



CANADA-UNITED STATES TRADE CENTER OCCASIONAL PAPER NO. 37

**The Impact of The U.S. Bio-terrorism Act Upon Canadian
Exporters of Food Products to the United States: A Firm-Level
Analysis.**

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March 2008

The views presented in this paper are those of the authors, and are in no way policy statement of the Canada-U.S. Trade Center or the State University of New York at Buffalo.

Abstract

This paper examines the impact of the 2002 U.S. Bio-terrorism Act (BTA) upon Canadian exporters of food products to the United States. A major goal of the BTA is to secure U.S. ports of entry against imports that might threaten the health or safety of U.S. citizens. Although this is a respectable goal, data from a sample of 144 Canadian exporters suggest that the BTA represents a major non-tariff barrier to Canada-U.S. trade. Current regulatory procedures have disrupted cross-border supply chains in significant ways. These disruptions have damaged the Canada-U.S. commercial relationship by imposing extra shipment and distribution costs upon Canadian exporters. These delays have had a serious impact upon small-to-medium sized firms (SMFs). The paper concludes with a brief discussion of possible remedial actions that might be taken by Canadian exporters.

This paper builds upon a 2005 pilot study that was conducted by the Canadian Embassy, Washington, D.C. The author was given access to the Embassy's survey instrument, sampling frame, and preliminary results. I wish to thank the Canadian Embassy and the Canadian Government for both financial and technical assistance with this expanded inquiry.

I. INTRODUCTION

Logistics-based aspects of the post-9/11 Canada-U.S. commercial relationship have become increasingly complex as a result of the 2002 U.S. Bio-terrorism Act (BTA), as well as a wide array of related security measures designed to monitor the nature of Canadian shipments of merchandise and services to the U.S. (Andreas, 2003; Andrea and Smith, 2003; Lee et al., 2005; McConnell, 2003; Molot, 2003). Although the U.S. has a legitimate interest in promoting homeland security, there is mounting evidence that many of the post-9/11 security initiatives have created escalating irritants such as shipment delays, traffic congestion at Canada-U.S. border crossings, product spoilage, supply-chain disruptions, and shrinking export sales for Canadian firms (Ontario Chamber of Commerce 2004, 2005; MacPherson et al., 2006). These difficulties can be traced to tightened inspection and customs-clearance procedures at U.S. ports of entry. United States regulatory policies to support the objectives of the Department of Homeland Security (DHS) have had an especially negative impact upon Canadian exporters of food products and other biological materials.

Although the U.S. Food and Drug Administration (FDA) has been routinely inspecting imports of food and biological substances for decades, the post-9/11 detention regime has intensified to a level that many Canadian exporters perceive as obsessive. The task of separating the security and/or health-related interests of U.S. consumers from the non-tariff or protectionist interests of U.S. producers is far from easy. There is, however, an emerging suspicion among Canadian companies that regulatory measures such as the BTA represent non-tariff trade barriers that are covertly structured to trump Canadian exports (Goldfarb and Robson, 2003; Goldfarb, 2004; Gilbert, 2005).

The goal of this paper is to describe the nature and extent of BTA-related problems, and to offer suggestions for possible remedial actions. Data for the inquiry come from a sample of 144 Canadian exporters of food products. These exporters were surveyed in the autumn of 2005 by the Canada-United States Trade Center at the University at Buffalo. The survey instrument was designed to shed light on: (1) the extent of shipment delays as a result of FDA inspections; (2) the reasons for FDA interventions; (3) the extent to which shipments had been damaged as a result of FDA 'holds' on perishable goods; (4) sales losses as a result of delivery delays; and (5) documentation procedures and costs. Of the 144 companies that participated in the survey, 32 supplied detailed statements regarding the nature and impact of specific FDA holds. Prior to a discussion of the survey results, however, it is appropriate to outline a research context for the analysis.

