Analyzing the Agricultural Trade Impacts of the Canada-Chile Free Trade Agreement

CATPRN Working Paper 2008-08

October 2008

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Funding for this project was provided by the Canadian Agricultural Trade Policy Research Network (CATPRN). The CATPRN is funded by Agriculture and Agri-Food Canada but the views expressed in this paper are those of the authors and should not be attributed to the funding agency.

Abstract

In this paper we study the agricultural trade impacts of the Canada Chile Free Trade Agreement (CCFTA). We find that the effect of the CCFTA on Chilean agricultural exports to Canada is large and positive. We estimate that approximately one-half of a 90 percent increase in Chilean exports to Canada can be attributed to trade preferences that the country received under the agreement. We found no effect of the agreement on Canadian exports to Chile. As far as we know, our paper is among the few that carries out a detailed empirical analysis of \ the effect of the FTA on agriculture. Most empirical papers that have studied the trade impact of FTAs rely on country-wide gravity models and aggregate trade data. These aggregate analyses can hide negative effects of FTAs on some sectors (like agriculture) where a country may have a comparative disadvantage. Our approach is industry-focused and differs from the mainstream literature analyzing FTAs.

1 Introduction

Recently we have seen an exponential growth of trading partnerships.[1] Across the world, long standing barriers have been broken down. Relatively closed economies like Japan and Korea, have announced negotiations for bilateral Free Trade Agreements (FTAs). Distant neighbors such as New Zealand and Singapore have forged ahead with trade negotiations. Countries, in Asia and Latin America are increasingly strengthening their trade ties.

In response to the increase in FTA's across the world the US and Canada are also building trading relationships across the world. The US has 15 bilateral, and 6 regional agreements in place.[2] Of these agreements 7 were signed recently (from 2004-2007) by the Bush Government. Canada has FTA's with the US, Mexico, Israel, Chile, and Costa Rica. Recently Canada signed the Canada-European Free Trade Agreement (EFTA) in January 2008, an FTA with Peru in May 2008, and an FTA with Colombia in June 2008.[3] Canada is also in the process of negotiating additional FTAs with a number of other partners, such as Singapore, Korea, the FTA of the Americas, the Caribbean Community (CARICOM) and the Dominican Republic.[4]

In this paper we study the Canada-Chile Free trade Agreement (CCFTA). The CCFTA was signed in Santiago on December 5 1996 and came into force on July 5, 1997. It im-

[1] Since 1995 over 245 trade arrangements have been notified to the WTO (www.wto.org).

[2] Partner Countries: Australia, Bahrain, Chile, Colombia, Israel, Jordan, Malaysia, Morocco, Oman, Panama, Peru, Malaysia, Singapore, South Korea.

[3] The Canada - European Free Trade Association (EFTA) was signed on 26-Jan-2008, and Canada - Peru Free Trade Agreement was signed on 29-May-2008. As of June 7, 2008, Canada has also concluded free trade agreement (FTA) negotiations with Colombia.

[4] For more informatin please see the Foreign Affairs and International Trade Canada website: http://www.dfait-maeci.gc.ca/tnanac/reg-en.asp.

mediately eliminated 75 percent of bilateral tariffs, with most of the remaining tariffs being gradually phased out. The agreement largely follows the NAFTA, in that - besides bilateral trade liberalization - it also contains parallel provisions on investment protection, a mutual exemption from anti-dumping measures and on labor and environmental standards. An analysis of the CCFTA is useful for insights beyond the CCFTA. Canada has recently signed two other FTA's (with Colombia and Peru) modeled on the NAFTA. Analyzing the CCFTA will help us understand the impacts of FTA's with Colombia and Peru as well.[5]

We focus on the agricultural trade impacts of the CCFTA. The CCFTA also provides the immediate or gradual elimination of tariffs for most products in the agricultural sector. It immediately eliminated 69 percent of tariffs set by Canada and 44 percent of tariffs set by Chile, and for most other products tariffs were to be phased out gradually.[6] We focus on agriculture as this sector is often a sticking point in most trade agreements. This is borne out by the observation that most FTAs around the world contain special provisions for agriculture. Sometimes segments of the agriculture sector are entirely excluded from trade liberalization. Consider the US-Australia FTA as an example. This FTA requires no change in the U.S. MFN above-quota tariff on dairy products, and also requires no change in Australia's quota access for sugar. Similarly, the CCFTA also allows both countries to maintain the application of tariffs for quantities exceeding respective quotas for diary, poultry and egg products.

To study the agricultural trade impact of this FTA, we use a gravity model to predict

[5] This analysis will probably provide the best predicton of the agricultural impacts of these agreements for the next few years before the data required to anlalyze these FTA's becomes available.

[6] 35 percent of Canadian HS6 categories are exempt from tariff reductions and 22 percent of Chilean. This information is gathered from the Agriculture and Agrifood Canada web site: http://www.agr.gc.ca/misb/itpd/english/trade_agr/ccfta.htm.

the effect of tariff cuts on trade flows. The gravity model is a well received robust model for predicting trade patterns across countries. It explains bilateral trade flows that are based on the distance between the trading partners, and demand measured by economic mass (GDP, GDP per capita etc.). The model can include an array of variables to account for other determinants of trade like exchange rates, common language, connecting borders, treaties and other trade policies. We find a large and positive effect of CCFTA on Chilean agricultural exports to Canada. Controlling for the differences in comparative advantage in producing agricultural products, like differences in incomes, exchange rates and other characteristics, we estimate that approximately one-half of a 90 percent increase in Chilean exports to Canada can be attributed to trade preferences that the country received under the agreement. On the other hand, we find no effect of the agreement on Canadian exports to Chile. To account for the more prolonged phase out period for Chilean tariff reductions, we estimate the elasticity of Canadian and Chilean bilateral trade volumes with respect to tariff changes proposed by CCFTA. The results from this section further support the finding that it was mostly Chilean exporters who benefited from CCFTA tariff cuts, while Canadian agricultural producers did not respond to more export opportunities created by the agreement.

