agriculture, initiated reductions in tariff protection, curtailed trade-distorting domestic support, and imposed disciplines on export subsidies for the first time. The agreement lowered agricultural tariffs and promoted the conversion of quotas, licensing requirements, and other nontariff barriers into tariff equivalents for subsequent reduction and/or elimination. The URAA also established the WTO dispute settlement mechanism and imposed restrictions on domestic policies, limiting the amount of national support allowed. These reforms have enabled the global market to function more efficiently. Yet, artificial impediments to trade remain.

Agricultural protectionism continues to be a major problem worldwide (Gibson et al.). Trade is severely hampered by the use of policy instruments that impede trade, such as tariffs, domestic labeling requirements, national sanitary and phytosanitary regulations, antidumping rules, countervailing duties, commodity safeguards, and state-trading import regulations (USDA, ERS, May 2001). Given these practices, international negotiators must determine how to discipline their widespread use.

One possible solution is seen in the regional trade agreements (RTAs) that have recently become a fixture in the global trade arena (Burfisher and Jones). RTAs can be powerful forces promoting market liberalization that not only complement, but go beyond, multilateral trade efforts to open international markets (Bergsten). They are, in other words, viewed as vehicles to "deeper integration," where deeper integration is associated with the removal of "behind-the-border" barriers inhibiting trade. Not only is it easier to reach agreements on trade issues when negotiating with fewer countries under an RTA than with many more countries participating in the WTO, but it is easier to sustain national differences in cultural tastes, preferences, and institutions where openness and diversity are tolerated because of trust, mutual respect, and shared basic values.

Even so, RTAs often represent a second-best solution because they typically divert as well as create trade

(Bhagwati and Panagariya; Panagariya). Trade is created by the reduction of member-country trade barriers. Trade is diverted whenever member-country imports shift from more efficient nonmember suppliers to a less efficient member supplier due to RTA concessions. The question of trade creation versus trade diversion is "the single most interesting question related to regional agreements" (Gardner, 2000).

Empirical analyses show that the trade-creating effects of NAFTA have dominated the trade-diverting effects (Clausing; Vollrath, 1998). These empirical findings suggest that by lowering and removing border measures that constrain market forces, NAFTA has enlarged the open market in North America (USDA, ERS, 2002). NAFTA has also promoted North American agricultural market integration by extending national treatment to foreign-owned companies and increasing access by foreign companies to domestic financial markets. However, many institutional barriers continue to segment national markets in North America. Further integration of these markets could be achieved through harmonization of inspection, grading, and labeling standards; better coordination of domestic farm, marketing, and macroeconomic policies; and the adoption of a universal system of commercial law and common antitrust and regulatory procedures.

Creation of an environment conducive to spatial and temporal integration is more important than ever in the modern world because the impact of open-market reforms has become more pronounced with the advent of the new information technologies (IT). Advances in electronic telecommunication and use of the Internet enable communication to take place faster and cheaper than ever before in openly integrated markets. Communication networks allow individuals, companies, and communities to interact more effectively with each other across national borders and to reap the benefits of increasing returns. The IT revolution is likely to fuel economic growth by lowering costs (Friedman, 2000).

Economic Payoffs to More Unified Markets

Internationally integrated commodity, product, and input markets function more efficiently than nationally segmented markets. They also establish an environment that is conducive to growth. This occurs because of comparative advantage and increasing returns. (See box, "Fundamental Economic Forces Underlying Comparative Advantage and Increasing Returns.")

Better Exploitation of Comparative Advantages

All three North American countries possess inherent comparative advantages in commodity agriculture. Both the United States and Canada enjoy relative cost advantages in grains and oilseeds because of their abundance of fertile farmland. Mexico's strength is with high-value fruits and vegetables due to its relatively plentiful supply of labor and its semi-tropical climate. These comparative advantages are not fully exploited whenever barriers exist that inhibit trade and artificially segment the North American market.

One principal aim of CUSTA/NAFTA was to increase the efficiency of North American agriculture by making better use of continental resources. For this reason, the agreement lowered member-country tariffs and nontariff barriers to trade. These policy shifts enabled the price mechanism to generate more accurate information about relative scarcity within North American agriculture. The post-CUSTA-NAFTA rise in commodity complementarities, which link one country's import shares with its partner's comparative advantages, suggests that structural change and shifting trade patterns have benefited U.S., Canadian, Mexican, and global agriculture. (Bilateral trade complementarities present in U.S.-Canadian as well as U.S.-Mexican agricultural trade are examined later in this report.)

Realization of Increasing Returns

Market integration and trade expansion also enhance economic welfare because a more unified and enlarged market generates increasing returns which drive unit costs down as output rises. Underlying the phenomenon of increasing returns are scale economies, spillover effects of human capital, and increased use of technological inputs such as computer programs that, once created, can be used repeatedly without additional costs and that are accessible to many, but not all, producers.

National Returns to Scale and Greater Operational Efficiencies

Increasing returns attributable to scale economies are derived from both national and international returns to scale. National returns to scale result from increased plant and industry size within country borders. Notable examples of such economies occurring in North America include the enlargement of meatpacking plants in both the United States and Canada and the increased size of vegetable production and marketing operations in Mexico.

Applied research on U.S. agriculture shows that the emergence of large-scale operations within the U.S. food sector has benefited U.S. consumers by lowering retail prices. These benefits are extended to consumers in Canada and Mexico whenever the North American food market becomes more open. U.S. consumers also benefit from national scale economies in neighboring countries when continental markets become more open. For example, a greater variety of lower price fruits and vegetables is now available year-round in U.S. supermarkets as a result of NAFTA and structural change in the Mexican fresh produce industry.

Outsourcing and International Returns to Scale

Companies that outsource production abroad combine low-wage labor from one country with highly skilled human capital from another to generate international returns to scale (Ethier). The efficiency payoffs of these internationally derived returns are "over and above the stated neoclassical gains from increased specialization and exchange across countries" (Feenstra).

There are many instances of efficiency gains from outsourcing in North American agriculture. Examples include cross-border trade in various segments of the meat, livestock, and fruit and vegetable industries (Cook; Southard). U.S. textile and apparel firms provide a particularly interesting illustration of trade in intermediate inputs. NAFTA provided inducements for capital-intensive yarn spinning and weaving manufacturing firms, such as Dupont, to make foreign direct investments and to establish joint ventures with labor-intensive apparel assembly firms in Mexico. The result has been that many U.S. firms have effectively traded their managerial experience, embodied in their

highly skilled labor force, for Mexico's low-wage labor.

Spillover Effects of Human Capital

In much of North America, the "traditional food system," in which price signals are the main mechanism for allocating resources and delivering products across market stages (i.e., farm input suppliers, farmers, food processors, and retailers), has been replaced by the "new food system" (Barkema; Kinsey). The new system relies less on market prices and more on institutional innovations such as contracts, strategic alliances, and vertical integration and coordination. These innovations rely heavily on human capital (skills embodied in the workforce). This is significant because human capital generates spillover returns to society at large (Lucas).

Increased Use of Technological Inputs

Intra-NAFTA trade in high-value agricultural products is growing rapidly. This is significant because consumer prices for these products reflect marketing networks, product designs, and other technological inputs that underlie increasing returns. All that is needed for technological inputs that have productive value to generate increasing returns is a market through which goods produced with these inputs can be sold (Romer). Producers also profit from increased sales when the market is extended, provided their inputs are non rival and partially excludable (see box, "Fundamental Economic Forces Underlying Comparative Advantage and Increasing Returns," for details). Consumers also benefit from an expansion in the size of market because it allows them to choose from a wider variety of lower priced goods.

Recent developments in North American fruit and vegetable markets illustrate how the use of technological inputs, in combination with more open continental markets, have generated very large payoffs. Clearly, NAFTA, which removed obstacles that were responsible for segmentation of national fruit and vegetable markets in North America, was beneficial to society because the agreement enabled better exploitation of comparative advantages. By using contractual and institutional arrangements, suppliers throughout the produce production/marketing chain in Mexico, Canada, and the United States probably experienced increasing returns. Variable costs likely increased little, if at all, by expanding the size of the market to include all three national economies.

Fundamental Economic Forces Underlying Comparative Advantage and Increasing Returns

Comparative advantage and optimal resource use. Comparative advantage explains why societies are better off when spatial markets become more unified. More open and integrated national markets provide opportunities for additional cross-border trade. This trade enables a country to shift its pattern of production in such a way that, after exporting those goods it does not want and importing those it would like, its citizens are able to consume more without any increase in available resources. As a result, movement towards more integrated markets not only changes production patterns and increases trade, but raises national income in partner countries.

The gains from more unified market integration described above follow a one-time shift in production and trade specialization. There are, in fact, additional dynamic gains from market enlargement which follow the initial change. These other benefits arise because the more integrated market transmits increasingly accurate price signals across national borders, information that producers use to optimize resources and to justify the adoption of more profitable technologies.

Contracts, vertical integation and other institutional innovations are sources for increasing returns. Contracts and strategic alliances help control costs and ensure that the output generated is endowed with desirable characteristics. Contracts frequently stipulate the use of precise production practices and/or the use of specific inputs or input combinations. Alliances are typically designed to minimize risks and lower costs. Vertical integration occurs when upstream and downstream activities are coordinated through ownership within a single firm. Vertical integration typically leads to lower transaction costs through better coordination between upstream input supply and downstream output demand (Young and Hobbs). Coordination takes many forms, including administrative planning and management of the processes required to ensure identity-preserved supply chains for value-enhanced crops, such as wheat used to produce General Mill's Wheaties breakfast cereal, grown in Idaho under approved farming practices.

Important attributes of technological inputs. The unique characteristics of technological inputs—nonrivalry and either partial- or non-excludability—explain why their use creates positive spillovers (Romer). Once produced, technological inputs can be used over and over again without additional costs. This attribute is called "nonrivalry." Typically, nonrival goods are ideas or designs that have fixed but no variable costs because duplication can occur at essentially zero additional cost. A rival good, by contrast, can be used by only one firm or person. Moreover, technological inputs are either "non-excludable" or "partially excludable." A good is excludable if the owner can prevent others from using it.

Large-firm scale economies and possible negative fallout from increased concentration. One area of some concern about increased firm size is whether concentration leads to the abuse of market power and departures from competitive pricing (USDA, ERS Briefing Room). This is an empirical question which quantitative analyses can answer. Econometric studies of the meatpacking industry in the United States show that increased concentration has not led to the extraction of excess profits (MacDonald et al.; Persaud and Tweeten). Similar conclusions were drawn by Reed and Clark, who investigated other areas of the U.S. food system, including the fruits and vegetables sector.

