International Trade and Foreign Direct Investment: A Focus on the Free Trade Area of the Americas[1]

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Abstract

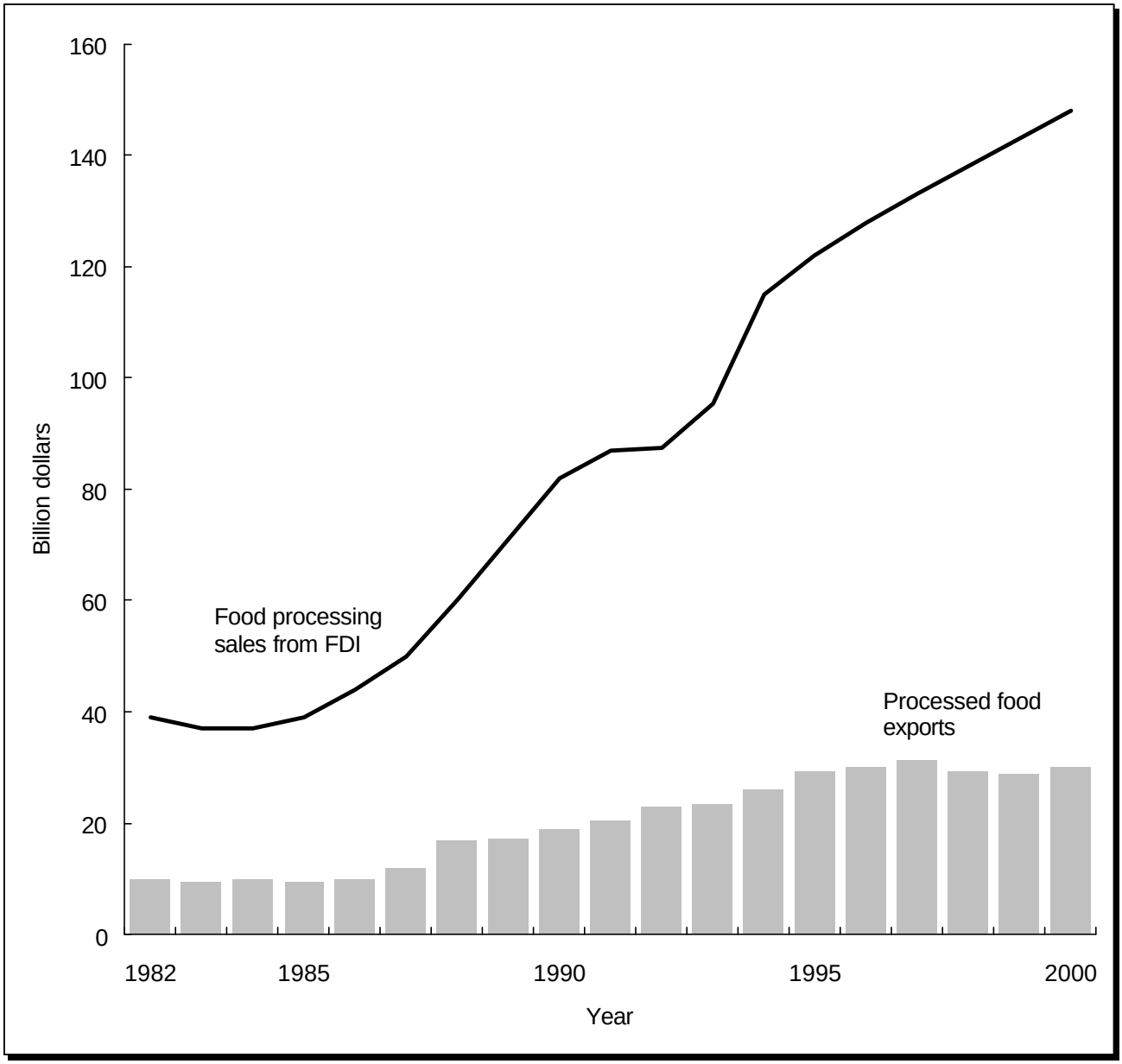
Trade and foreign direct investment (FDI) are principal strategies to access foreign markets. As the world becomes increasingly interdependent, the linkages between these two strategies become increasingly important. Processed foods are the fastest growing market for U.S. agricultural exports and foreign affiliate sales have grown even faster than exports. A key question regarding U.S. competitiveness is whether FDI displaces or enhances exports? The overall objective of this research is to model the relationship between U.S. FDI and exports for processed food products in FTAA countries and to determine whether these market access strategies are substitutes or complements. Empirical results indicate a complementary relationship between FDI and exports; thus U.S. agribusinesses should use both strategies to access FTAA markets.