The main contribution of this paper is to draw attention to the impact of FTA on Canadian agriculture trade. Most empirical papers that have studied the trade impact of FTAs rely on country-wide gravity models and aggregate trade data. This provides overall trade effects of an FTA, and can hide negative effects of FTAs on some sectors (like agriculture) where a country may have comparative disadvantage. Our approach is industry-focused and

differs from the mainstream literature analyzing FTAs. As far as we know, our paper is among the first few that carries out a detailed empirical analysis of the effect of FTA on agriculture.[7]

This study is also timely given the news of new FTA's being signed by US and Canada and the long list of pending negotiations. It informs a debate on whether countries should sign or negotiate further FTAs (Becker, 2001). Many of these studies ask, what is the effect of an FTA on overall bilateral trade, and whether both partners benefit from these agreements in terms of 'trade creation.' As mentioned earlier, not many studies take a more detailed look at the effect of an FTA specifically on agricultural industries.

We structure this paper as follows. In subsection 1.1, we describe the bilateral trade between Canada and Chile and the changing patterns over time. In section 2, we provide a brief literature review. In section 3, we describe in detail the methodology and the various econometric models used to analyze the impact of CCFTA, and present the results. We conclude in section 4.

1.1 Canada-Chile Trade

The Canada-Chile Free Trade Agreement provides immediate elimination of tariffs for most products. It immediately eliminated 69 percent of tariffs set by Canada and 44 percent of tariffs set by Chile, and for most other products tariffs were to be phased out gradually. The grace period for most sensitive products, in the Canadian tariff schedule, was set between 5 to 10 years with the exception of beef, sugar and milling wheat, cases in which tariffs were

[7] Others that have studied the effect of trade agreements on agriculture trade have done so for specific subsectors (Vollrath and co-authors (2006)) or have concentrated on other issues like transprtation costs (Prentice et al (1998)) or border effects.

meant to be phased out in 15 to 17 years.[8] For diary, poultry and egg products both countries maintain the application of tariffs for quantities exceeding a certain quota.

Canadian imports from Chile have been increasing since the FTA was signed. Imports grew by 86 percent between 1996 and 2004 and almost doubled by 2005 (Table 1). Chile's share of the Canadian import market has also been growing over the past 11 years, it increased by 33 percent, one of the largest increases among all South American countries. This growth has varied across different products: Chilean exports to Canada increased the most in edible fruits, but also in areas such as beverages, cereals and fish products (Table 2). This is not surprising since most of these categories are characterized by immediate elimination of all tariffs upon implementation of CCFTA.

As for the advantages afforded by the CCFTA to the Canadian exporters of agricultural products to Chile, the situation looks very different, as Figure 1 shows. The total value of Canadian exports to Chile decreased by 60 percent until 2004 and by almost 66 percent by 2006, from around $165 million to just over $55 million at the end of the period. As Table 1 shows, Canadian exports uniformly declined with respect to most Latin American partners, while the growth with the rest of the world stayed strong. One of the most dramatic decreases in Canadian exports to Chile, post 1996, was for exports of cereals, from around $150 million to less than $34 million. This sub-sector in fact can be seen to drive the overall decrease, due to its overwhelming share of the total: cereals account for over 90 percent of total Canadian agricultural exports to Chile, with the proportion decreasing to just over 60 percent in 2006, back to its 1992 levels. On the other hand many other product categories have been areas

[8] Source: Agriculture and Agrifood Canada web site http://www.agr.gc.ca/misb/itpd/english/trade_agr/ccfta.htm.)

of growth for Canadian exporters in the Chilean market after the signing of the CCFTA. However, even very substantial increases (from 1000 percent to more than 8000 percent) in exports of products such as oil seeds, medicinal plants (HS12), preparations of cereals, bread and pastry (HS19), and products of the milling industry (HS11) could not compensate for the overall decline (Table 2).

The exporters of edible vegetables benefit the most from the agreement, both in terms of growth and in absolute terms, which may be the outcome of speedy tariff reductions completed by 2001. At the same time, exporters of other products that received wide tariff preferences under the agreement, such as manufacturers of cereal, tobacco products, edible fruits, prepared vegetables, and miscellaneous edible products did not seem to benefit.

2 Related Literature

Many studies have looked at the trade impact of FTAs on member countries. The majority of empirical research analyzes trade effects of FTAs using the gravity model.[9] Frankel and Wei (1993, 1995), Bayoumi and Eichengreen (1995), Frankel, Stein and Wei (1995), Malhotra (2007), Freund (2000), Gilbert, Scollay and Bora (2001) analyzed trade creation and diversion effects for different FTAs using gravity models. The majority of previous studies found both trade creation and trade diversion for most major FTAs (EU, NAFTA, MERCOSUR, AFTA, EFTA, CER). However, the magnitude of trade creation and diversion

[9] These studies use the concept of trade creation and trade diversion as conceptualized by Viner (1950). The trade creation effect is a result of removal of trade barriers, in case the member of PTAs were natural partners - the removal of trade barriers generally lead to trade creation within the block. The trade diversion effect would arise if the countries within the trading block (PTA) replace trade from countries outside the trading block. This generally happens because the lowering of trade barriers gives member countries a chance to sell their goods cheaper than the non- member countries purely due to the removal of trade barriers, trade is diverted away from non-member countries that had the natural comparative advantage.

effects varies substantially across studies. Cernat (2001) considered many FTAs, and found that some were trade creating (AFTA, EU, SADC and COMESA) while others were trade diverting (MERCOSUR and Andean Community). For the EU, he estimated 20 percent trade creation measured as a share of total EU imports, while for the NAFTA the results are mixed. Frankel and Wei (1995) report 15 percent trade creation for the EU and found no evidence of trade diversion for the period 1972-92. The above literature highlights differences across FTAs in its effect on trade, and emphasizes the need to analyze each FTA individually.