II. RESEARCH CONTEXT

Since 9/11, the U.S. government has deployed a variety of antiterrorist policies and regulations that pertain specifically to the flow of goods and services through U.S. ports and across its international borders (for a recent overview, see MacPherson et al., 2006). For example, the BTA empowers the FDA to randomly inspect inbound shipments of food or biological products to ensure that such items do not pose a hazard to U.S. security interests, public health, or consumer safety. Shipments can be held for inspection or laboratory testing at the discretion of the FDA. The FDA is not required to provide a reason for held shipments, nor are FDA officials required to transmit the results of their sampling or testing procedures to foreign shippers or manufacturers. Canadian exporters can reduce the risk of delivery delay by joining the Customs-Trade Partnership Against Terrorism (C-TPAT), which is an expedited customs-clearance

program for companies whose facilities, processes, and supply chains are certified by U.S. Customs as being secured against terrorism. Even with C-TPAT, however, there is no guarantee that the FDA will *not* hold goods for inspection or testing. Further, even though Canadian firms may file Prior Notice and Customs forms online to expedite clearance, the FDA can still hold pre-cleared shipments. Literally any food product or biological material can be detained. Prior Notice is an online product registration procedure that alerts U.S. Customs and the FDA to an incoming shipment. Exporters that are fully compliant with Prior Notice can have their goods held if the FDA believes that there is some risk to allowing a shipment into the United States. To this day, exactly how ‘risk’ is assessed remains a mystery to the Canadian government. Canadian shippers, as well as U.S. importers of Canadian products, appear equally dismayed about the poor quality of official information regarding post-9/11 security compliance.

The damage caused by shipment delays can be described in terms of several general categories. Under one scenario, U.S. importers do not receive their Canadian orders on time. If this were to be a persistent problem, then those importers would likely seek alternative suppliers located inside the U.S. itself. This would amount to ‘trade diversion’, if only because U.S. buyers would not place orders with Canadian producers in the first place if cheaper products at comparable quality were domestically available. Secondly, delivery delays can disrupt just-in-time (JIT) inventory management systems. For moderately perishable products such as cheese, this might force U.S. importers to boost inventory levels (pushing up carrying costs). Alternatively, Canadian exporters might need to establish storage facilities in the U.S. to counter this problem. For highly perishable products (e.g. fresh fruit), delivery delays result in rapid spoilage. An additional problem is that many Canadian exporters find new U.S. customers on the basis of product samples that are sent to trade shows, distributors, or supermarkets. If these

samples are subjected to FDA holds, potential export sales might be delayed or lost altogether. Taken together, these types of costs can have serious consequences for Canadian exporters. Under the worst-case scenario, firms could lose entire shipments through spoilage, lose their export customers, and not get paid for the damaged goods.

To date, however, none of Canada's U.S.-bound shipments of cheese, yogurt, candy bars, or other food products have been found to be FDA non-compliant in terms of safety, hygiene, or quality. Further, no explosives, poisons, or undesirable people have been found hidden in U.S.-bound trucks. The question thus arises: how much is all this costing the Canadian economy? According to Taylor et al. (2004), the current system of Canada-U.S. border management is riddled with organizational inefficiencies that generate multi-billion dollar losses to the economies of the U.S. and Canada on a yearly basis. In a recent study by the Ontario Chamber of Commerce (2004), for example, the total cost of border delays to Canada and the U.S. was estimated at around C\$13 billion per year. In a more recent study by MacPherson and McConnell (2005), the cost to Canada alone was estimated at close to US\$6 billion per year. Both studies were based upon firm-level surveys conducted in southern Ontario. The present study differs from these earlier inquiries in three respects. First, this study focuses only upon the food products sector (which is arguably the most sensitive sector when it comes to the impact of border delays). Second, this study uses a mix of statistical and qualitative data. The latter are especially illuminating, in that these data offer a picture of current trade irritants at a fine level of detail. Finally, this study draws its data from a random sample of exporters across all of Canada's major regions, giving greater geographic scope than previous inquiries.