Introduction

International trade in processed foods has been the most rapidly growing portion of world food and agricultural trade (Henderson, Handy, and Neff). Historically, bulk commodities accounted for the majority of U.S. agricultural exports. In 1991, U.S. processed foods surpassed bulk goods in export value. Additionally, USDA trade forecasts indicate that the composition of trade will continue to shift toward processed products (USDA-ERS, 1997). Thus, processed food products are the growth market for U.S. exports and this study will focus on them for FTAA countries.

Another facet in the evolution of international trade is the way agribusinesses access foreign markets (Figure 1). Historically, the export market was the primary means of accessing foreign markets. Foreign direct investment by U.S. agribusinesses provides a market access alternative that can be viewed as "tariff jumping." Foreign affiliate sales that stem from FDI are not subject to import tariffs or other trade barriers, in contrast to U.S. exports of similar products. In 2000, FDI sales of U.S. processed food was five times the amount of U.S. exports--$150 billion versus $30 billion (Bolling and Somwaru 2001).

Figure 1. Processed Food Sales from Foreign Direct Investment Exceed U.S. Exports



Note: 1999 and 2000 FDI sales are estimates
Source: U.S. Department of Commerce, Bureau of Economic Analysis

The FTAA includes 35 countries in Northern, Central, and South America plus the Caribbean, excluding Cuba (Figure 2). In regards to U.S. exports of processed foods, Canada, Mexico, and Brazil are major FTAA importers (Figure 3).

Figure 2. The Free Trade Area of the Americas.

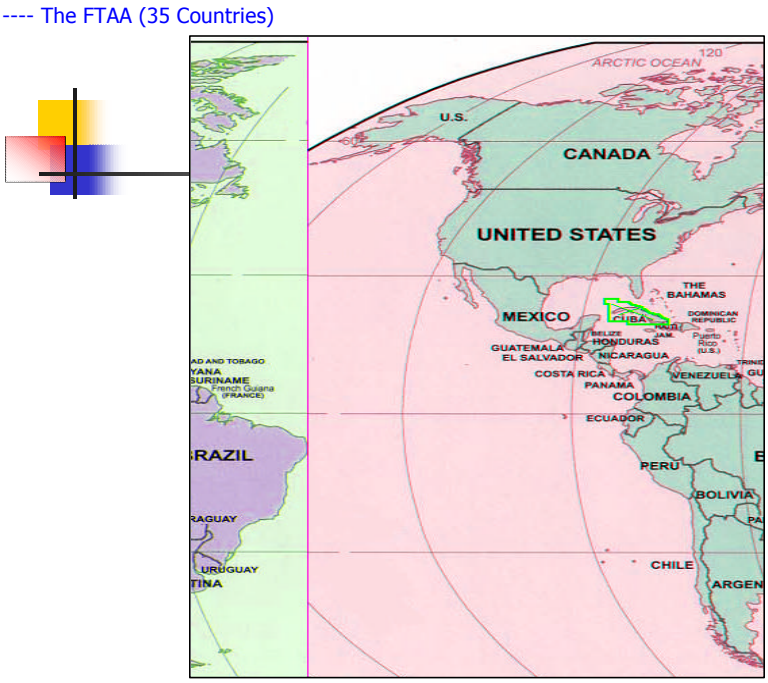
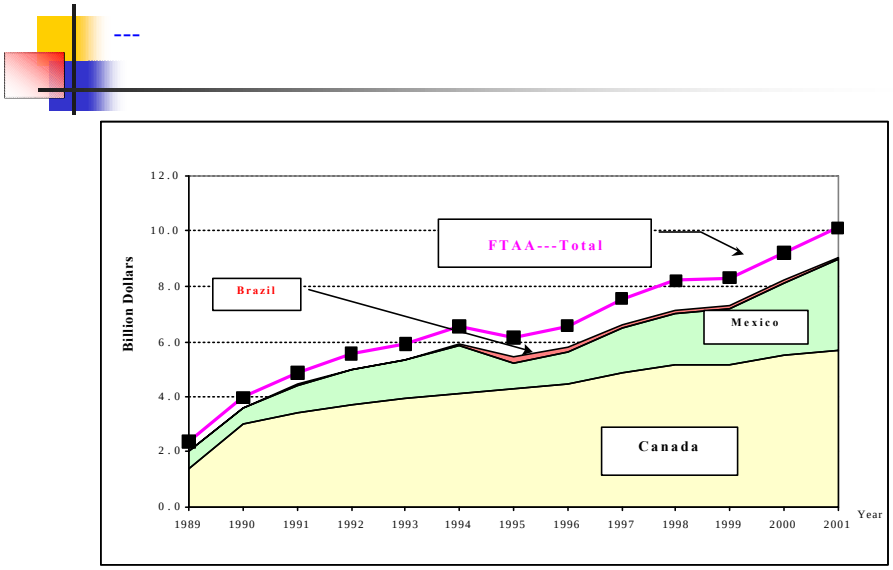