A large number of papers starting with McCallum (1995), Helliwell (1998), Hillberry (1998), Anderson and van Wincoop (2001) assess the effects of borders for the bilateral trade flows between FTA partners and conclude that borders matter. Regarding the particular issue of agricultural trade, Furtan and Van Melle (2004) estimate the border effects of trade in agricultural products between Canada and its NAFTA partners: US and Mexico between 1992 and 1998. The authors conclude that the non-tariff frictions in Canada-US agricultural trade are significant (Furtan and van Melle (2004)).

Vollrath and coauthors (2006) adopt a gravity approach when they analyze trade in processed and staple agri-food products among a wide cross-section of 69 countries biennially from 1996 to 2002. Among others, they find that differences in per capita income affect trade in manufactured food but not trade in commodity foods, that is consistent with the HO theory of international trade - the land/labor ratio is an important determinant of trade in food products and that the EU, NAFTA and MERCOSUR have all increased the intra-bloc trade in food products beyond that which would have taken place in the counterfactual. In a more specialized study focusing on Canadian pork exports to the US market, Prentice et. al.

(1998) use a gravity inter-regional trade model - which they compare to a derived demand for transportation - to estimate the potential to increase exports in various local markets in the US. Their main finding is that the volume of exports is highly elastic with respect to transportation costs.

In our study we look at what happens to Canada's agricultural trade from signing the CCFTA. All studies on FTA's in our literature review rely on country-wide gravity model and aggregate trade data hence, ignoring the effect of FTAs on agriculture. The other set of literature carries out more specialized analysis and concentrates on a few sub-sectors within the agriculture sector. where as we focus on all the subsectors within the agricultural sector. Also, we use both a gravity model, as is common for studying FTAs, and actual tariff reduction data in the second model.

3 Data, Methodology and Results

Trade data for this study comes from the Statistics Canada database. It covers bilateral industry-level trade data between Canada and 196 other countries including Chile. The data is collected at 6-digit Harmonized System (HS6) industry classification. The analysis uses data for agricultural industries (HS1-HS24) and covers 800 commodity categories for the period from 1988 to 2005. The data on country-level macroeconomic variables such as GDP, exchange rate, interest rate and price levels, is taken from the International Financial Statistics database maintained by the International Monetary Fund. Geographical variables have been obtained from the World Bank COMTRADE database.

Before the agreement came into force, Chile imposed a uniform ad-valorem tariff rate of 11 percent for all imported products, and the main target of CCFTA is to remove these

tariff barriers. The liberalization of Chilean market for Canadian agricultural exports was phased out over several years starting from 1997. Chilean tariffs will be gradually removed in three years for 1.8 percent of HS6 headings, in six years for 32.7 percent, in eleven years for 37.9 percent and in sixteen to eighteen years for 4.2 percent. At the same time, 22.1 percent of HS6 headings are not covered by CCFTA, and the 11 percent ad-valorem tariff will be preserved for those products. On the other hand, the liberalization of the Canadian agricultural market for Chilean products was scheduled over a substantially shorter period: import tariffs on 65 percent of all agricultural HS6 categories were completely removed by 2003, while the rest (35 percent) were exempt from tariff elimination provisions. Data on Chilean tariff preferences for Canada under the trade agreement is taken from Agriculture and Agri-Food Canada database.

In this section we talk about the several econometric approaches we employ to examine the effect of CCFTA on Canadian agricultural trade with Chile. We start with the standard approach proposed in the literature for measuring trade policy effects on trade flows. This approach is based on a standard gravity-type equation, which explains the natural logarithm of one country's imports with the level of income in its trading partner country and the log of pairwise distance. This specification is augmented with a number of other geographic and economic variables to account for other possible trade factors. The list includes a binary variable for a common language to capture cultural proximity, a set of geographic variables (binary variables for island and landlocked status of a partner country) to control for variation in trade costs. Since the gravity model was designed for explaining the value of bilateral trade and is not suited for modelling industry-level trade flows, the economic size of the country

may not be a good explanatory variable for agricultural trade, which in a larger extent depends on a country's comparative advantage. For this reason, we included three variables to capture the country's comparative advantage in producing agricultural products: the total land area used in the agricultural sector, the share of agricultural land per worker, and the amount of fertilizer used in agricultural sector (grams per square kilometer) to capture the technology advantage. We also control for the variation in the exchange rate since it is an important determinant of a country's export supply and demand, given the exogenous agricultural trade balance with each country. The set of year effects (time dummies) account for global business cycles, effects of multilateral trade liberalization, oil shocks, etc. The exact specification takes the following form:

$$\begin{aligned} \ln(X_{ict}) = \beta_0 + \beta_1 PC_i + \beta_2 FTA_{it} + \beta_3 ER_{it} + \beta_4 \ln(Y_{it}) + \\ + \beta_5 F_{it} + \beta_6 AL_i + \beta_7 ALW_i + \beta_8 \ln(D_i) + \beta_9 ComLang_i + \\ + \beta_{10} Llocked_i + \beta_{11} Island_i + \beta_T \left[Year\ Effects\right] + \varepsilon_{ict}, \end{aligned} \tag{1}$$

where i denotes trading partner country, c denotes industry and t denotes time. Variable X_{ict} is the value of Canadian exports or imports of industry c from country i at year t, Y_{it} and ER_{it} are nominal GDP and nominal exchange rate of country i at year t, respectively,[10] F_{it}, AL_i and ALW_i are the amount of fertilizer intensity, the size of cultivated land and the size of cultivated land per worker, respectively. D_i is the distance between the home country and country i. Finally, $ComLang_i$, $Llocked_i$, and $Island_i$ are binary variables that take value of one if country i speaks either English of French, is landlocked or an island nation, respectively.

[10] The exchange rate is measured in the units of foreign currecny per one Canadian dollar.