What Price Analyses Show About Cross-Border Integration in Commodity Markets

Economists like to use prices whenever possible to identify a market (Stigler and Sherwin). This is due to the fact that "the market" is defined as the collective set of buyers and sellers that establish the price. Moreover, reliable price data are often readily available at the individual commodity and product level. By contrast, other market-based data—such as quantities produced and/or the value of trade—often do not exist or are difficult to obtain at desired levels of frequency.

Economists consider markets to be spatially integrated for a specific good if prices for the good in different localities move in tandem with each other over time. This is based upon the law of one price (LOP) (Dornbusch). The absolute version of this law states that prices will equalize across freely trading areas and that identical goods sell for the same common-currency price in different countries. In practice, applied economists base their analyses on the relative LOP, which allows for transaction costs that do not vary proportionally over time.

Market integration is typically viewed as a longrun phenomenon. It is present whenever a stable price relationship is established. This means that spatial prices can temporarily deviate from each other in the short run and still be consistent with the notion of an integrated market. The concept of spatial arbitrage is central to understanding why this is so. One way to view arbitrage is to visualize traders buying in a low-priced market, transferring the item to a high-priced market, and reselling the purchased good until price equalization occurs. Spatial arbitrage explains why prices for a uniform good in different localities tend towards equality and move in tandem with each other in integrated markets.

Applied economists typically view integration of spatial markets in terms of degree rather than with respect to strict adherence to the LOP (Fackler and Goodwin). At one extreme are completely segmented markets; at the other are perfectly integrated markets.

A simple correlation of U.S. and NAFTA-member prices (denominated in a common currency) provides a relatively straightforward way to depict national price co-movements. Using this indicator, perfect market integration (segmentation) of two area markets occurs if the price correlation equals 1 (0). Correlations that fall between 0 and 1 suggest intermediate levels of market integration. Simple correlations of area prices are relatively easy to calculate and can be used to quickly gauge the extent of integration. For example, price correlations in a Canadian-U.S. meat study show that U.S. and Canadian pork product markets are, on average, more integrated (correlation of .86) than the national markets for beef products (correlation of .60) which, in turn, are more integrated than the markets for whole chicken (correlation of .26) (Jinkins and Vollrath). These results confirm expectations that U.S.-Canadian beef and pork operate more like a single market than poultry. Canada's supply-managed poultry policies insulate this sector from U.S. and world markets.

One problem with using price correlation as an indicator of market integration across countries is that it cannot account for many real-world complexities. It cannot reveal, for example, how exchange rate fluctuations affect the enlarged market. Analyzing market integration across national borders in countries with different currencies is considerably more complicated than focusing on spatial markets within a country. Shifts in currency values affect inter-country, but not intra-country, market integration--unless exchange rate pass-through (ERPT) is complete. Complete ERPT occurs when an exporter alters own-currency prices at which it sells goods in the foreign market commensurate with the shift in the bilateral exchange rate, resulting in no change in the foreign-currency prices of exported goods. If the U.S. dollar appreciates, for example, U.S. exporters would have to lower U.S.-dollar prices at which they sold their goods in overseas markets in order to maintain their competitiveness in these markets. Otherwise, the foreign-currency price of U.S. goods would rise due to dollar appreciation and U.S. exporters would lose market share.

To separate the components of U.S.-Canadian market integration, Vollrath and Hallahan used LOP models to isolate the influence of foreign-currency domestic prices on home-currency local prices from that of the exchange rate. ERPT elasticities, defined as the responsiveness of the home-country price to a change in the relative value of the U.S. dollar to the Canadian dollar, show that a change in the exchange rate has little or no bearing on contemporaneous U.S. and Canadian domestic prices for meat and livestock.[2]

This reveals that fluctuations in the bilateral exchange rate are a barrier to cross-border market integration. It means that shifts in the Canadian-U.S. exchange rate can fundamentally alter U.S. and Canadian competitiveness in each other's markets. The finding of incomplete ERPT is supported by widespread evidence in the applied literature that the transmission of exchange rate changes to product and factor prices is usually weak (Isard).

Shifts in government policies and/or programs influence integration. To determine the impact of the 1994 NAFTA legislation and termination of Canadian rail subsidies under the Western Grains Transportation Act (WGTA) in 1995, Mohanty and Langley examined integration of the U.S.-Canadian spring-wheat and feed-barley markets before and after these policy innovations. Their research revealed stable longrun price relationships between the United States and Canada in both spring wheat and feed barley, confirming that U.S.-Canadian markets for both grains have been, in fact, integrated for some time. Their findings also revealed that integration deepened over time, most notably following the elimination of freight subsidies in 1995. The longrun price transmission elasticity for wheat (barley) increased from 0.84 (0.67) in the pre-WGTA period to 0.99 (0.91) in the post-WGTA period, where the price transmission elasticity is defined as the responsiveness of the home-country price to a change in the partner-country price. In addition, their research showed that following a price shock, the speed of adjustment back to equilibrium increased in both grain markets post-NAFTA (post-WGTA reform). This finding provides additional evidence that the U.S.-Canadian markets for spring wheat and feed barley have become increasingly integrated. It is likely that the creation of NAFTA and reform of the WGTA contributed to the observed convergence of U.S. and Canadian grain prices.

Recently, a new perspective of market integration has emerged, one that relates to "market connectedness" (McNew). In this approach, market integration is measured by the degree to which supply and demand shocks are transmitted from one region to another. One advantage of this new perspective is that it focuses explicitly on the price adjustment process. For example, it can reveal the impact of delivery lags on contemporaneous prices. It can also show the path of adjustment and how long it takes for shocks to dissipate.

National markets may not be integrated with each other to the same degree. For example, empirical analyses of market connectedness show that meat markets in the United States and Canada are asymmetrically integrated. The high degree of responsiveness of Canadian pork and beef prices to shocks in corresponding U.S. product markets indicates that the Canadian market is highly dependent upon and integrated with the U.S. market (Jinkins and Vollrath). But the reverse does not hold. U.S. pork and beef prices are not very responsive to shocks occurring in the Canadian market. The accumulated, 8-week multiplier of a unit shock to U.S. pork (beef) prices is 4.27 (1.94). By contrast, Canadian-based impact multipliers do not exceed 1 in any U.S. meat market.

Price analyses convey useful information about market integration because of the central role of prices in defining the market for individual goods, and because price data reflect equilibria of supply and demand through time and space. But problems of aggregating unlike items constrain the ability of price analyses to expose information about market unification at the sector, industry, or even undifferentiated product level. Trade data and institutional analyses can be used to enhance our understanding of market integration at the aggregate level.

[2] They also found that the U.S.-Canadian exchange rate exhibits a random walk while national commodity prices are stationary in levels. This finding alone identifies the exchange rate as an inhibiting factor constraining market integration.

What Trade Data Reveal About Market Unification Throughout North American Agriculture

The Concept of "Tradability" and Evidence of Trade Expansion

The concepts of "tradability" and "non-tradability" enable us to differentiate integrated from segmented markets (Barrett and Li). A product is "tradable" between two countries if the good is actually traded or if market intermediaries are indifferent about exporting and not exporting from one country to the other. Given this perspective, the mere existence of cross-border trade at either the disaggregate or aggregate level of analysis provides *prima facie* evidence that spatial markets are interconnected and, therefore, integrated.

Explosive growth in the real (1989-91) U.S. dollar value of intra-NAFTA trade beginning in the early 1980s points to greater market integration in North American agriculture (fig. 1).[3] Since the advent of CUSTA, agricultural trade among the United States, Canada, and Mexico has increased 120 percent, rising from $11.2 billion in 1987-88 to $24.6 billion in 2000-01 in real (1989-91) terms.[4] The growth of U.S.-Canadian agricultural trade quickened immediately following implementation of CUSTA. Similarly, the growth in U.S.-Mexican trade boomed after implementation of NAFTA (fig. 2).

The fact that U.S.-Mexican trade began to take off in 1987 suggests that the Mexican agricultural economy started becoming more integrated with that of the United States as a result of liberalizing domestic reforms in Mexico in the mid-1980s. NAFTA deepened continental integration by locking in Mexico's reforms. Prior to the mid-1980s, inward-oriented and market-unfriendly policies had segmented the Mexican agricultural economy from its northern neighbors, severely constraining market integration in North America.

Despite the growth of U.S. bilateral trade with Canada and Mexico during the CUSTA/NAFTA era, cross-border markets that span country boundaries in North America are far less integrated than are the national domestic markets. Gravity models, which account for the influence of distance and market size, show that merchandise trade among Canadian Provinces was 20 times larger than trade between the Canadian Provinces and U.S. States prior to CUSTA (McCallum, Helliwell). The disparity between intra-Canadian and Canadian-U.S. trade decreased post-CUSTA to a factor approximating 12 (Hufbauer). This points to the gap still separating U.S. and Canadian markets. Similar inferences would likely be drawn for the U.S.-Mexican and Canadian-Mexican markets, provided that gravity models had been estimated that included trade among states within Mexico and/or within the United States.

Examination of intra-NAFTA export shares reveals more about agricultural market integration than changes in the absolute value of agricultural trade among the North American countries. Such shares identify the magnitude of member-to-member trade in comparison with member-country exports to the world excluding NAFTA. The rise in intra-NAFTA export shares in figure 1 shows that trade among the NAFTA countries grew faster than exports supplied by the United States, Canada, and Mexico to non-NAFTA countries. Growth in the relative importance of intra-NAFTA exports began in the early 1980s, prior to the formation of the free-trade agreements among the three countries. The post-CUSTA/NAFTA rise was steady with the exception of the dramatic, but brief, fall-off in 1995. This sharp decline coincided with the temporary curtailment of Mexico's ability to import because of the peso devaluation.