Figure 3. U.S. Processed Food Exports to FTAA and to Canada, Mexico, and Brazil.



Research Objectives

The purpose of this paper is to analyze the relationship between U.S. FDI and exports. Specifically, we (1) identify the determinants of U.S. exports and FDI for processed food industry into FTAA countries and (2) investigate the relationship between U.S. exports and FDI for the processed food industry in the FTAA; that is, whether they are substitutes or complements. Empirical analyses examined the relationship between U.S. FDI and exports of processed foods into several FTAA countries–Canada, Mexico, and Brazil.

Literature Review

Exports and FDI Models–Substitutes or Complements?

Two possible relationships describe FDI and exports: (1) substitutes, and (2) complements. A substitutive relationship indicates that an increase in FDI will decrease exports to foreign countries or vice versa. In contrast, a complementary relationship indicates that FDI and exports move in the same direction.

Seminal work by Robert Mundell introduced a *substitutive relationship* between FDI and international trade. This originated from the neoclassical Heckscher-Ohlin-Samuelson assumptions, where international trade is driven by differences in factor endowments and factor prices for homogenous products. These differences become smaller when international factors become mobile between countries and international trade flows decrease. Thus, Mundell concludes that capital movements, driven by FDI, are the perfect substitute for exports. Mundell also stated that import tariffs reduce exports and encourage foreign direct investment. Alternatively, Kojima described FDI as *complementary* to trade if FDI capital outflows create or expand the opportunity to export products. Lipsey and Weiss and Rugman stated that the

production by foreign affiliates of one product may increase total demand for its entire product line, making FDI and exports complementary.

Empirical results appear mixed (Connor; Overend, Connor, and Salin; and Pagoulatos). However, viewing empirical studies from a developed versus developing country perspective indicates that the relationship between FDI and exports tends to be substitutive between developed countries (Gopinath, Pick, and Vasavada; and Munirathinam, Marchant, and Reed) and complementary from developed to developing countries (Bolling and Somwaru 2000; Malanoski, Handy, and Henderson; Carter and Yilmaz; Marchant, Saghaian, and Vickner; and Marchant, Cornell, and Koo).