Variable PC_i is a partner country dummy variable that takes the value of one when partner country is Chile to control for possible pre-FTA differences in trade patterns relative to other countries, and FTA_{it} is an interaction of PC_i and a time-specific dummy variable for Canada-Chile FTA. Coefficient β_1 measures how much greater is Canadian imports from (exports to) Chile relative to imports from (exports to) the average Canadian trading partner. Coefficient β_2 is of key importance in the analysis: it measures the trade effect of the Canada-Chile FTA on the (log) level of Canadian exports to and imports from Chile. A Positive and significant β_2 would indicate a trade-creating effect of the FTA for Canadian agricultural sector, while insignificant values would suggest that the FTA creates no competitive advantage for Canadian agricultural exporters to Chile relative to other countries.

Specification (1) is estimated with OLS where observations are clustered by country-industry to obtain a robust covariance matrix adjusting for within-cluster correlation. Estimation results for equation (1) are presented in Table 3 for Canadian imports and in Table 5 for exports. We first focus on the results for Canadian imports. In the basic specification without additional controls (column 1), the coefficient estimate for β_1 is positive, which implies that Canada already exported 39 *percent* more to Chile than to the average country during the period 1988-1997.[11] Adding the FTA variable to the basic specification suggests that this effect nearly doubled as a result of the FTA: the coefficient $\beta_2 = 0.30$ implies that exports of the average Chilean agricultural sector to Canada increased by 35 *percent* as a result of the agreement.

Including other controls in specifications (3)-(6) we observe that most coefficients have

[11] $\exp(0.33) - 1 \simeq 0.39$

the expected signs and are consistent with theoretical predictions. The negative coefficients on GDP and common language may look odd. However, keeping in mind that the dependent variable is agricultural imports rather than total trade, larger GDP of a partner country may indicate its comparative disadvantage in agriculture and as a result lower export intensity in agricultural sectors. Similarly, countries that speak English or French may be specializing in production of manufacturing goods. Positive and significant estimates of β_6 and β_7 support the main prediction of the Hecksher-Ohlin model that countries that are more endowed with agricultural land will specialize in agricultural-land-intensive products and hence are more likely to export to Canada. Countries that use more capital-intensive technologies also export more agricultural products to Canada, as reflected by positive coefficient β_5. It is also the case that countries that pay higher trade costs, such as more distant countries, island countries and countries without sea access, trade less agricultural goods with Canada. These traditional gravity parameters are economically meaningful and statistically significant. Finally, appreciation of the Canadian dollar relative to the currency of a trading partner has positive effect on Canadian imports.

Overall, the main gravity model variables have sensible and statistically significant coefficients. Our central focus in this analysis is the pattern of Chilean imports from Canada. Results from columns (3)-(6) provide further evidence on the trade creating effects of CCFTA for the Chilean agricultural industry. During the period 1997-2005, Canadian agricultural imports from Chile became $23-34$ *percent* larger than with the average country, controlling for pre-CCFTA cross-country differences.

The results highlight the very strong effect of CCFTA for Canadian imports from Chile

relative to other countries. Table 4 reports the estimation results for specification (1) with different control groups (group of countries as comparison). Table 4 only reports the coefficient estimates on the FTA dummy (β_2) for the equation with Canadian imports. We differentiate the control group with respect to geographic area and income level, following the World Bank classification. Chilean agricultural exporters to Canada improved their performance relative to those from richer countries with higher income levels. In particular, the CCFTA improved the comparative advantage of Chilean agriculture relative to European, East Asian, and, to some extent,[12] Central and South American countries. At the same time, Chile gained no trade advantage over countries with lower income level or African countries. These results are consistent with the hypothesis that free trade agreements crowd out the least productive competing importers, which are presumed to be concentrated in high income countries with specialization in manufacturing goods.

Turning to the specification with Canadian exports in Table 5, the results for the basic specifications (1) and (2) show that Canadian agricultural exports to Chile prior to the FTA were not substantially different from that to the average country (insignificant β_1). The coefficient β_2 is also always insignificant, meaning that Canadian exports to Chile were not affected by the trade agreement. This result is robust to the inclusion of other variables in columns (3) to (6). The coefficient on GDP is positive and significant, implying that Canada sells more of its agricultural exports to larger countries. A positive coefficient on agricultural land area leads to the same conclusion. The effect of the exchange rate on the value of exports is positive, which implies that the appreciation of Canadian dollar tends

[12] The coefficient on 'Central and South America' dummie is the higher one but its large standard error indicate high variance in this effect across countries from comparative group.

to reduce total exports. The estimated coefficient on the amount of agricultural land per worker (β_7) is negative giving further support to the Hecksher-Ohlin theory: countries that are relatively scarce in agricultural land endowment tend to import agricultural products from other countries, and from Canada in particular. Consistent with the predictions of the gravity model, the coefficients on landlocked and island are positive.[13]

In general, the estimates of the modified gravity model are broadly consistent with theoretical predictions and we can use it to address the main question of the analysis: the effect of the CCFTA on the flow of Canadian exports to Chile. Controlling for cross-country differences, coefficient β_1 remains insignificantly different from zero. Therefore, prior to the CCFTA Chilean agricultural imports from Canada were not statistically different from the average Chilean trade partner. Moreover, the coefficient on the CCFTA dummy is always insignificant, implying that the FTA had no effect on the volume of Canadian agricultural exports to Chile. Together with the previous result for Canadian imports, the main conclusion of the empirical analysis is that the CCFTA generated disproportionately higher benefits to producers from one member of the agreement, Chile, while Canadian producers of agricultural products seem not to have benefited.