Asymmetric Integration Between the United States and Its Neighbors

Two intensity measures of trade—the bilateral trade intensity index developed by Brown and the commodity complementarity index developed by Drysdale—can be used to enrich analyses of cross-border integration.[5] These indices have been widely used to gauge regionalization and the success of regional trade agreements in promoting market integration (Vollrath, 2001; Anderson and Norheim; Dell'Aquilla et al.). Both indicators neutralize the

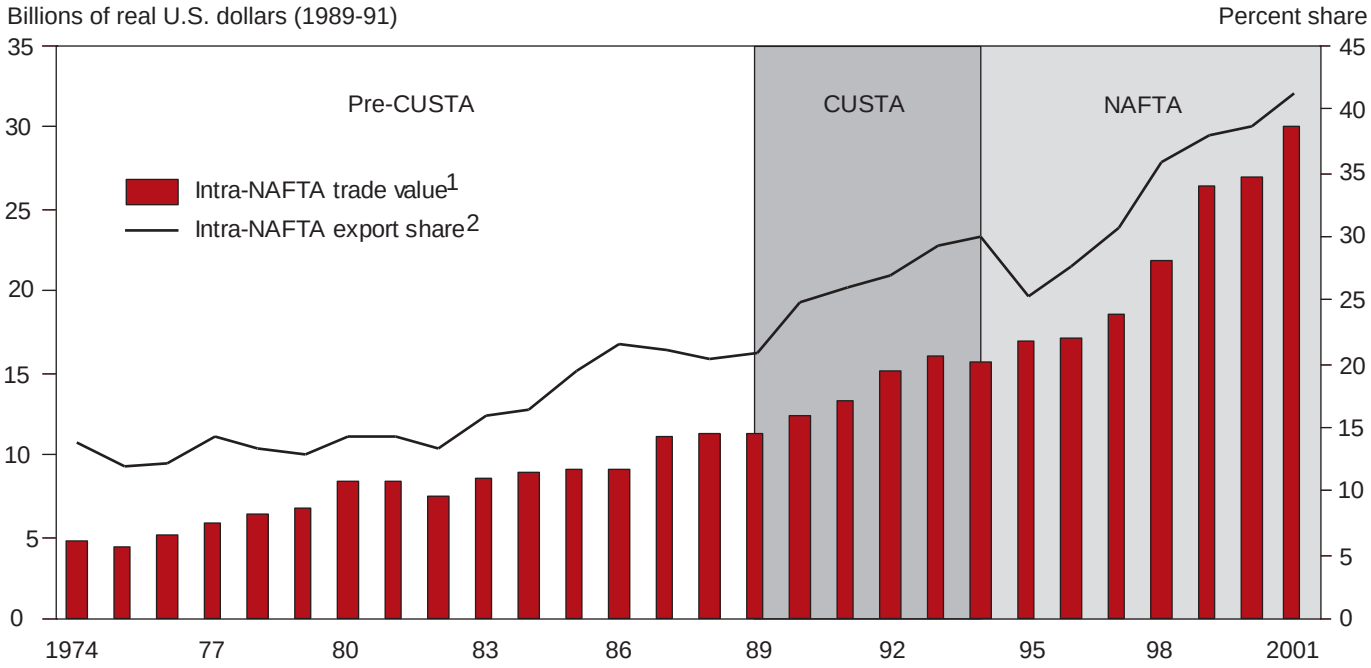
[3] Data used in this analysis are, for the most part, from ERS's International Bilateral Agricultural Trade (IBAT) database derived from UN Comtrade.

[4] These figures are expressed in real 1989-91 U.S. dollar terms.

[5] The bilateral trade intensity index is the product of the complementarity and trade-bias indices. Drysdale's complementarity index is sum of the product of exporter revealed-comparative-advantages and importer commodity import market shares. See, Vollrath and Johnston for a concise and intuitive statement showing the interrelationships among these measures and Appendix B for algebraic formulation of the indices used in this study.

Figure 1

Trade shares show that intra-NAFTA agricultural trade grew faster than NAFTA trade with the rest of the world

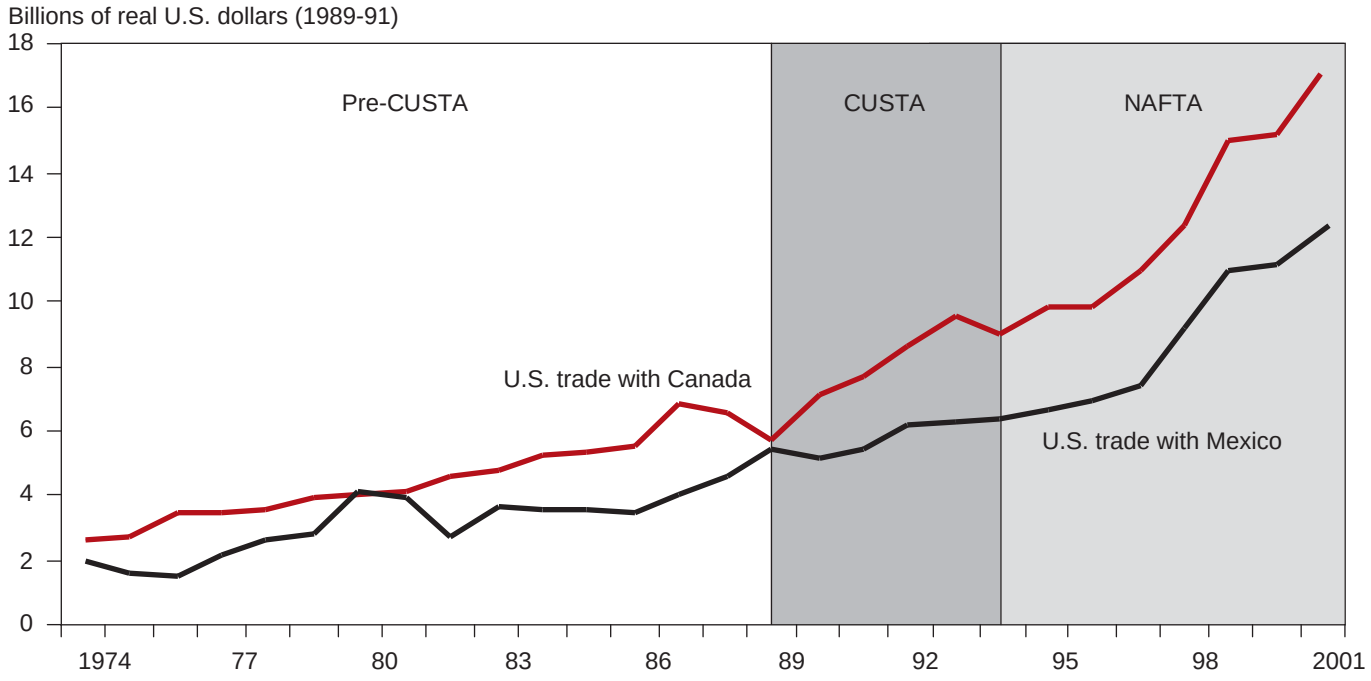


[1]Intra-NAFTA trade value is the total value of U.S., Canadian, and Mexican trade with each other.
[2]Intra-NAFTA export share represents the share of NAFTA-partner trade with each other compared with their exports to all foreign markets.

Source: ERS IBAT data derived from UN Comtrade deflated by FAOSTAT trade indices.

Figure 2

U.S. agricultural trade with Canada and Mexico shows accelerated growth after CUSTA/NAFTA



Source: ERS IBAT data derived from UN Comtrade deflate by FAOSTAT trade indices

impact of country size, account for both partner exports and imports, and require no modeling assumptions because they are purely data-driven (Hertel).

Bilateral trade intensity indices show the relative importance of a specific exporter in supplying imports to a particular country in comparison with other supplying countries. They also identify the relative importance of the importing partner in absorbing exports provided by a particular country in comparison with other foreign import markets. Bilateral trade intensities depicting total U.S. agricultural trade with Canada and Mexico show that "neighborliness" is clearly an important factor in overall U.S. and Canadian trade (fig. 3)[6]. These indices reveal that between 1974 and 2001, U.S.-Canadian (U.S.-Mexico) agricultural trade was, on average, 3.7 (4.4) times greater than would have been predicted in the absence of 1) trade inducements, such as preferential trade arrangements and comparative advantages, and/or 2) impediments to trade, such as relatively large distances, comparatively high transportation costs, language differences, discriminatory barriers to trade, etc.

The bilateral trade intensities depicting each country's exports with the other are often asymmetric. U.S.-Canadian indices for total agriculture show that Canada's importance as a market for U.S. exports averaged 1.4 times greater than the importance of the United States as a market for Canadian exports during 1974-88, prior to CUSTA. By 1989, the relative importance of the Canadian and U.S. market for each other's exports had reached virtual parity, with suppliers in both countries sending 4.7 times more goods to their neighboring market than was typical elsewhere in their respective foreign markets. While the geographical importance of partner trade continued to increase post-CUSTA for both countries, Canadian exporters became relatively more reliant upon the U.S. market than vice versa. By 2001, Canada exported 5.5 times more agricultural goods to the United States than to its other foreign markets; while the United States exported 4.2 times more goods to Canada than elsewhere.

Shifting attention to U.S.-Mexican trade, the indices reveal that the geographical importance to Mexican exporters of the U.S. market is twice that of the importance of the Mexican market to U.S. exporters. The strong reliance of Mexico on the U.S. market reached a peak in 1992, at which time Mexican exports to the United States were 10.6 times greater than expected in a scenario with no special inducements or impediments to trade. Thereafter, Mexico's bilateral export intensity with the United States steadily declined, falling to 7 in 2001.

U.S. Agricultural Market Integration with Canada and Mexico, Overall

A summary indicator of U.S. agricultural integration is best provided by taking a simple average of the two intensity measures showing the U.S.-partner trade relationship, one that describes the situation when the United States is the exporter and the other when the United States is the importer. The simple average simultaneously accounts for both countries' exports and imports and puts bilateral trade in the context of global trade. The bilateral-trade-intensity averages in figure 4 indicate that both the U.S.-Canadian and the U.S.-Mexican agricultural markets have become more integrated within the last 25 years. The U.S.-Canadian intensities more than doubled between 1974 and 2001, rising to 4.9. The intensities characterizing U.S.-Mexico trade, which have consistently been higher than those typifying U.S.-Canadian trade, also rose during this period, reaching 5.8 by 2001.