From the outset, however, it should be stressed that this paper is primarily empirical, exploratory, and descriptive. Most of the recent literature on hardened North American borders

focuses upon the already congested U.S.-Mexico crossing points (e.g. Ackleson, 2003; Andreas and Biersteker, 2003; Haralambides and Londono-Kent, 2004). In contrast, there is only a scant literature on the economic impact of the post-9/11 hardening of the Canada-U.S. border. Indeed, most of the available literature with a Canada-U.S. focus is either impressionistic or positional in nature (see Vance et al., 2005). It is against this backdrop of acute research scarcity that the empirical work presented in this paper was framed.

III. SURVEY METHOD AND MAIN RESULTS

As a first step toward addressing the issues summarized above, a random sample of 200 Canadian exporters of food products was drawn from the proprietary databases of the Canada-United States Trade Center at the University at Buffalo. A pilot study involving 25 firms was conducted in May of 2005 to test the effectiveness of the questionnaire, as well as to assess the required sample size at $p = 0.05$ using three test variables (export-intensity, holding duration, and firm size). At the 95% confidence level, it was estimated that a sample size of 168 firms would be required for exploratory purposes. A total of 144 companies responded to the survey after two rounds of follow-up, giving a response rate of 72 percent (28 firms short of the initial target). Nevertheless, this is a respectable response rate for a postal survey, especially one that deals with business establishments (see Dennis, 2003). The survey instrument asked for a mix of categorical, ordinal, and ratio-level data across several dimensions, including post-9/11 security spending, the incidence and duration of shipment detentions, the reasons for cargo inspections, spoilage effects, and other aspects of export impact (discussed presently). Respondents were also asked a series of open-ended questions regarding their post-9/11 experiences regarding border hardening. The fact that many firms supplied detailed comments suggests that the final

response rate of 72 percent was achieved primarily because of survey salience. Specifically, most respondents were interested in the topic, and many wanted to see copies of the aggregate results.

This said the possibility of non-response bias could not be dismissed. In an effort to test for bias, three approaches were employed. First, respondents and non-respondents were compared in terms of published data on employment counts and establishment age. T-tests failed to uncover significant differences with regard to these two variables. Second, early versus late respondents were compared in terms of several metrics, including holding duration, export-intensity, and firm size (these variables are defined presently). The logic here is that late respondents (more than 4 weeks in this case) are sometimes thought to more closely resemble non-respondents than early participants (Babbie, 1992). Again, t-tests failed to uncover significant differences between these two groups (the n-size for early respondents was 103, while the n-size for late respondents was 41). Finally, non-respondents were contacted directly by telephone to find out why they declined to participate. Of the 56 non-respondents, 26 indicated that they do not participate in surveys as a matter of company policy; 19 noted that they export very rarely; while 11 refused to offer an explanation.

Although the survey achieved a fairly high response rate, it should be conceded that 4 of the non-respondents rank among Canada's oldest and largest exporters of food products. All 4 of these non-participants explained their non-response in terms of confidentiality concerns, though 3 of the 4 wanted to receive summaries of the aggregate results. Despite the non-participation of several 'big players' (i.e. firms with > 1000 employees), confidence intervals for key variables turned out to be sufficiently slim to offer exploratory results for discussion and review. For example, the average annual post-9/11 holding delay was estimated to be 4.0 days. At +/- 3 standard errors of the sample mean, this gives an upper confidence limit of 4.4 days and a lower

limit of 3.6 days. The confidence interval in this case is 0.8 days at the 99% reliability level, with a standard error of 0.13 days. Repeating these procedures for the various categorical measures revealed accuracy levels that were also acceptable. Using the standard error of the binomial distribution, for instance, the estimated incidence of FDA holding (70%) is accurate within +/- 4.3 percentage points at the 99% confidence level. In sum, the sample would appear to be representative of the broader population.