A potential problem with specification (1) is a possible endogeneity problem due to correlation of PC and FTA dummies with the error term. Country-specific fixed effect not captured by the list of country-specific variables may lead to the biased estimates of the model parameters. In particular, we can think of technological differences, differences in land quality, country-specific policies in support of agricultural sectors, etc. Presence

[13] However, the distance coefficient becomes positive and significant. This can possibly indicate higher demand for Canadian agricultural goods in more distant countries.

of unobservable country-specific fixed effect motivates time differentiation of the regression equation (1) to remove it:[14]

$$\Delta \ln(X_{ict}) = \beta_0 + \beta_1 FTA_i + \beta_2 \Delta \ln(Y_{it}) + \beta_3 \Delta ER_{it} + \varepsilon_{ict}$$

where $\Delta Z_{it} = Z_{i,2005} - Z_{i,1997}$. This simple specification is augmented with other variables:

$$\begin{aligned} \Delta \ln(X_{ict}) = \beta_0 + \beta_1 FTA_i + \beta_2 \Delta \ln(Y_{it}) + \beta_3 \Delta ER_{it} + \\ + \beta_4 \Delta AL_i + \beta_5 \ln(D_i) + \beta_6 ComLang_i + \beta_7 Border_i + \\ + \beta_8 Llocked_i + \beta_9 Island_i + \varepsilon_{ict} \end{aligned} \tag{2}$$

The estimator for FTA dummy, which takes the value of one for Canada-Chile country-pair observations, is an adjusted difference-in-difference estimator of the effect of an FTA, where the control group is a set of countries that have no free arrangements with Canada. In the benchmark specification we look at the change in the growth rate of Canadian agricultural trade with Chile relative to the growth rate of imports from other countries during the period 1997-2005 when the Chilean market was completely liberalized for Canada. These results are not very different from the analysis in level form: the flow of Chilean exports to Canada has increased by around 60 *percent* as a result of the agreement, while the effect of the CCFTA on Canadian exports is insignificant.

One of the possible reasons for the asymmetric effect of the CCFTA on agricultural trade between member countries is the difference in tariff elimination schedules. In 1997, Canada and Chile started with very similar protection levels for their agricultural products. As it

[14] Differencing out the country specific fixed effects (country fixed effects are constant over the two periods so differencing will cancel them out)

was mentioned earlier, Chile applied a uniform 11 *percent* import tariff to imports of all products from all countries, which fell to 7.5 *percent* by 2005, the last year of our sample. The Canadian simple average tariff for agricultural industries was 7 *percent* in 1997, while the applied import tariff weighted by trade shares was 11.2 *percent* that declined to 4.6 *percent* in 2005. By 2005, 65 *percent* of all HS6 categories of Chilean exports were exported duty-free into Canada, while only 35 *percent* of Canadian HS6 categories received duty-free treatment in Chile. As a result of this prolonged liberalization of the Chilean agricultural sector, the effect of the CCFTA may not be completely reflected in the data currently available.

If a different time path for tariff reductions is the only reason for observed asymmetry in the effect of the CCFTA on bilateral trade, then the elasticity of Canadian imports and exports with respect to the FTA tariff preferences should not be different. To verify if this is the case, we used an econometric specification that comes from a reduced form of microeconomic partial equilibrium model (Clausing, 2001). The basic empirical specification takes the following form:

$$\Delta \ln(X_{ct}) = \beta_0 + \beta_1 \Delta tariff_{ct} + \beta_T \left[Year\ Effects\right] + \varepsilon_{ct} \tag{3}$$

where c denotes industry and t denotes time. X_{ct} is the value of Canadian industry c imports from (exports to) Chile at year t, $tariff_{ct}$ is the Canadian (Chilean) ad-valorem free tariff for the industry c imports from Canada (exports to Chile) at year t, and Δ denotes the one year time-differencing.

Table 6 presents estimation results for specification (3). The GLS estimates in columns (5)-(6) show no effect of Chilean tariff preferences granted to Canadian exports to Chile: the

coefficient is not only positive but also insignificant. Controlling for industry-specific fixed effects in columns (3)-(4), such as differences in initial tariffs, factor intensities, and industry-specific comparative advantage, seems to have little effect on the sign of β_1. It is significant atthe 10 *percent* confidence level, suggesting that the reduction in Canadian exports to Chile was greater in those sectors where the CCFTA tariff cuts were deeper. Therefore, there is little evidence that tariff preferences granted by Chile for Canadian imports under the CCFTA have promoted an increase in Canadian agricultural exports to that country.

At the same time, in the specification with Canadian imports from Chile in columns (1)-(4), the effect of the CCFTA tariff reduction has a strong and significant effect on agricultural trade. The coefficient on the Canadian tariff change toward Chilean imports in the specification with industry-specific fixed effects is -0.75, which implies a 75 *percent* increase in imports in response to a 1 *percent* tariff reduction. This number seems to be very large, given that the average tariff change for Chilean agricultural products from 1997 to 2005 was 4.5 *percent* and the average increase in imports for the same period was only 87 *percent*. For example, 1 *percent* tariff reduction for the average country, controlling for country-specific characteristics, is responsible for only a 28 *percent* increase in imports. This suggests that there must be some factors other than tariff changes that affected positively Canadian imports from Chile (for example, there may be a sharp decline in import quota restriction going parallel with tariff reduction, and both effects will be attributed to tariffs). In general the magnitude seems to be overestimated, but the sign and significance are very robust across specifications. Therefore, the data confirms that Canadian and Chilean agricultural exporters responded differently to trade liberalization made available by the FTA.

While the CCFTA stimulated Chilean farmers to increase their sales to Canada, we found no effect of the CCFTA tariff preferences on Canadian agricultural exports to Chile. This result is robust to the inclusion of other controls and confirms the predictions found in the difference-in-difference analysis of the CCFTA on Canadian trade with Chile.

4 Conclusion

In this paper we estimated the effect of the Canada-Chile Free Trade Agreement on the volume of agricultural trade between member countries. Since the CCFTA was implemented in 1997, the value of Chilean agricultural exports to Canada steadily increased, while Canadian exports to Chile shrank. In the first part of the analysis we estimated the trade effect of the CCFTA using a difference-in-difference approach, based on a gravity model and controlling for different factors that may affect the bilateral volume of trade such as appreciation of the Canadian dollar. We found that the introduction of the CCFTA has increased bilateral trade, especially Chilean exports to Canada: exports of an average industry increased by an additional 25 - 35 percent as a result of the FTA. At the same time, we found no evidence of the CCFTA effect on the value of Canadian exports to Chile.