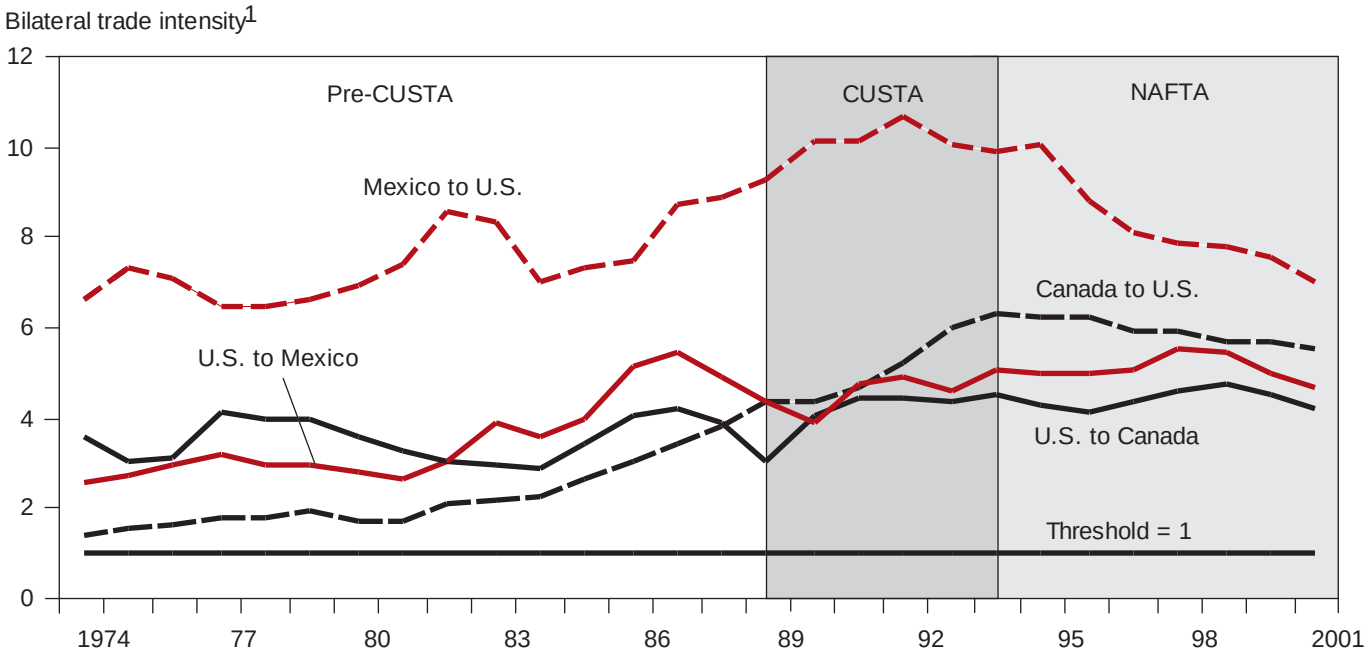
Changing market fundamentals deepened the integration of U.S.-Canadian agriculture beginning in 1981, when the two countries' average bilateral trade intensities began their ascent, rising from 2.2 to a peak of 5.4 in 1994 (fig. 4). CUSTA may have boosted this integration during the early years of the agreement—as evidenced by the detectable 1989-94 rise in these intensities—but CUSTA appears not to have enhanced U.S.-Canadian integration subsequently. By 2001, U.S.-Canadian intensities had fallen modestly to 4.9. The leveling-off of U.S.-Canadian bilateral trade intensities suggests that the importance of Canada (the United States) as a market for U.S. (Canadian) agricultural goods has reached a plateau.

Many factors have contributed to the integration (segmentation) of U.S. and Mexican agriculture. Market-oriented reforms in Mexico in the mid-1980s, anticipation of an impending trade agreement between both nations, and implementation of the NAFTA legislation undoubtedly contributed to the post-1984 2.2-point rise in the two countries' average trade intensities to

[6] Neighborly trade is also important for the four subsectors comprising total agriculture--bulk commodities, fresh produce and horticultural products, processed intermediates, and high-value processed products. In cases involving the United States and its NAFTA trading partners, bilateral intensities depicting each subsector always exceeded 1 post-CUSTA/NAFTA, except for Canadian bulk exports in 1991. These empirical findings underscore the relative importance of intra-NAFTA trade, even in such areas as bulk commodities where the United States competes internationally with both Canada and Mexico.

Figure 3

U.S. agricultural exports to Canada (Mexico) were substantially greater than would have been anticipated in the absence of special inducements and impediments



1A bilateral trade intensity value of 1 signifies that a trading partner is no more or less important than a country's typical trading partner, where importance is gauged by the presence of such factors as preferential trade agreements, resource endowments, geographic location, and trade barriers

Source: ERS. IBAT data derived from UN Comtrade.

7.5 in 1995. By 2001, the average U.S.-Mexican intensity had fallen to 5.8. This downward shift reflects, in part, loss in the value of the Mexican peso after the 1995 devaluation.[7] It also reflects a conscious policy reorientation in Mexico towards greater geographic market diversification. Post-NAFTA, Mexico established bilateral trade agreements with the EU, Chile, Costa Rica, and Mercosur[8] in an attempt to broaden its foreign market beyond the United States.

Growth in Complementarity of U.S.-Canadian and U.S.-Mexican Agricultural Trade

The structure of U.S., Canadian, Mexican, and global agriculture has undergone major shifts in recent years. But what does this mean for society at large? To help answer this question and to draw inferences about economic welfare, this report uses Drysdale's complementarity index. This index links one country's export specializations with its trading partner's commodity import shares across the spectrum of all traded goods. Put another way, it measures the degree to which the exporter's commodity profile of comparative advantages corresponds with the importance of each commodity in its trading partner's import basket. Upward sloping complementarities provide evidence that the structural change taking place is consistent with more efficient use of global resources.

A recent analysis using Drysdale's index has divided agriculture into two agricultural subsectors--field crops and non-farm, high-value products (HVP) (Vollrath, 2001).[9] Figure 5 depicts the changing complementarity patterns characterizing U.S.-Mexican and U.S.-Canadian trade in field crops and HVP. The right-hand

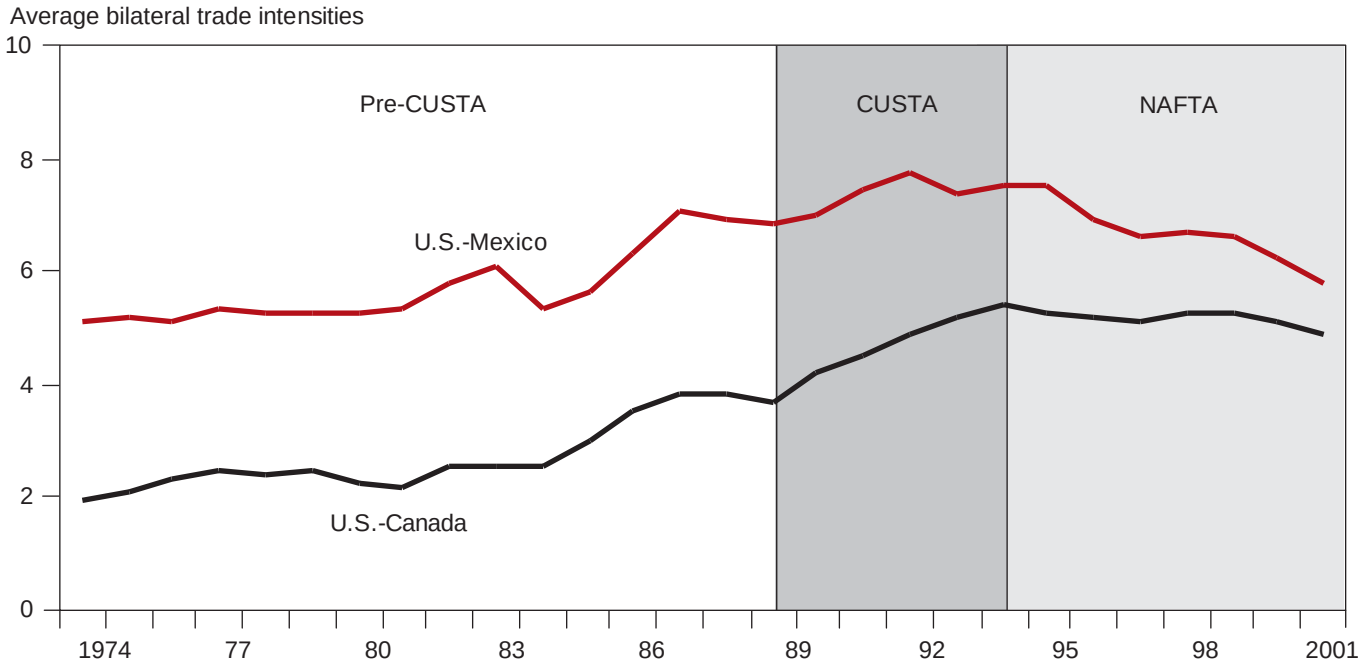
[7] Shortly after the peso devaluation in 1995, the United States became a relatively less important market for Mexican exporters because the higher value of the dollar increased the price of U.S. imports in Mexico, lowering demand. Mexico continued to be an increasingly important market for U.S. exporters as prices for Mexican goods in the United States fell due to the devaluation of the peso. But by 1999, lower income had eroded the purchasing power of Mexican consumers and the relative importance of Mexico as a market for U.S. exports fell.

[8] The countries belonging to Mercosur are Argentina, Brazil, Paraguay, and Uruguay.

[9] "Field crops" include farm-produced commodities that are traded on international markets. They include rice, wheat, corn, and other cereals; cotton and other plant fiber; soybeans and other oilseeds; fresh fruit and vegetables; legumes and tubers; nuts; cut flowers; tobacco; coffee; and other crops. "HVP" includes all other agricultural goods, including all sugar and sugar-containing products. Note, this analysis of complementarity is based upon trade (not production) data and only sugar that has been processed is traded across international borders.

Figure 4

Overall bilateral trade intensities characterizing U.S. trade with its neighbors suggest that U.S. agricultural market integration with Canada and Mexico has recently slowed



Source: ERS. IBAT data derived from UN Comtrade.

figures display patterns when the United States is the exporter; the left-hand figures show situations when the U.S. neighbor is the exporter.

Some interesting observations can be drawn from comparing the various complementarity series. The first is that complementarities characterizing U.S.-Mexican trade in field crops exceed those typifying corresponding U.S.-Canadian trade. This is not surprising in view of similarities in the makeup of farm production in the United States and Canada and the dissimilarities characterizing U.S. and Mexican production. Both the United States and Canada are major producers and world suppliers of grain and oilseeds. Mexico, by contrast, is an important supplier of tropical produce and of labor-intensive fruits, vegetables, and horticultural products.

A second observation relates to differences in the relative importance of field crops and HVP among the NAFTA countries. In the U.S.-to-Canada and Canada-to-U.S. cases, complementarities are highest for HVP and lowest for the primary farm commodities. This reflects, in part, the higher demand for HVP compared with primary commodities in the developed countries. For Mexican exports to the United States, complementarity indices are higher for field crops than for HVP. This can be explained by the fact that Mexico is still a developing country with a primarily staple-based supply of agricultural exports.

A third observation is that complementarities are relatively stable over time, reflecting the fact that tastes and preferences are typically slow to change. The exception to this generalization are complementarities involving Mexican exports. This exception can be explained by large variations in the value of the peso that have affected year-to-year competitiveness of Mexican agriculture in international markets.