A summary of the regional distribution of respondents and the incidence of holding is shown in Table 1. Three points should be emphasized with regard to these data. First, there are no statistically significant variations in response rates by region. Second, the spatial distribution of response proportions and n-sizes closely matches the percentage distribution of gross regional product for Canada. In short, random sampling appears to have delivered a geographically representative sample. Third, there are no statistically significant variations in the regional incidence of shipment holds. An implication is that FDA enforcement procedures are uniform across all ports of entry along the Canada-U.S. border. It should be noted that approximately 90 percent of all U.S.-bound shipments are moved by truck, followed by rail (6%), air transport (3%), and express courier (1%).

The fact that there are no regional variations in the incidence of shipment detentions might seem surprising at first blush. After all, there is evidence that some border crossings are ‘easier’ than others in terms of business travel. For example, Richardson (2006) notes that ‘port shopping’ can be effective when it comes to cross-border movements of Canadian professionals under NAFTA’s business travel provisions. For merchandise, however, the usefulness of the port-shopping option seems limited (see MacPherson et al., 2006). There are two main reasons for this. First, the FDA applies standardized procedures across all U.S. ports of entry. The

Federal mandate to do this is unequivocal. Second, even if some entry points were more lax than others, bulk shippers face constrained choices from a logistics perspective. Business travelers, in contrast, can more easily shop for optimal entry points. When it comes to port of entry selection, such travelers are clearly more flexible than fully loaded trucks or rail cars.

Keeping these points in mind, Table 2 reports the incidence of FDA holds by perishable versus non-perishable food shipments. The survey instrument defined a perishable product as an item that would start to lose value or deteriorate significantly within 48 hours of an expected delivery. While fresh fruits, vegetables, flowers, and dairy items spring out as obvious examples, it is perhaps less obvious that refrigerated products such as yogurt or cheese also start to lose value if they do not arrive at the customer's retail site on time. Such products have expiry dates that are non-negotiable under Canadian and U.S. law, and these expiry dates are readily discernible once such products enter the United States. On this note, Table 2 reveals some interesting findings. Specifically, the odds of experiencing an FDA hold are significantly higher for exporters of perishable goods. For illustration purposes, products that are likely to be held by the FDA include goat's cheese (British Columbia), Chinese vegetables (grown north of Toronto, Ontario), or yogurt-based products such as 'fruit smoothies' from Quebec. Nutritional power bars and canned vegetables, in contrast, seem to bypass the FDA's scrutiny at a much higher level of success. If the product has a tendency to melt, wilt, or perish over a short period of time (i.e. within at least 48 hours), then the product in question will probably be looked at quite closely by U.S. inspection authorities. Of the 81 exporters of perishable products, fully 72 (88.8%) were subject to holds in 2005, compared to only 29 (46%) among exporters of less-perishable items. Of the 101 firms that were subject to holds, 72 were exporters of time-sensitive goods.

This said, the task of quantifying the commercial impact of shipment detentions upon any given firm is not straightforward. This is because most firms ship on a weekly or monthly basis, and average cargo values per shipment are not always the same. Conceivably, then, a Canadian exporter that ships to the U.S. 2-3 times per year would be harder hit by a single 4-day cargo detention than a comparable exporter that ships on a weekly or daily basis. Simply counting the number of delay-days is inadequate for impact assessment. To partially counter this problem, a 'holding index' was calculated which scales commercial impact in terms of the number of detentions divided by the number of shipments. This ratio is then multiplied by the total number of holding days for all detained shipments. The end result is an index ranging from zero (no impact whatsoever) to ≥ 1 (serious impact). For this sample, the index ranges from zero ($n = 43$) to > 1 ($n = 62$), with a mean impact score of 0.72. There are, of course, potentially serious limitations to this approach because the dollar value of individual shipments for any given firm might vary widely over the space of a normal operating year (in this case, 2005). Nevertheless, the holding index correlates strongly with firm-level estimates of holding-related revenue losses ($r = 0.87$; $p = 0.004$). This correlation pertains to a sub-sample of 63 firms that was able to quantify their holding-related sales losses (the remaining 38 firms were unable to offer such estimates).