In the second part of the analysis we measured the sensitivity of bilateral trade flows to tariff preferences proposed by CCFTA and found similar results: each one percent of Canadian tariff preferences granted to Chile raised Chilean exports to Canada, while Canadian exports of agricultural products have not responded to tariff preferences received in Chilean markets. [15]

[15] In the absence of the CCFTA agreement would Canadian exports to Chile have fallen more than they did? The point is well understood by the Canadian Wheat Board. Quoting from a news article (http://www.bilaterals.org/article.php3?id_article=5981) Spokesperson [of the Canadian Wheat Board] Maureen Fitzhenry says that Canada need only look at countries where it doesnt have agreements to grasp

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the CCFTAs contributions. "Brazil signed a free trade agreement with the U.S. in the late 1980s, and were almost right out of that market right now. [Not having a FTA] can kill you," she says. The board credits the agreement for Canada's continued lock on the Chilean durham wheat market.

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Table 1a: Trade Patterns in Agriculture: Comparing Chile with other Latin American Countries (,000 Canadian Dollars)

Canadian Imports	Brazil	Chile	Colombia	Argentina	Venezuela	Latin America*	All Countries
1996	319152	222637	238855	99279	3648	1494284	14045092
1997	368258	247501	247280	115754	6951	1717872	15678826
2000	361833	272317	240694	169806	3766	1803102	18636002
2004	450318	413021	231866	108022	2464	2059958	21318089
2006	638956	498600	317987	149941	1155	2524865	23533758
GROWTH (96-04)	0.41	**0.86**	-0.03	0.09	-0.32	0.38	0.52
Market Share in 1996	0.21	0.15	0.16	0.07	0.00	1	
Market Share in 2006	0.25	0.20	0.13	0.06	0.00	1	
Growth in Share	0.18	**0.33**	-0.21	-0.11	-0.81	0	

* Excluding Mexico

Table 1b: Trade Patterns in Agriculture: Comparing Chile with other Latin American Countries (,000 Canadian Dollars)

Canadian Exports	Venezuela	Colombia	Chile	Brazil	Argentina	Latin America*	All Countries
1996	235550	214642	164605	393840	12911	1433402	22907265
1997	220639	187424	92033	270752	32321	1393782	25362671
2000	223480	153423	83351	87929	8848	1130942	27342995
2004	212192	178930	58345	38678	9717	1114769	31018006
2006	193407	138941	55687	49493	6211	1015057	31668538
GROWTH (96-04)	-0.04	-0.05	-0.37	-0.86	-0.70	-0.20	0.22
Market Share in 1996	0.164	0.150	0.115	0.275	0.009	1	
Market Share in 2006	0.191	0.137	0.055	0.049	0.006	1	
Growth in Share	0.159	-0.086	-0.522	-0.823	-0.321	0	

* Excluding Mexico

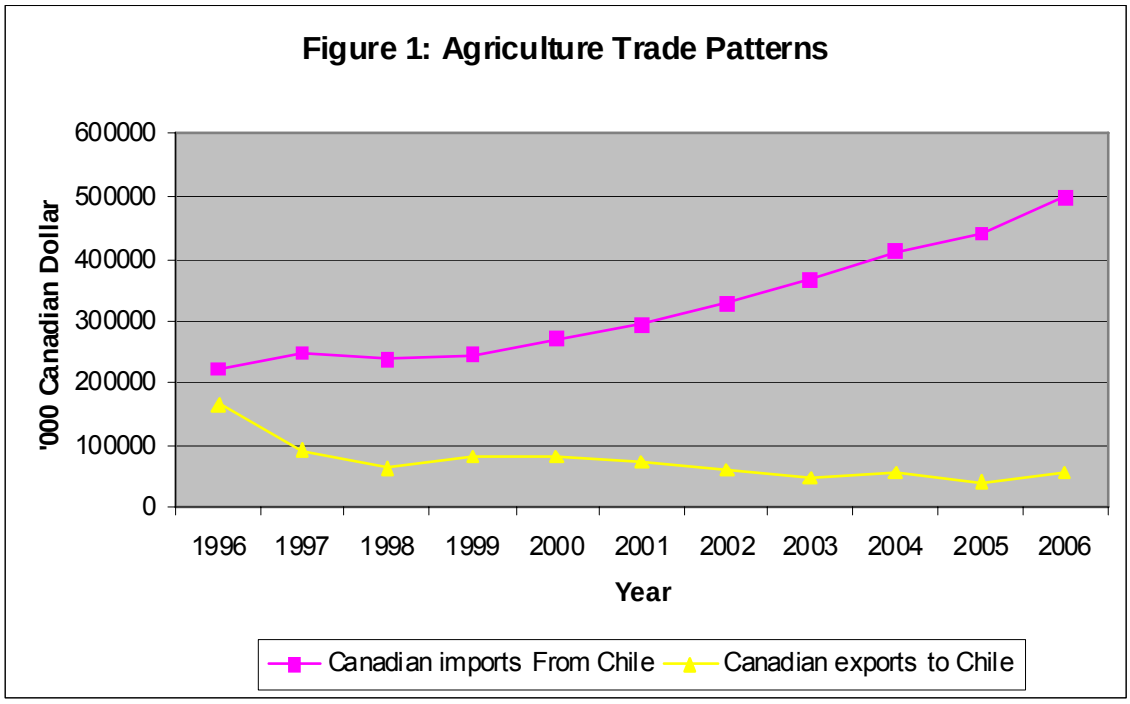
Figure 1: Agriculture Trade Patterns
600000
500000
400000
300000
200000
100000
0
'000 Canadian Dollar
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
Year
Canadian imports From Chile
Canadian exports to Chile