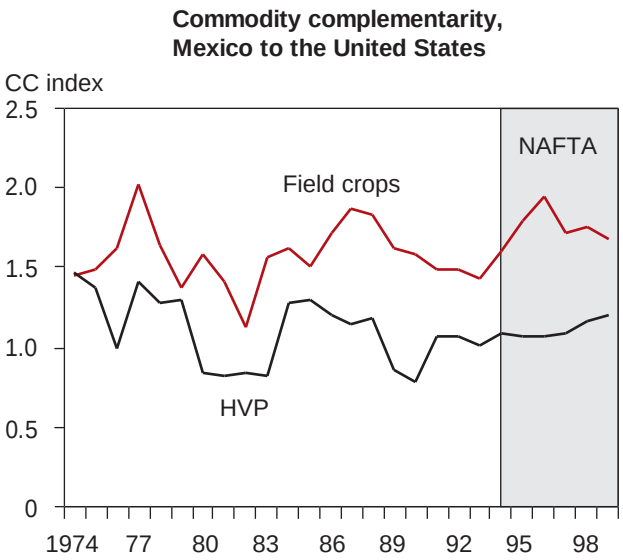
What is most interesting and economically significant in the case of Mexican-U.S. trade is that the pre-NAFTA downward trends in the complementarity indices reversed themselves during 1994-99. Upward sloping complementarities indicate that post-NAFTA allocations of U.S. and Mexican resources have resulted in better conformity to global patterns of comparative advantage in field crops—at least as far as the United States and Mexico are concerned.

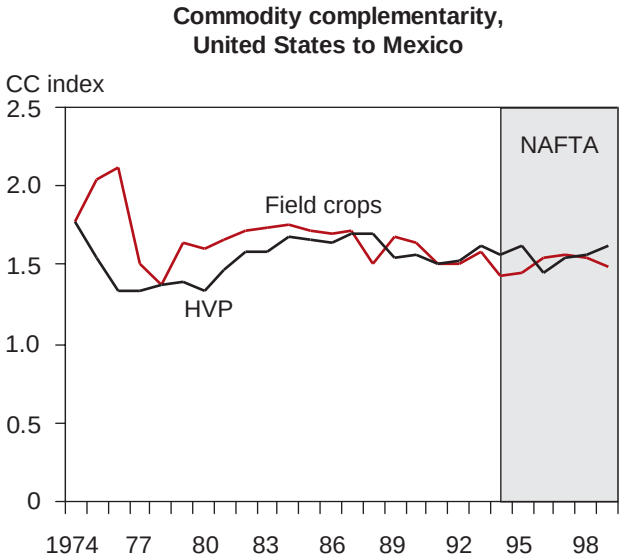
The most significant finding in the case of U.S.-Canadian trade is that all complementarity series exhibit upward-sloping trends post-CUSTA. This suggests that structural change and shifting trade patterns after 1988 have benefited the United States, Canada, and global agriculture. CUSTA and NAFTA may very well have contributed to these favorable developments.

Figure 5

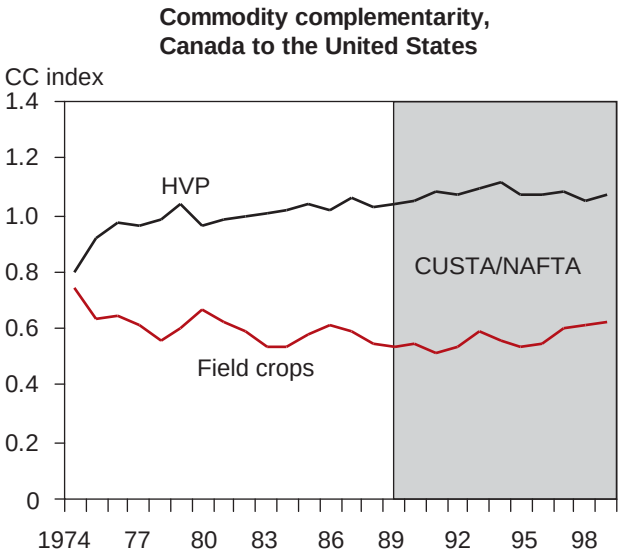
Increasing complementaries depict U.S.-Canadian and U.S.- Mexican trade in field crops and high-value agricultural products

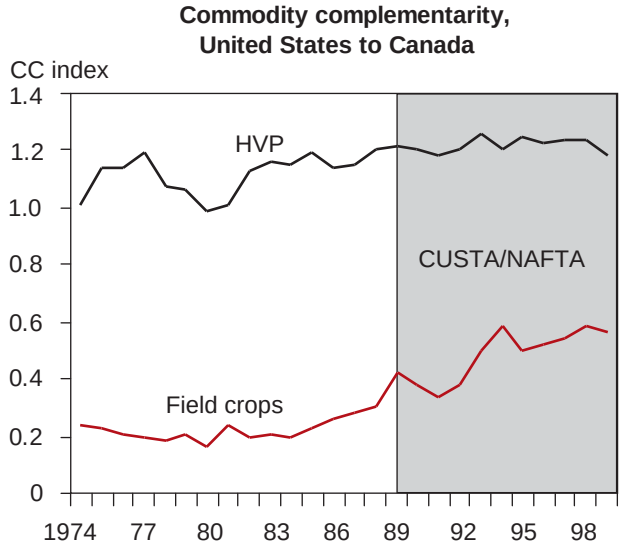
Pre-NAFTA downward trends in Mexico-to-U.S complementarities reversed themselves during 1994-98





Increased complementarities characterize post-CUSTA U.S.-Canadian trade





Source: ERS. IBAT database derived from UN Comtrade.

What the Record Shows About Integration in Capital and Labor Markets

Cross-Border Integration of Capital Markets on the Rise

Recent growth in foreign direct investment (FDI) indicates that progress achieved in unifying the North American market has been more successful than a simple analysis of integration based upon trade data would suggest. Post-CUSTA/NAFTA expansion of intra-member FDI has tripled in value, while intra-member trade has doubled (U.S. Department of Commerce). The growth in intra-member FDI reflects the success of CUSTA and NAFTA in reducing impediments to cross-border investment by providing for the equal treatment of domestic and foreign investors and by locking in reforms of the 1980s that liberalized the Mexican economy.

FDI is a powerful force for change. It provides the recipient with resources which, when combined with relatively abundant domestic factor inputs, increase output and productivity. In the North American food processing industry, FDI has transferred cutting-edge technology embodied in capital and managerial knowledge. These developments have had positive impacts on local production and productivity. For example, U.S. investment in the Canadian grain-processing industry has enabled all the major players in the Canadian market to exploit scale economies (Wilson and Dahl).

The inception of CUSTA and NAFTA coincided with significant growth in the flow of U.S. food processing FDI to Canada and Mexico.[10] U.S. investment in Canada (Mexico) rose from $1.8 billion to $5 billion ($2.3 billion to $5.3 billion) between 1988 (1993) and 1999. The reliance upon FDI to access foreign markets is particularly strong for U.S. food processing firms. Sales from Canadian and Mexican affiliates of U.S. companies are about three times the level of U.S. processed food exports to these countries (Bolling et al.).

Common sense might dictate that increased FDI would curtail imports of processed foods due to expansion of local production, but this has not happened on an aggregate basis. U.S. exports of processed foods to both Canada and Mexico increased substantially at the same time that U.S. food processing FDI to both countries rose. Figure 6 highlights the sharp rise in both FDI and exports after CUSTA and NAFTA.

Applied analysis shows that U.S. FDI in the Canadian and Mexican food processing industries complements, rather than substitutes for, additional U.S. agricultural exports to these countries. Using a dynamic model that accounts for the interrelationship between U.S. FDI and U.S. exports to Canada and Mexico, Jerardo and Bolling ascertained that U.S. FDI and U.S. exports rise and fall together in the processed food economies of both Canada and Mexico. They also discovered that complementarity in these FDI-export relationships deepened post-CUSTA/NAFTA. In the U.S.-Mexican case, Mexican demand for processed intermediate inputs from the United States increases with U.S. investment in Mexican food processing. Product specialization explains FDI-export complementarities in the U.S.-Canadian case.

Big Challenges and Opportunities in the Labor Market

Growth in the number of Mexicans crossing the border into the United States points to increased integration of the U.S. and Mexican labor markets (University of California, Davis-a).[11] One in 25 Mexicans crossed the northern border in the 1990s.[12] The rapid expansion of Mexican emigration has swelled the U.S. Hispanic population. According to the International Office for Migration, there were 7.5 million Mexicans living in the United States in 1998, a fourfold increase from 20 years earlier (The Economist, 2/23/02).

Employment of Mexican labor in the United States is beneficial to both countries. Mexican migrants have led to lower production costs in meatpacking plants and on produce farms. Foreigners working in the United States often provide a substantial source of income to their families back home. Remittances by

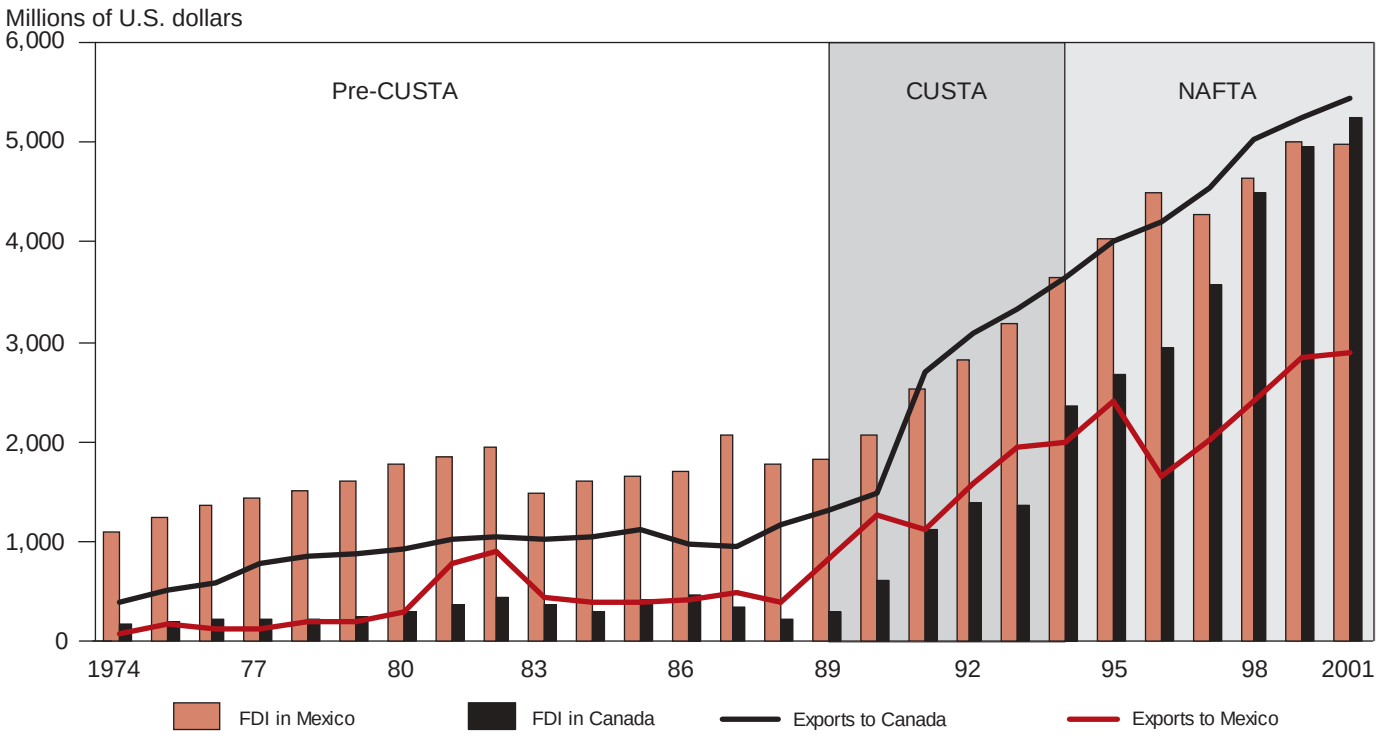
[10] It should be pointed out, however, that growth in U.S. processed-foods FDI and exports to Mexico first took off in the late 1980s, prior to the formation of NAFTA.