Following this approach, Table 3 provides a snapshot of the business impact of recent FDA holds. On average, the survey firms experienced a total of 4 delay- days (the range was from 1 to 183 days), with average holding-related sales losses of \$55,000 spread across all shipments (the range was from \$1000 to \$400,000). On average, the survey firms allocated some 150 person-hours per annum to BTA-related compliance activity since 2002 (i.e. paperwork and research), with a range spanning 24 hours (low) to 500 hours (high). While the average direct cost of

regulatory compliance is probably less than \$3000 per firm (e.g. 150 person hours times \$20 per hour), the total impact is likely to be much higher than this (i.e. sales losses, higher insurance premiums, increased transportation costs). Since 9/11, for example, transportation costs have increased by an average of 23%, whereas insurance premiums have risen by almost 20 percent. In both cases, firms were asked to estimate price hikes arising from security measures rather than other effects (e.g. inflation).

Of the 101 firms that experienced shipment detentions in 2005, 23 were given explanations by the FDA. Table 4 compares some of the basic attributes of these 23 firms with their counterparts that failed to obtain explanations. The t-test results indicate that explanations are more likely to be given to larger and more export-experienced firms, and that investment in regulatory compliance (person hours) also plays a significant role. Completion of a Canadian government-sponsored BTA seminar seems to help too, in that fully 73 percent (n = 19) of the 26 firms that completed such a seminar were given FDA explanations. Of the 78 firms that did not receive FDA explanations, 71 did not complete a BTA seminar. Membership of C-TPAT delivers similar results, suggesting an important role for compliance investment in securing FDA feedback. Obtaining an FDA explanation is important because this information can be used to reduce the odds of repeat holding in the future.

The pre-BTA environment contrasts sharply with the post-BTA regime (Table 5). In 2001, cross-border shipment delays generated an average of \$14,000 per firm in sales losses, compared to \$55,000 in 2005. Between 2001 and 2005, the incidence of holding increased from 25% to 70%, while average hold durations moved from 1.5 days to 4.0 days. Although shipment delays can be caused by infrastructural problems, traffic congestion, and/or inadequate staffing levels at ports of entry, no less than 93 of the 101 firms that experienced holds in 2005 blamed such

detentions on the BTA. The remaining 8 firms conceded that detentions were mainly the result of improperly filed paperwork.

Compliance investment appears to be a critical factor in reducing the odds of commercial damage arising from shipment holds. Table 6 underscores this point by comparing C-TPAT members with non-members, as well as BTA seminar attendees with non-attendees. The results are hard to misinterpret. BTA-related sales losses are significantly lower for C-TPAT members. The latter also exhibit lower average scores on the holding index. Almost identical results can be seen for BTA seminar attendees versus non-attendees. Specifically, knowledge-based compliance investments seem to pay dividends in terms of reduced sales losses.

As a final step in the description, Table 7 summarizes the results of an OLS regression that links the holding index with a series of firm-level characteristics. There is minimal inter-correlation between the independent variables, though there is a general tendency for larger firms to exhibit higher levels of export experience ($r = 0.253$; $p = 0.09$). The model suggests that holding rates vary inversely with company size (employment counts), years of export experience, export-intensity, and investment in regulatory compliance (person hours). More simply, larger firms that have been in the export business for many years tend to experience fewer and less financially damaging shipment detentions than their smaller counterparts (the latter tend to have shorter export exposure than the former). Although the parameter estimate for product perishability falls short of the 95% significance level, it would seem that time-sensitive shipments are associated with higher scores on the holding index.¹

Interestingly, the r-square of 0.34 in the OLS model jumps to over 0.6 by including dummy variables for C-TPAT membership and BTA seminar completion. However, these two variables

¹ Perishability was measured across a 7-point scale, ranging from 1 (non-perishable) to 7 (highly perishable). Table 2 shows a perishable versus non-perishable dichotomy for descriptive purposes, but Table 7 uses the complete index.

are highly interconnected, and both are strongly associated with compliance investment. Backward elimination rejected both variables in the regression analysis, leaving a fairly simple model that makes good sense from an intuitive standpoint. In a nutshell, small manufacturers of perishable products are more likely to be targeted by the FDA than larger firms that have longer histories of export involvement. It should be noted that the general picture shown in Table 7 repeats itself when the holding index is replaced by sales losses. However, using sales losses as the dependent variable cuts the n-size from 101 to 63 (a loss of 38 observations).