Theoretical Model

The following methodology is used to model the relationship between U.S. FDI and exports for processed foods into FTAA countries where a system of simultaneous equations is used to capture the interaction of exports and FDI strategies used in FTAA countries. Based on the empirical findings in the literature review, the theoretical econometric system of simultaneous equations is given by

(1) $FDI_{ti} = f(X_{ti} , IR_t, ER_{ti}, GDP_{ti,,} C_{ti}) + e_{1ti}$

(2) $X_{ti} = g(FDI_{ti}, ER_{ti}, GDP_{ti}, XPRICE_{ti}) + e_{2ti}$

where *t* represents years and *i* represents each FTAA country. FDI is U.S. foreign direct investment in food processing industries for FTAA countries. Similarly, X is U.S. exports of processed foods to FTAA countries; IR is the U.S. lending interest rate; ER is the exchange rate measured in each respective FTAA foreign currency per U.S. dollar; GDP is the gross domestic product for each FTAA country; and C is foreign compensation rates in the food processing sector; XPRICE is the price of U.S. exports; and e_{1ti} and e_{2ti} are stochastic errors. The functions

f and g presume linearity in the parameter estimates on the explanatory variables and all variables are transformed using a natural logarithm so that the parameter estimates have an elasticity interpretation. Because the empirical model is a simultaneous system, the regressor-error independence property is violated rendering traditional ordinary least-squares estimates biased and inconsistent. Hence, the unknown structural parameters in our simultaneous equations system are estimated using the full-information maximum liklihood (FIML) method with pooled, cross-section (by FTAA country), time series data.

A priori, IR is expected to be inversely related to FDI since a higher U.S. interest rate increases the debt capital cost for U.S. firms to invest abroad. ER is expected to be inversely related to exports and directly related to FDI. Intuitively, this suggests that as the U.S. dollar becomes stronger relative to foreign currencies, U.S. exports become more expensive to importers, hence lowering U.S. exports. A strong dollar results in greater purchasing power abroad and thus, makes FDI a more attractive market access alternative.

GDP is a proxy for foreign income and it is expected to be directly related to both exports and FDI. Hence higher incomes are expected to lead to higher consumption of processed U.S. food products regardless of distribution channel. Lower wages in the host country are expected to attract FDI, thus, a negative relationship is expected.

Export prices (XPRICE) are expected to be inversely related to exports, indicating a downward sloping demand curve for exports. And finally, the relationship between FDI and exports for FTAA countries is difficult to predict a priori based on the mixed results in the literature. If there is a direct relationship between the two variables, FDI and exports are considered complementary, while an inverse relationship would indicate a substitute relationship.

Annual data were collected for selected FTAA countries—Canada, Mexico, and Brazil. The data sources are U.S. Department of Agriculture, Foreign Agricultural Trade of the United

States (FATUS), U.S. Department of Commerce, Bureau of Economic Analysis (BEA), the OECD, and the International Financial Statistics Yearbooks of the International Monetary Fund (IMF).

Empirical Results

Empirical results using FIML estimation on pooled data will indicate whether there exists a substitutionary or complementary relationship between U.S. exports and FDI of processed foods into FTAA countries as well as their key determinants. Thus, results will provide valuable information on the appropriate market access strategies to enhance competitiveness.

This simultaneous equation model system was estimated with cross-section and time-series data, (e.g., two countries over 10 years (1989-1998) and one country (Brazil) over 6 years (1993-1998). The Breusch-Pagan test for heteroscedasticity and the Durbin-Watson test for autocorrelation were conducted. The Breusch-Pagan test rejected heteroscedasticity in both the FDI and export equations. The Durbin-Watson test was inconclusive. Empirical results for FDI and exports are reported in Table 1.