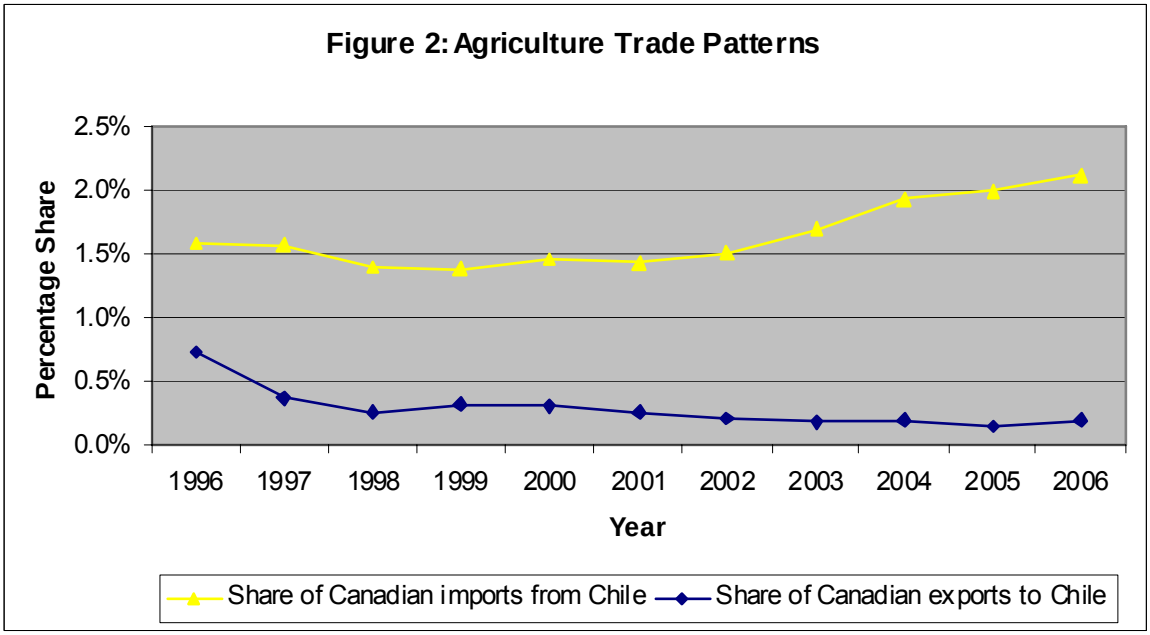
Figure 2: Agriculture Trade Patterns
2.5%
2.0%
1.5%
1.0%
0.5%
0.0%
Percentage Share
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
Year
Share of Canadian imports from Chile
Share of Canadian exports to Chile

Table 2a: Trade Patterns in Agriculture: Top 10 Import Commodities

Imports	1996	2005	growth	96 share	05 share
HS 08 - Edible Fruits and Nuts	124357778	254500309	105%	56%	58%
HS 22 - Beverages, Spirits and Vinegar	38520926	66316301	72%	17%	15%
HS 23 - Residues and Waste from the Food Industries, and Prepared Fodder	18929606	3313762	-82%	9%	1%
HS 20 - Preparations of Vegetables, Fruit, Nuts or Other Parts	21493513	14372519	-33%	10%	3%
HS 03 - Fish, Crustaceans, Molluscs and Other Aquatic Invert.	10289210	68254846	563%	5%	15%
HS 01 - Live Animals	685524	19911	-97%	0%	0%
HS 10 - Cereals	236983	11326720	4680%	0%	3%
HS 07 - Edible Vegetables and Certain Roots and Tubers	2269622	3339142	47%	1%	1%
HS 16 - Meat, Fish and Seafood Preparations	800265	1862159	133%	0%	0%
HS 09 - Coffee, Tea, Maté and Spices	2238275	1144739	-49%	1%	0%

Table 2b: Trade Patterns in Agriculture: Top 10 Export Commodities

Exports	1996	2005	growth	96 share	05 share
HS 10 - Cereals	149332133	22218353	-85%	91%	52%
HS 07 - Edible Vegetables and Certain Roots and Tubers	7196364	8809758	22%	4%	21%
HS 20 - Preparations of Vegetables, Fruit, Nuts or Other Parts of plants	1305993	298045	-77%	1%	1%
HS 17 - Sugars and Sugar Confectionery	1282451	230255	-82%	1%	1%
HS 02 - Meat and Edible Meat Offal	1267386	2229779	76%	1%	5%
HS 24 - Tobacco and Manufactured Tobacco Substitutes	1652032	15855	-99%	1%	0%
HS 23 - Residues and Waste from the Food Industries, and Prepared Fodder	93005	980655	954%	0%	2%
HS 04 - Dairy Produce, Eggs, Honey and Other Similar Edible Products	1320352	1127529	-15%	1%	3%
HS 15 - Fats, Oils, Their Cleavage Products and Waxes	278733	102545	-63%	0%	0%
HS 11 - Products of the Milling Industry; Malt, Starches, Insulin and Wheat Gluten	18387	228524	1143%	0%	1%
HS 12 - Oil Seeds, Oleaginous Fruits, Industrial or Medicinal Plants, Straw,Fodder	67565	525421	678%	0%	1%
HS 19 - Preparations of Cereals, Flour, Starch or Milk	44667	991533	2120%	0%	2%