IV. DISCUSSION

Most of the survey firms have experienced significant sales losses as a direct result of shipment detentions, especially for time-sensitive goods destined for U.S. supermarkets. Many U.S. buyers are starting to impose payment penalties for late deliveries, while others are actively seeking alternative suppliers inside the U.S. itself (see MacPherson et al., 2006). Security budgets now account for an average of 3.1 percent of total sales among Canadian exporters of food products, compared to an average of only 1.2 percent in 2001. Insurance premiums have escalated for most of these firms, as have transportation costs.

Having said this, few of the survey firms are C-TPAT members, and few have taken advantage of informational seminars regarding BTA compliance. Taking advantage of either of these two options significantly increases the probability of receiving an FDA explanation for holding. Further, it would appear that either option is associated with lower than average BTA-related sales losses, as well as lower than average scores on the holding index (recall that these two variables are positively correlated). Perhaps not surprisingly, larger firms were found to be more likely to exploit these options than their smaller counterparts.

There is little doubt that post-9/11 FDA detentions have created Canada-U.S. trade frictions that amount to more than just minor tensions. The hardening of the Canada-U.S. border continues as I write. For instance, all business and pleasure travelers are slated to require a passport to enter the U.S. by 2009. Some Canadian firms have started to respond to border delays by setting up production or distribution facilities inside the U.S. (see Richardson, 2006), but this is not a feasible option for all Canadian exporters of perishable foods. Short of a political or diplomatic solution to the detention problem, the only realistic option available to Canadian exporters of perishable foods is compliance investment. So, how much investment is required? And, how should compliance expenditures be allocated?

Evidence from the survey suggests that scores on the holding index drop well below 0.5 among firms that invest at least 200 person hours per year in regulatory compliance. Here, compliance refers primarily to trade documentation and legal research. Assuming an hourly wage rate of \$20 (an arbitrary guess on my part), the annual cost of compliance investment is a mere \$4000 per firm. Further, it should be noted that BTA seminars are free, and that the annual cost of C-TPAT membership averages only \$5000 per firm. An average compliance investment of \$9000 per annum would seem like a bargain when compared to average sales losses of \$55,000 each year.

Despite the rather modest outlays required to reduce the odds of holding, there is a clear perception among many of the survey firms that most of the post-9/11 security measures are protectionist in nature. Not surprisingly, most of the firms holding this viewpoint indicated that they had extant or potential competitors located inside the United States. The concept of 'potential competition' is insightful because it refers to U.S. producers that may eventually acquire a price-advantage if Canadian shipment delays persist or intensify. Given that late deliveries ultimately impose additional costs upon Canadian manufacturers, the negative welfare

effects are akin to those that flow from import duties. Unlike import duties, however, shipment delays create *delivery* disruptions that hurt both producers and buyers. With a visible import tariff, producers and buyers at least know when (or if) a shipment will arrive. To illustrate these points, consider the following firm-level examples that were drawn from personal interviews with 23 of the 101 companies that experienced FDA holds in 2005.

V. QUALITATIVE FINDINGS

Twenty-three of the 101 firms that experienced FDA holds in 2005 were interviewed between December 2005 and February 2006. These firms were selected on the basis of prior acknowledgement that follow-up interviews would be entertained. Each interview was conducted on-site, and lasted an average of 55 minutes per firm. The interview process followed a semi-structured format, revolving around three main questions: (1) why were shipments held? (2) what types of costs did these holds entail? and (3) have strategic or tactical plans been assembled to deal with these holds in the future?