[11] Analyses of the degree of integration in labor markets can be revealed via national wage rates and by movement of labor across country borders. Given the difficulty of securing information on wage rates for comparably skilled labor, emphasis here is placed on the movement of labor.

[12] Sidney Weintraub, scholar from the Center for Strategic and International Studies, Washington, DC, from the NAAMI symposium proceedings.

Figure 6

U.S. exports of processed food to Canada and Mexico move up in tandem with U.S. foreign directinvestment in food manufacturing



Source: U.S. Department of Commerce, Bureau of Economic Analysis. *Survey of Current Business* and USDA FATUS.

Mexican migrants totaled $11 billion in 2002, up from $700 million in 1980 (The Economist, 1/25/03; University of California, Davis-b), and are now much larger than both private investment and the money provided by the multilateral development banks.[13] Conditions in rural Mexico would arguably be significantly worse if Mexican migrants were not able to find gainful employment in the United States.

Despite the increase in the supply of low-wage foreign labor in the United States, there is a growing debate among American citizenry about the desirability of immigration (Drucker). This debate stems from problems of illegal immigration, cultural assimilation, the stress put upon educational, health, and other social services in the United States, and the adverse effect on wages earned by relatively unskilled U.S. laborers.

The U.S. Immigration Reform and Control Act (IRCA) of 1986 was established to rectify problems of illegal entry and employment of unauthorized workers. To accommodate agricultural interests, this legislation contained two programs for farm labor. The Special Agricultural Worker (SAW) program provides a mechanism for foreign workers to become legal immigrants. The guest-worker program permits U.S. farmers to employ unauthorized laborers.

Recently, a U.S.-Mexican working group on migration was created to address the concerns of both U.S. farmers and foreign workers. At its first meeting in the summer of 2001, the group explored the concept of "earned legalization," a novel idea, that, if implemented would enable the U.S.-Mexican labor market to function more efficiently (Martin).[14] Only unauthorized foreigners who have worked in the United States would be eligible for earned legalization. These workers would have to continue working in the United States to maintain their temporary legal status before qualifying to become legal immigrants. Earned legalization would provide guarantees to U.S. farmers that newly legalized workers could not immediately leave agriculture before seeking employment elsewhere in the U.S. economy. It would also assure foreign workers that they could eventually become legal immigrants and seek nonfarm jobs.

[13] *Ibid.*

[14] After consulting with national legislatures, border states, communities, and other stakeholders, this binational working group is to make specific recommendations aimed at alleviating migration concerns.

Relatively skilled workers in each NAFTA country have been the major beneficiaries of increased market integration in North America as their real wages have increased most (Feenstra and Hanson). The educated labor forces in the United States and Canada have been able to harness information technologies that cause firms to switch production towards areas that are biased in favor of skilled workers. Moreover, increased competition from low-wage Mexico has induced domestic resources in the United States and Canada to shift further towards industries which use skilled labor relatively intensively, enabling better exploitation of comparative advantages.

The well-educated labor force in Mexico has also benefited from the enlarged North American market. This has occurred primarily because of increased U.S. and Canadian direct investment and outsourcing by "Northern" multinational corporations into Mexico. Feenstra and Hanson provide empirical evidence that the expanded flow of capital from "North" to "South" has resulted in increased manufacturing production in Mexico. They point out that "activities outsourced to the South are, from the North's perspective, ones that use relatively large amounts of unskilled labor, but, from the South's perspective, are ones for which the reverse is true." The result is an increase in the relative demand for skilled labor in both regions, which, in turn, causes the relative wage of skilled labor to rise in all three countries. Examples abound in North America. For instance, vegetable processing, such as the cutting and freezing of broccoli, the transformation of cotton into apparel, and other manufacturing processes employing semi-skilled workers, used to take place in the United States. Now, these industries are thriving in Mexico. Moreover, many displaced U.S. workers have found higher paying jobs in other sectors.

While many workers have reaped gains from the integration of North American agriculture, other have not. For example, Mexican grain and livestock producers have incurred net financial losses. By 1998-99, real net income for these producers had declined 45 percent from levels achieved just prior to NAFTA (Salcedo-Baco).

A number of options are available to facilitate needed labor adjustments. One option is the development of retraining programs that enable displaced workers to again become productive. In the United States, the Trade Adjustment Assistance program was created in 1962 to ease the adjustment burden in the domestic apparel industry. This program assists U.S. workers who lose their jobs or whose hours of work and wages are reduced as a result of international trade. More specifically, it provides displaced workers with opportunities to engage in long-term training while receiving temporary income support.[15] Similar kinds of targeted programs could be developed in Mexico and Canada, facilitating the transition of temporarily disenfranchised workers to higher income employment.

Another option is the creation of "degressive-wage insurance," which would provide assistance to any worker dislocated from employment for whatever reason (Hufbauer). Under this concept, if a worker loses a job because a firm goes out of business or closes a plant, that worker would be eligible for supplementary income payments after finding a new job. The supplementary payment could cover a portion of the difference between the worker's old and new wage. Ideally, the portion would decrease over time (say, 3 years), to circumvent future problems of entitlement.

Economic logic provides a rationale for assisting those whose income falls because their skills are in less demand after national markets become more open and economically integrated. Two important impacts of more open markets enable society to compensate those workers so that net benefits are never negative. One is that as demand for domestic resources changes in response to increased economic openness, the returns to the abundant factor in each country rise while the returns to the scarce factor in each country fall.[16] The other is that changes in the pattern of trade raise domestic income in the aggregate. These two impacts provide policymakers with justification to redistribute income in such a way as to not make anyone worse off. If done well, redistribution can create additional gains by increasing the productivity of labor that had been economically disenfranchised through market integration. The acquisition of needed skills enables workers to secure higher wage jobs that become available as integration takes place.

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[15] U.S. workers in North Carolina displaced from their textile jobs due to NAFTA can obtain $2,500 for retraining. They also qualify for extended unemployment insurance for a period up to 2 years following loss in employment (Hamrick et al.).

[16] Stolper-Samuelson theorem.

The Tradeoffs of Alternative Exchange-Rate Regimes

The absence of a common currency has adversely affected cross-border integration of agricultural commodity, product, and factor markets in North America. Empirical evidence shows a high degree of cross-border price transmission for specific commodities, suggesting strong spatial linkages between countries in North America (Vollrath and Hallahan). But this research also shows that the exchange rate inhibits continental integration.

The fact that changes in exchange rates cause U.S.-dollar denominated prices for the same good to diverge in the United States, Canada, and Mexico raises the question of whether a common currency might be advisable for North America. Quantitative analysis supports the view that a single currency generates substantial gains to the traded sectors (Frankel and Rose), and that a common currency in the three North American countries would increase intra-NAFTA trade by 50 to 70 percent (Hufbauer).

The increase in the post-CUSTA U.S. agricultural trade deficit with Canada has, in large part, been attributable to the appreciation of the U.S. dollar vis-à-vis the Canadian dollar from October 1991 to December 2002. Econometric analysis shows that a 1-percent exchange-rate shock (due to a disturbance in either the U.S. or Canadian economy) affects the U.S.-Canadian agricultural trade balance between 5 and 9 percent and that such a shock takes almost 2 years to work itself through the system before a new equilibrium is achieved (Kim et al.). Given that the U.S. dollar increased in value against the Canadian dollar 33 percent during the 1990s, the U.S.-Canadian exchange rate may be the dominant factor affecting post-CUSTA U.S.-Canadian agricultural trade.

NAFTA-induced tariff reductions increased U.S. access to the Mexican market and, therefore, fundamentally altered the nature of U.S. trade with Mexico; but the changing value of the peso was also a very important determinant of U.S.-Mexican trade. The expansion of U.S. agricultural exports to Mexico lost momentum immediately after Mexico devalued the peso in December 1994. Krueger contends that significant realignment of the U.S.-Mexican exchange rate has and will have a much larger influence on trade than Mexico's entry into NAFTA "because the total reduction in tariffs at the end of 15 years would average only 10 percent, in contrast with the 50 percent real depreciation."

It may be useful to examine the desirability of alternative exchange-rate regimes given the drag that current exchange rates impose upon the integration of agricultural markets in North America. What are the options? At one end of the spectrum is the hard-fixed exchange rate; at the other end are completely flexible rates. A whole host of managed (or pegged) exchange-rate regimes exist between these extremes. Currently, flexible rates characterize U.S., Canadian, and Mexican currency regimes.

Most theoretical and applied macroeconomists no longer favor managed exchange rates (Hufbauer). Milton Friedman views pegged rates as "ticking bombs." He explains why: "A central bank controlling a currency that comes under downward pressure does not have to alter domestic monetary policy. It can draw upon reserves of foreign currency or borrow foreign currency to meet the excess demand for foreign currency. Such a policy can smooth over minor and temporary problems, but lets minor problems that are not transitory accumulate. When that happens the minor adjustments in exchange rates that would have cleared up the initial problem will no longer suffice. It now takes a major change."

Obstfeld and Rogoff point out that sustaining official pegged rates has become more difficult in recent years due to the deregulation of world financial markets. Large swings in international capital flows can put pressure on the balance of payments, making it difficult to sustain a fixed peg. The integration of global financial markets explains why pegged exchange rates are rarely found today.

Historically, the Mexican peso has experienced periods of appreciation followed by financial crises that have required corrective devaluation. Devaluations of the Mexican peso, which have occurred under both nominal- and crawling-pegged exchange-rate regimes, lend credence to the view that managed exchange rates are not viable in the long run. This leaves two options for the North American countries-either commitment to the current system of flexible bilateral exchange rates or adoption of a hard-fixed regime.

The U.S. dollar would likely form the foundation of any *hard-fixed* regime established in Canada and/or Mexico because the United States is by far the largest economy in NAFTA. The U.S. real (1995) GDP is more than 13 (24) times greater than that in Canada (Mexico). Hence, a shift to a hard-fixed regime in

North America would likely result in the adoption of U.S. dollar.