Table 3: Effect of CCFTA on Canadian Imports

	OLS (1)	FE (2)	OLS (3)	FE (4)	OLS (5)	FE (6)
Chili Dummy	0.3304***	-0.1224	0.7257***	0.5845***	0.5802***	0.4070***
	(0.1171)	(0.1101)	(0.1066)	(0.0990)	(0.1213)	(0.1139)
FTA dummy	0.3003**	0.4682***	0.2172*	0.2208***	0.2426	0.2935*
	(0.1493)	(0.1394)	(0.1257)	(0.0856)	(0.1823)	(0.1666)
%Δ(Exchange rate)					0.0054	0.1384***
					(0.0503)	(0.0460)
log(GDP)			-0.0491***	-0.0503***	-0.0348***	-0.0413***
			(0.0068)	(0.0064)	(0.0078)	(0.0073)
Furtalizer			0.0000***	0.0000***	0.0000***	0.0000***
			(0.0000)	(0.0000)	(0.0000)	(0.0000)
log(Ag. land)			0.1400***	0.1967***	0.1302***	0.1719***
			(0.0082)	(0.0077)	(0.0093)	(0.0088)
Ag. land per worker			13.3777***	2.8032*	15.0397***	1.9755
			(1.5690)	(1.4932)	(1.7283)	(1.6654)
log(Distance)			-0.0604*	-0.0637*	-0.0976**	-0.0766*
			(0.0364)	(0.0347)	(0.0408)	(0.0394)
Common language			-0.2123***	-0.1548***	-0.1859***	-0.1782***
			(0.0423)	(0.0391)	(0.0471)	(0.0441)
Landlocked			-0.7447***	-0.7911***	-0.4669***	-0.5155***
			(0.0868)	(0.0802)	(0.1052)	(0.0983)
Island			-0.0610	0.0209	-0.0395	0.0504
			(0.0463)	(0.0427)	(0.0515)	(0.0481)
Constant	11.2851***	11.0899***	9.9688***	9.3612***	10.0655***	9.4268***
	(0.0463)	(0.0436)	(0.3028)	(0.2946)	(0.3397)	(0.3341)
R2	0.0189	0.0151	0.0405	0.0421	0.0432	0.0392
N	119927	119927	39332	39332	29496	29496

Notes: The dependent variable is log of Canadian imports value (annual). Standard errors in parentheses. Columns (2), (4) and (6) include industry fixed effects. All specifications include time fixed effects.

Table 4: Effect of CCFTA – Difference Control Group

CONTROL GROUP	***FTA dummy***	
Central and South America	0.515*	(0.346)
Asia-Pacific	0.346***	(0.135)
European Union	0.387***	(0.147)
West Africa	-0.193	(0.357)
North Africa	-0.291	(0.376)
East-South Africa	0.359	(0.311)
Middle East	0.269	(0.174)
High Income	0.574***	(0.153)
Mid-up Income	0.244*	(0.148)
Mid-low Income	-0.024	(0.131)
Low Income	-0.091	(0.155)

Notes: The dependent variable is log of Canadian exports value (annual). Standard errors in parentheses.

Table 5: Effect of CCFTA on Canadian Exports

	OLS (1)	FE (2)	OLS (3)	FE (4)	OLS (5)	FE (6)
Chili Dummy	0.1330	-0.2482*	-0.0789	-0.0615	-0.0826	0.0333
	(0.1583)	(0.1415)	(0.1261)	(0.1034)	(0.1694)	(0.1363)
FTA dummy	-0.1493	0.1250	0.1770	0.2079	0.0191	-0.0410
	(0.1882)	(0.1680)	(0.1739)	(0.1421)	(0.2259)	(0.1795)
%Δ(Exchange rate)					-0.0758	-0.1150***
					(0.0531)	(0.0425)
log(GDP)			0.0357***	0.0412***	0.0297***	0.0342***
			(0.0053)	(0.0044)	(0.0073)	(0.0060)
Furtalizer			-0.0000	0.0000**	0.0000	0.0000***
			(0.0000)	(0.0000)	(0.0000)	(0.0000)
log(Ag. land)			0.1581***	0.1197***	0.2072***	0.1581***
			(0.0060)	(0.0050)	(0.0085)	(0.0071)
Ag. land per worker			-11.2879***	-12.4622***	-15.9266***	-17.4019***
			(0.8435)	(0.6981)	(1.3476)	(1.0970)
log(Distance)			0.1229***	0.1241***	0.1832***	0.2067***
			(0.0260)	(0.0220)	(0.0355)	(0.0299)
Common language			-0.0534	-0.1243***	0.0441	-0.0867**
			(0.0351)	(0.0294)	(0.0511)	(0.0424)
Landlocked			-0.2879***	-0.5439***	-0.4899***	-0.7542***
			(0.0685)	(0.0567)	(0.1152)	(0.0936)
Island			-0.5742***	-0.2177***	-0.6564***	-0.2383***
			(0.0359)	(0.0301)	(0.0500)	(0.0415)
Constant	10.7359***	10.7044***	7.9304***	7.9347***	7.6473***	7.6378***
	(0.0386)	(0.0346)	(0.2273)	(0.1938)	(0.3097)	(0.2628)
R2	0.0369	0.0278	0.1051	0.0830	0.1364	0.1041
N	126955	126955	35691	35691	18815	18815

Notes: The dependent variable is log of Canadian exports value (annual). Standard errors in parentheses. Columns (2), (4) and (6) include industry fixed effects. All specifications include time fixed effects.

Table 6 : Effect of CCFTA Tariff Cuts on Canadian Exports

Dependent variable:	Imports growth rate				Exports growth rate	
	(1)	(2)	(3)	(4)	(5)	(6)
%Δtariff	-1.1094***	-1.0980***	-0.7456*	-0.7361*	0.1546	0.2054*
	(0.4151)	(0.4084)	(0.4317)	(0.4222)	(0.1070)	(0.1226)
%Δtariff other countries		0.0465		0.0570		
		(0.0451)		(0.0479)		
Constant	0.2456	0.2465	0.3251	0.3479	-0.2167	0.2667
	(0.2285)	(0.2264)	(0.2342)	(0.2308)	(0.3235)	(0.3517)
Industry fixed effects	NO	NO	YES	YES	NO	YES
R2	0.0071	0.0080	0.0096	0.0110	0.0332	0.0387
Number of observations	2260	2153	2260	2153	640	640

Notes: The dependent variable is an annual growth rate of Canadian imports in columns (1)-(4) and annual growth rate of Canadian exports in columns (5) and (6). Standard errors in parentheses. Columns (2), (4) and (6) include industry fixed effects. All specifications include time fixed effects.