Only 7 of the 23 interviewees indicated that FDA explanations were given. Three of the 7 were told that the hold was random, 2 were told that their documentation was ‘suspect’, 1 was told that the truck driver’s legal status was questionable, and 1 was told that the commodity in question might pose a public health risk because of a general contamination alert affecting meat imports from Canada and elsewhere. In all 7 cases, the FDA supplied reasonable and timely explanations. In the case of the 3 random holds, the FDA cleared the cargo in less than 2 hours.

For the 16 firms that were offered no explanations, the story is quite different. Eleven of these firms asked for explanations, but not only failed to receive feedback but *also* failed to obtain an acknowledgement that they had actually asked. The remaining 5 firms were contacted by the

FDA with an acknowledgement that feedback would be forthcoming. Almost 18 months after the hold in question, these 5 firms are still waiting for a response. So, is the FDA simply inefficient, lazy, or plain obstructive? The answer is probably 'no', in that most respondents conceded that the FDA is attempting to impose a broad-sweeping Federal security mandate at a time when staffing levels at Canada-U.S. border crossings are inadequate. Although many interviewees expressed frustration with the FDA, a majority conceded that U.S. border inspectors are doing the best they can with the limited resources available.

With regard to cost effects, Table 3 points to average 2004 sales losses of around \$55,000 per firm. Adding the costs of regulatory compliance obviously inflates these costs. Of the 23 firms that were interviewed, 9 lost at least 1 shipment in 2005 as a result of total product spoilage, whereas 11 were forced to sell at a massive discount (half price, or less) because of contracted delivery guarantees (freshness timelines). As one example, a producer of specialty cheese that experienced a 55 day hold lost its U.S. customer entirely, and no repeat contracts have been awarded since 2005. The same firm had to recall its refrigerated shipment from Buffalo (New York) because the U.S. buyer had no interest in old cheese (no matter how well preserved). Adding insult to injury, the Toronto cheese producer had to dispose of the old cheese because of the sell-by label on the packaging. As a further example, a Vancouver supplier of dairy-based confectionary products was repeatedly penalized by its U.S. customers in 2005 for failing to meet 24-hour delivery schedules. Although the product in question had a shelf-life of almost 2 weeks, the cost penalties assessed on the producer were clearly quite serious. This is a case where the buyer actually benefits, whereas the producer has no real choice except to close the original deal and minimize its losses.

In terms of tactical adjustments to the post-9/11 environment, 17 of the 23 interviewees stated that compliance investment is a top priority. This is because most of these firms sell at least 15 percent of their total output to U.S. customers. Unlike earlier survey-based findings regarding strategic responses under the ‘new regime’ (e.g. MacPherson et al., 2006), few Canadian food exporters are considering foreign direct investment as a marketing option. There are exceptions, but not many. For instance, a large Toronto-based supplier of processed cattle grain recently bought a Western New York grain-processing plant to bypass the border delay problem. The grain moves across the border (minimal inspection), and is then processed and distributed inside the United States. For most Canadian exporters of food products, especially perishable items, this type of compensatory strategy is simply not feasible.

One of the interviewees that participated in the follow-up study summarized the root nature of the current problem in terms of the following thoughts. These comments come from a large Ontario exporter of food products that typically ships to the U.S. across the Peace Bridge between Fort Erie (Ontario) and Buffalo (New York).

“The truck arrives fully loaded at Buffalo at around 12:45am, on time, with about \$75,000 worth of refrigerated product. We need to get the truck to the Tops Distribution Center (*a local warehousing and distribution facility*) by 3:00am. It’s 1:00am when we clear U.S. Customs, but that’s fine because we have 2 hours to get to Tops, which is only about 40 minutes away. But we get pulled over by FDA, and they want to take a look. It takes them 7 hours to take a look. Meanwhile, we are losing close to 4% of the shipment (*value*) for every hour we lose. It’s 7:00am in the morning when we are ready to move. We lost about 40% of the cargo value right there at the border, and then we meet the Buffalo commute on the I-90 which only makes matters worse. We ship at night or very early in the morning to avoid this. We get to Tops, and the unloading guys we usually deal with have gone home, so the day shift doesn’t know what they are supposed to do because they have their own loads coming. By the time the truck is unloaded, the driver has missed his next pick-up in Fort Erie and so the truck goes back to Toronto empty. It was never like this before 9/11”. (Personal interview, February 12, 2006).