Use of the U.S. dollar as the single currency in North America would have far-reaching implications. Continental adoption of the U.S. dollar would mean the loss of the Canadian dollar and Mexican peso as policy instruments. This would prevent Canada and/or Mexico from being able to adjust domestic interest rates and/or alter money supplies in order to cushion domestic economic shocks. But adoption of the U.S. dollar would increase price transparency, lower transaction costs, and virtually eliminate exchange-rate risk. It would also advance the cause of commodity and factor market integration by facilitating cross-border transactions. Moreover, eradication of volatile bilateral exchange rates would remove a source of uncertainty that inhibits trade and investment within NAFTA.

Mexico could conceivably benefit from either dollarization or being a member of a North American monetary union. Membership would impose fiscal discipline and contain domestic inflation. It would also mitigate exchange-rate volatility problems that have plagued Mexico's international economic relationships. A more stable exchange rate, such as that provided by use of the U.S. dollar, would be conducive to Mexico's trade and development. The economic payoffs would increase as Mexico's economy became more open to the international market and as its trading sector grew relative to the size of its domestic economy.

The use of the U.S. dollar could, however, pose major problems for Mexico. Mexico is a developing country, and its economy is structurally dissimilar from that of both the United States and Canada. One reflection of this difference is that Mexico and its NAFTA partners specialize in the production and export of goods from different industries. Such differences mean that the suitability of macroeconomic policies, at any given point in time, could differ between Mexico and its NAFTA neighbors. Given its relative size, Mexico might have to bear a disproportionate share of adjustment costs to the adoption of a uniform NAFTA monetary policy.

Similarities in the structures of the U.S. and Canadian economies mitigate concern about Canada’s adopting the U.S. dollar. Consider, for example, that both are developed countries and that much of U.S.-Canadian trade is of the intra-industry type. Intra-industry trade means that each partner produces and trades goods with each other that come from the same industry but that are from different product niches. Interestingly, research conducted in the early 1990s showed that Canada and the United States were more suitable to the creation of a currency union than Europe, where shocks were likely to generate "non-negligible regional problems" (Eichengreen). But concerns remain over whether the United States would allow Canada a voice at the monetary table and provide Canadian financial institutions with access to the services rendered by the U.S. Federal Reserve (Robson and Laidler).

Institutional Challenges and the Means To Deepen Continental Integration

The policy agenda that must be addressed if further market integration is to take place within North American agriculture is likely to be more complex than the agenda that was accomplished by CUSTA and NAFTA. Initially, the primary focus of these agreements was the progressive dismantling of tariff barriers. It is now critically important to address institutional obstacles to the unification of markets within North America. The major dilemma confronting the single North American economy is that while product and factor markets are becoming more integrated across international borders, the institutions to support this integration remain largely national.

Deeper integration is dependent upon the provision of public goods such as the harmonization of standards to ensure that health, quality, safety, and environmental concerns are met throughout North America. It also is dependent upon the relaxation of such nontariff barriers as rules-of-origin, anti-dumping, and countervailing duties. Moreover, market distortions that inhibit deeper integration can stem from national policies and institutions, including domestic supply-managed programs, state trading enterprises, and cross-border differences in macroeconomic objectives.

More interaction and dialogue among the three NAFTA governments and their citizens would help identify and implement common approaches to common problems. The process of arriving at a consensus is often exceedingly difficult. As Helliwell put it, "trying to agree whether individual nations are legitimately exercising sovereign choices or, alternatively, are engaging in behavior that is unfair or damaging to other nations is invariably contentious."

Efforts to unify markets generate tension whenever integration erodes cultural and institutional differences among national economies or undermines sovereign autonomy (Lawrence et al.). While *openness* can advance the cause of market integration, *diversity* and *cohesion* are also important. Diversity accommodates different national conditions, preferences, and traditions. It also allows for experimentation and innovation. Cohesion holds a community together by trust, mutual respect, shared basic values, and institutions. It is needed if openness is to remain viable and diversity tolerated. There are often difficult choices policymakers must make that involve tradeoffs between openness, diversity, and cohesion—even though the latter two forces may inhibit integration.

Greater market integration within North America can be achieved either through the development of harmonized NAFTA policies and/or through the coordination of the various national policies mutually affecting the three economies. Coordination can occur using the mechanisms of convergence, compatibility, and/or mutual recognition.

Harmonization

Harmonization involves the enactment of common policies and policy instruments (Josling). It is linked to the willingness of a country to suspend a degree of sovereignty. Within the context of NAFTA, harmonization entails a departure from country-based decisionmaking in favor of a supra-national process that introduces uniform or essentially similar policies and regulations in different countries.

Harmonization can improve economic efficiency. It often lowers production and marketing costs, benefiting both producers and consumers. For example, different product standards among member countries impose costs on processing firms, some of which are passed up to the retail level. Costs increase when products have to be tailored to the regulations in different countries because manufacturers need separate production runs for each market. Such regulations make it more difficult to manage inventories and product distribution. Moreover, regulatory systems that require producers to perform specific scientific tests and submit results are expensive. As such regulations have a substantial fixed-cost component, they impose a particularly large burden on small- and medium-sized firms that cannot spread implementation costs across a large sales volume (Short).

Harmonization can be accomplished within NAFTA through the establishment of uniform laws and regulations that require traceability of products and their ingredients. The countries in North America have already reached agreements on issues such as tariff reductions, common packaging standards and labeling, and the establishment of uniform sanitary and phytosanitary regulations (Short).

Food and consumer product trade associations play an important role promoting market integration for processed products throughout North America (Fogarty). In 1998, the North American Alliance was established, bringing together the Grocery Manufacturers of America, the Food and Consumer

Products Manufacturers of Canada, and Conmexico. All three associations influence the formation of science-based public policies in their own countries and provide legal, educational, and political expertise to member companies. The objectives of the North American Alliance are to facilitate harmonization of labeling, promote the establishment of uniform food safety standards, and reduce trade barriers that lead to market disintegration within North America.

Convergence

Another unifying path that can be followed to increase market integration is policy *convergence*. Convergence entails movement towards harmonization of programs and/or regulations over time. It is associated with changes in domestic policies (both internal and external) attributable to pressures that emerge due to increased interdependence among national economies as well as to reactions to common influences such as technical change (Josling). Convergence occurs in North American agriculture when increased market access and competition (due, in part, to market-liberalizing reforms) constrain the effectiveness of traditional domestic programs.

In Canada, the two-price wheat program was eliminated before the 1988/89 crop year. Policymakers recognized that the program would not be sustainable under the free trade agreement with the United States because Canadian millers and bakers could import wheat and wheat flour from the United States duty-free. Similarly, the United States refrained from using the Export Enhancement Program (EEP) for grain shortly after CUSTA was implemented. Continued implementation of EEP export subsidies was not tenable after Canada, a large grain supplier, gained unlimited access to the U.S. market. The boost in U.S. domestic prices due to these subsidies would have provided incentives to the Canadian Wheat Board to move more grain into the U.S. market. Increased Canadian imports would not only haved rendered the EEP program prohibitively expensive, but would have put downward pressure on U.S. domestic prices, undermining the intended purpose of EEP subsidies to increase producer prices in the United States.

Compatibility

Compatibility is a third mechanism that can enhance market integration. Compatibility involves the development of policies, programs, regulations, and instruments which mitigate conflict (Josling).

One source of contention among NAFTA members is the application of national trade remedy laws that often protect domestic industry from import competition (Loyns et al., November 2000). Legal mechanisms used to shield domestic producers include anti-dumping, countervailing duties, and the application of special duties or quotas when "safeguards" are triggered. The use of domestic-based laws to settle dispute among countries in North America encourages adversarial behavior and fosters market segmentation.

CUSTA/NAFTA created formal institutional mechanisms to help resolve trade disputes, strengthening the ability of member countries to render national policies more compatible. Under the agreement, member countries can request judicial review of anti-dumping and countervailing duties via NAFTA arbitration panels (Gifford, 1997, 2000). No party involved in a NAFTA dispute-resolution suit is allowed to block the adoption of the panel report.

Less formal institutional mechanisms under NAFTA capable of rendering member policies more compatible include the formation of committees, working groups, and other subsidiary bodies. While a primary aim of such organizations is to ensure effective implementation and administration of the free-trade agreement, they provide a vehicle for member countries to explore areas of mutual interest and to discuss possible alternative solutions for deepening continental integration. To date, 30 such organizations have been established. Examples include the Committee on Sanitary and Phytosanitary Measures, the Working Group on Grading and Marketing Standards, the Working Group on Rules of Origin, and the Animal Health Technological Working Group.

NAFTA institutional mechanisms, as well as government consultations and informational exchanges among experts, represent ways to reach agreement about contentious issues and remedial courses of action. Observers contend that conflict among NAFTA countries can be better managed and problems avoided should greater use be made of such resolution processes (Young et al.; Young, 2000).

Mutual Recognition

Mutual recognition is another coordinating mechanism that can increase market integration. It allows for the suspension of domestic regulations, standards, and certifications in favor of member-country procedures. One advantage of mutual recognition is that it helps preserve national diversity. Diversity accommodates cultural traditions and allows for experimentation and innovation (Lawrence et al.).

Mutual recognition has been used extensively in the European Union (EU) to reinvigorate market unification. By the early 1980s, EU policymakers had become aware that the much celebrated Common Market was not so common after all (Lawrence et al.). Many of the official barriers that had previously been removed had been replaced by a collection of nontariff barriers, national regulations, and private practices with a strong national bias. This led European leaders to launch the EU-1992 project. The principle of mutual recognition was a central feature of this new initiative.

Compared with the EU, there has been relatively little use of the mutual recognition mechanism in North America. One example of mutual recognition in NAFTA is "national treatment" of red meat, whereby the United States and Canada have excluded each other from their domestic import laws.

To summarize, deeper market integration within North America is dependent upon the formation of policies that address institutional barriers to reform. Harmonization, convergence, compatibility, and mutual recognition are distinct mechanisms that can be used to promote institutional change that lead to more integration. Greater integration can be achieved through the adoption of a more universal system of commercial law, common antitrust and regulatory procedures, and harmonization of product standards. It can also be achieved through better coordination of domestic farm, marketing, and macroeconomic policies. Institutional reform can greatly enhance the efficiency and legitimacy of markets. It is likely to draw strength from commercial and consumer demands that markets be allowed to function more effectively.

The Prospects for a Re-Energized NAFTA

The economies of the United States, Canada, and Mexico have become more open and increasingly intertwined over time. Economists close to the policy formation process contend that NAFTA strengthened the unification of the continental agricultural economy (Gardner, 2000). But barriers remain and there is much that policymakers could do in the three national economies to induce additional integration.