Table 1. Parameter Estimates of U.S. FDI Sales and Exports to Canada, Mexico, and Brazil

Variables	Foreign Affiliates Sales (*FDI*)	Exports (*XQ*)
Intercept	-3.54* (2.15)	22*** (2.7)
Exports Quantity (XQ) (metric tons)	0.16* (0.11)	--
Foreign Affiliates Sales (FDI) (U.S. million dollars)	--	2.46*** (0.35)
Interest Rates (IR) (foreign IR / U.S. IR)	0.19** (0.09)	--

Exchange Rates (ER) (foreign currency / U.S. dollar)	0.11*** (0.03)	-0.35** (0.15)
GDP (U.S. million dollars)	1.05*** (0.27)	-4.19*** (0.59)
Compensation Rates (C) (Foreign C / U.S. C)	0.42*** (0.16)	--
Export Prices (XP) (U.S. dollar per metric ton)	--	-0.35** (0.15)

Notes: All variables are log-transformed; therefore, the parameter estimates are elasticities.
Values in parentheses are standard errors,
*** 1% significance level
** 5% significance level
* 10% significance level

Empirical Results for Exports

Table 1 presents empirical results for the export equation. In regards to the FDI-export relationship, empirical results in the export equation reinforce FDI results. Specifically, empirical results in the export equation show that FDI positively influences exports and is highly significant at the 1% level. The parameter estimate indicates that a 1% increase in FDI causes a 2.46% increase in exports.

Empirical results show that exchange rates and export prices negatively influence exports and were significant at the 5% level. These results are consistent with our above hypotheses. Additionally, we restricted the exchange rate and export price parameter estimates to be equal based on the law of one price. Thus, as shown in Table 1, a 1% increase in either exchange rates or export prices causes a 0.35% decrease in U.S. exports to FTAA countries. Unfortuately, empirical findings for GDP in foreign countries had the wrong sign.

FDI Empirical Results

Similar to the above results for exports, empirical FDI results show that exports positively influence FDI. Therefore, we found a complementary relationship between U.S. FDI and exports into our FTAA countries (i.e., Canada, Mexico, and Brazil), consistent with the findings of Malanoski, Handy, and Henderson and Bolling and Somwaru.

Exchange rates (foreign currency per U.S. dollar) were found to positively influence FDI and were highly significant at the 1% level. A 1% increase in exchange rates causes a 0.11% increase in foreign direct investment. This finding is consistent with our hypothesis that as the U.S. dollar appreciates, it will be cheaper for U.S. firms to invest in foreign countries.

Additionally, a 1% increase in foreign GDP causes a 1.05% increase in U.S. foreign direct investment. This parameter estimate was highly significant at the 1% level and results imply that U.S. agribusinesses invest in high income countries. The importance of GDP has been verified by Lipsey and Weiss, Ning and Reed, Gopinath, Pick, and Vasavada (1999), and Marchant, Saghaian, and Vickner.

Empirical results indicate that relative compensation rates (foreign compensation rate per U.S. compensation rate) positively affect foreign direct investment. Similar results were obtained by Barrell and Pain and Gopinath, Pick, and Vasavada. This finding was not consistent with our hypothesis that U.S. firms tend to invest in countries with low compensation rates. There are two possible explanations for this positive relationship between FDI and compensation rates. First, U.S. FDI flows into developed countries–which have high compensation rates–are higher compared to U.S. FDI flows into developing countries. This may indicate that relative productivity is a key in FDI flows rather than compensation rates. Second, this research focused on U.S. foreign affiliate sales in foreign countries rather than capital flows into foreign countries.

Thus, compensation rates and sales may be related. Also, high U.S. affiliate sales may stimulate higher compensation rates by U.S. affiliates in foreign countries.

Additionally, interest rates were found to positively influence U.S. FDI, contrary to our expectations. An increase in the number of observations would help to improve these results.

Conclusions

This research examined the relationship between U.S. foreign direct investment (FDI) and exports into foreign countries for the processed food industry (SIC-20) by estimating a simultaneous equation system for FDI and exports. The analysis focused on key FTAA countries that import a significant portion of U.S. processed foods–Canada, Mexico, and Brazil. Additionally, variables that influence FDI and exports were identified. Empirical results indicated a bi-directional complementary relationship between FDI and exports into key FTAA countries. This implies that FDI influences exports and exports influence foreign direct investment and that U.S. agribusinesses should use both FDI and export strategies to access key FTAA countries.

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