The payoffs of greater integration in North American agriculture are substantial. More integrated markets would better rationalize production, enhance economic efficiency, promote growth, and raise consumer income throughout the continent. It would also increase intra-NAFTA trade and cross-border investment, benefiting citizens in the United States, Canada, and Mexico. Using the *Economist Intelligence Unit* data on price dispersion, Hufbauer et al. estimate that Canadian per capita income would increase by about 3 percent, while Mexican per capita income would increase by about 7 percent, should these two countries become as integrated with the United States as the individual States of the United States are integrated among themselves.

The "good news is that NAFTA is performing at the upper end of pre-agreement expectations," (Hufbauer). Intra-member trade and investment have truly been impressive. Moreover, there is little evidence of the infamous "giant sucking sound," the figure-of-speech Ross Perot used to express concern about the loss of U.S. jobs to low-wage-paying Mexico in the public debates prior to passage of the NAFTA legislation.[17] But despite this good news, "NAFTA is much closer to the starting post than to the finish line (Ibid)." Much more remains to be done to deepen market integration within North America.

Pursuit of complete market integration in North America takes time. The many fits and starts that led to the formation of the European Union (EU) demonstrate the longrun nature of the integration process. The European Common Market, launched in the late 1950s, ran out of fuel in the 1980s. There was much talk of "Euro-sclerosis," as the European economies stagnated. Concerned Europeans recognized that numerous barriers were inhibiting EU competitiveness, dragging down growth, and raising unemployment. The collective response was Europe-1992, a broad-based initiative that eliminated many barriers inhibiting integration.

The recent birth of the euro (the EU common currency) is a significant achievement likely to have far-reaching implications for European market unification. The development of institutional mechanisms that support financial integration between and/or among the United States, Canada, and Mexico—including, perhaps, the formation of a monetary union—are possibilities down the road. The adoption of a single currency in North America would clearly have positive impacts on integration in the real-goods and factor-inputs sectors.

Though not as advanced as the EU, much progress has already been achieved towards the creation of a single North American market. NAFTA eliminated many tariffs by 2003; most others are scheduled for removal by 2008. Also, many nontariff trade barriers have been converted to more transparent tariffs and tariff-rate quotas. Yet, high levels of protection still exist, for example, in such large and important sectors as dairy, sugar, and poultry. Additional reforms are needed--including greater market-access provisions; further reduction in export subsidies; more discipline in the area of trade-distorting domestic farm policies; harmonization of sanitary and phytosanitary standards; establishment of labeling equivalencies; and the elimination of "rules of origin" and anti-dumping provisions that divert trade from more efficient, non-NAFTA suppliers.

Political considerations and institutional differences lie at the root of many of these obstacles. Witness the difficulties with U.S.-Mexican sugar trade, disputes over U.S. wheat imports from Canada and Canadian corn imports from the United States, the U.S.-Mexican stalemate over trucking, and the long-running U.S.-Canadian dispute over lumber, now entering its second decade.

As Hufbauer puts it, "barriers typically grow in thickets and the thickets can quickly regenerate. The launch of NAFTA was like cutting an overgrown lawn. NAFTA provided a vision, and started by cutting tariffs and other border barriers. Now we are in an era of fighting crabgrass. In some ways it's easier to cut an overgrown lawn than to fight the crabgrass. To realize the payoff

[17] Missing from Perot's argument was recognition that many high-wage jobs in the United States can be maintained because American workers are much more productive than their Mexican counterparts. NAFTA has a vital role to play even when American jobs are lost from firms that cannot compete with Mexican rivals by keeping down costs in the rest of the American economy. Only by redirecting capital into firms that can compete, will the United States be able to fully benefit from its comparative advantages.

from economic integration, the NAFTA partners must do more than uproot protective weeds, one by one. We need to energize NAFTA with bold thinking."

The most essential element of the bold thinking would be a reinvigorated public vision. Other critical elements would include the convergence of domestic agricultural programs, greater cooperation in establishing and enforcing common product standards, elimination of unnecessary regulations, the streamlining of customs procedures, expansion of NAFTA work visas, and the development of policies that compensate displaced workers and facilitate needed labor adjustments.

A more integrated North American agriculture requires not only harmonization of farms and trade policies in the United States, Canada, and Mexico, but also convergence of policies affecting national markets upon which agriculture is dependent, such as local transportation and domestic services. Moreover, a completely integrated continental agricultural market would require compatible, if not completely harmonized, cross-border macroeconomic regimes, consisting of uniform tax, monetary, and fiscal policies. The creation of supra-national institutions capable of mitigating divisive disputes within partner countries are needed to advance the cause of continental market integration. A single North American agricultural market can eventually emerge, if the dynamic forces underlying domestic demand, supply, and trade are allowed to operate in the three countries.

A re-energized NAFTA could play a critical and vital role in increasing market efficiency in North America. Regional trade agreements are better able to dismantle "behind-the-border" institutional barriers that inhibit integration than multilateral agreements. Collective and coordinated action is needed to address market failures on the continent and to press institutional reform forward.

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Appendix A: NAAMI Symposium Program Agenda

North American Market Integration and Its Impact on the Food and Fiber System

November 6, 2000

8:30am-9:00am	**Registration and Assembly**
9:00am-9:15am	**Welcome** *Introduction*: Neil Conklin, MTED Director *Context and Objectives*: Thomas Vollrath
9:15am-10:00am	**What Are the Dimensions and Economic Significance of Integrated Markets?** *One Continent, One Market: The Pathway and the Payoff:* Gary Hufbauer, Institute of International Economics
10:00am-10:45am	**What Actually Happened to Trade Flows?** (Moderator: Greg Pompelli, ERS) *Evolving Patterns of Integration in the North American Market and the Impact of NAFTA:* Thomas Hertel, Purdue University and Mark Gehlhar, Paul Johnston, and Thomas Vollrath, ERS
10:45am-11:00am	**Refreshments**
11:00am-12:30pm	**What Is the Extent of Market Integration in Selected Commodity Markets?** (Moderator: Bill Kost, ERS) *Measuring Market Integration: Theoretical Concepts and Empirical Tests:* Barry Goodwin, North Carolina State University *Integration in the Meat and Livestock Sector:* John Jinkins, ERS and Thomas Vollrath, FSA *Integration in Grains and Oilseeds:* Samarendu Mohanty, Texas A&M and Suchada Langley, ERS *The Importance of Switching Regimes in Meat and Horticultural Products:* William Hahn, ERS
12:30pm-1:30pm	**Lunch**
1:30pm-3:30pm	**What do Structure-Conduct-Performance Market Analyses Show?** (Moderator: Aziz Elbehri, ERS; Discussant: Ramon Guajardo) *Integration as a Source of Structural Change in North American Agriculture: The Case of Imperfectly Competitive Industries:* Philip Paarlberg, Purdue University *Concentration within the North American Continental Livestock Market: Implications for Market Behavior:* Jim MacDonald, ERS

The Integration of North America's Cotton and Textile Industries:
Stephen MacDonald and Leslie Meyer, ERS

The Impact on the Horticultural Sector of Seasonal Specialization, NAFTA, and Technological Change:
Linda Calvin, ERS

The North American Tomato Market: A Spatial Equilibrium Perspective:
Ramon Guajardo, University of Nuevo Leon, Monterrey, Mexico

3:00pm-3:15pm **Refreshments**

3:15pm-4:30pm **What is the Perspective from Private Enterprise?**
(Moderator: Walter Armbuster, Farm Foundation)

Canadian/Mexican/U.S. Private-Sector Panel:
Bryan Edwardson, Cargill
George Fleischmann, Food & Consumer Manufacturers of Canada
Sarah Fogarty, Grocery Manufacturers of America
Salomon Salcedo-Baco, Agrositio, Mexico

November 7, 2000

8:30am-9:45am **What is the Role of Government in Facilitating the Integration Process?**
(Moderator: John Dunmore, ERS)

The Effectiveness of Public Policies on Shaping a Single North American Market in Agriculture:
Bruce Gardner, University of Maryland

Policy Options and Innovative Alternatives Available to Improve Performance in Factor Markets Within North America:
Sidney Weintraub, Center for Strategic and International Studies

10:00am-10:15am **Refreshments**

10:15am-11:15am **What Are the Institutional Challenges to a More Unified North American Market?**
(Moderator: Robert Riemenschneider, FAS)

Institutional Factors Impeding Market Integration in Selected Commodity Markets:
Al Loyns, University of Manitoba, and Ronald Knutson and Rene Ochoa, Texas A&M

Prospects and Payoffs of Harmonizing Regulatory Systems Between the United States and Canada:
Cameron Short, AgriFood Canada

11:15am-12:15pm **What is the Perspective from Public Policymakers?**
(Moderator: Walter Armbruster, Farm Foundation)

Andres Rosensweig, SAGAR
Doug Hedley, AgriFood Canada
Joe Glauber, USDA

12:15pm-12:30pm **Wrap-up, Open Discussion, and Closure**

Appendix B: Equations for Bilateral Trade Intensity and Commodity Complementarity

Bilateral Trade Intensity

$$BTI_{ij} \equiv \frac{X_{ij}}{X_{iw}} \Big/ \frac{M_{jw}}{M_{ww} - M_{iw}} \equiv \frac{X_{ij}}{X_{iw}} \Big/ \frac{X_{wj}}{X_{ww} - X_{wi}}$$

Commodity Complementarity

$$CCD_{ij}^{s} \equiv \sum_{k \in s} \left[\left(\frac{X_{iw}^{k}}{\sum_{k=1}^{K} X_{iw}^{k}} \right) * \left(\frac{M_{ww}^{s} - M_{ww}^{s}}{M_{ww}^{k} - M_{ww}^{k}} \right) * \left(\frac{M_{jw}^{k}}{\sum_{k=1}^{K} X_{jw}^{k}} \right) \right] = XSP_{i}^{k} * MS_{j}^{k} \text{ , where}$$

$$XSP_{i}^{k} = \left(\frac{X_{iw}^{k}}{\sum_{k=1}^{K} X_{iw}^{k}} \right) \Big/ \left(\frac{X_{ww}^{k} - X_{wi}^{k}}{\sum_{k=1}^{K} \left(X_{ww}^{k} - X_{wi}^{k} \right)} \right)$$

$$\mathrm{MS}_{\mathrm{j}}^{\mathrm{k}} \equiv \left(\frac{X_{wj}^{k}}{\sum_{k=1}^{K} X_{wj}^{k}} \right)$$

Key to notation:

- i = exporter
- j = importer
- k = individual commodity or product
- w = world
- s = sector
- X_{ij} = fob exports from *i* to *j*
- M_{ji} = fob imports by j from i
- BTI_{ij} = Brown's bilateral trade intensity index
- CCD_{ij}^{s} = Drysdale's complementarity index
- MS_{j}^{k} = j's commodity k's import share
- XSP_{i}^{k} = i's export specialization pattern in i's foreign market