Note: italics are added by the author.

Another interviewee noted that the Detroit/Windsor border crossing has also become problematic. Although this port of entry is normally associated with automotive trade, major quantities of food products also traverse this border on a daily basis. In the following example, the interviewee was a truck driver with maximum security clearance and certified low-risk status.

“ I’ve been doing this for more than 20 years and have never had serious problems with U.S. Customs. By now, I know most of these guys, even the new people. I’m shipping to Florida, and I can get there in about 22 hours of driving time. We have a 24 hour cushion with our buyers in case I’m late. We ship stuff that helps fruit growers grow better fruit. I clear Customs at Detroit, but get pulled by FDA. I was stuck for 8 days. I stayed in a motel in Windsor, rented a car, and played some golf. I eventually got cleared, but was never given an explanation for the problem. The customer was unhappy, of course, but they eventually got their stuff. The owner says the company might have to start a fertilizer plant in Florida sometime soon. That’s OK by me, because I’m near retirement.”

As a final illustration, consider the following statement from a Vancouver-based supplier of apple-juice. The interviewee was the Chief Executive Officer of a major British Columbia apple grower and juice producer.

“Apple juice is a simple product. Sure, test it now and again to make sure it’s good. But hold it at U.S. Customs under FDA rules for 2 weeks? What’s going on here? How long does it take to test random samples from the truck? Our juice can sit in the truck for weeks without damage. The juice is refrigerated, and nicely packaged in drink boxes. But our customers are getting upset about these delays. I need delivery speed, and I need reliability in crossing the border. This has nothing to do with U.S. Customs. It’s the terrorism stuff, and Customs doesn’t play in this game. I called FDA, and offered to drink any juice box they wanted. The Customs guys are helping us, but the FDA guys are much different.”

These three quotes give a sense of the frustration facing many Canadian exporters of food products to the U.S. in the post-9/11 environment. It is not difficult to see how the data shown in Tables 1-7 were formed in light of these types of cross-border entry problems.

VI. SUMMARY AND CONCLUSION

The probability of holding does not vary by region or by transportation mode, but it does vary by company size, export experience, and export-intensity. Smaller firms are especially prone to holds, especially those with limited export exposure. In general, scores on the holding index are highest for firms employing less than 50 workers. These firms exhibit weaker levels of compliance investment than their larger counterparts. Even so, it would appear that the required level of compliance investment is not beyond the reach of small companies. Over time, moreover, it is possible that new efficiencies will emerge as learning curves are completed, giving rise to smoother cross-border transactions than those that prevail today (Industry Canada, 2004). On the other hand, it is possible that Canadian exporters will face even higher levels of border hardening in the future, leading us in the opposite direction.

Aside from compliance investment, another potential solution might be to establish a secure North American perimeter with random security checks at Canada-U.S. border crossings (Taylor and Robideaux, 2004; Taylor et al., 2004). Although many trade analysts endorse this option on efficiency grounds, the political obstacles are significant for at least two reasons. First, many U.S. politicians believe that a secure perimeter would be inadequate because terrorist incursions might be launched by Canadian citizens already resident in Canada. Such beliefs do little to strengthen the commercial, political, or diplomatic relationships that bind these two trading partners together. Sadly, such beliefs are unlikely to disappear anytime soon. The fact that Canada's security services uncovered a Toronto-based terrorist cell in June of 2006 underscores the possibility that U.S. public opinion might force Congress to implement even harder border security measures in the future. Second, the secure perimeter concept is perceived by many analysts as a first and necessary step towards the formation of a customs union with harmonized

external tariffs, standardized import security procedures, and possibly even uniform immigration clearance or screening standards. This level of economic integration does not seem to have political appeal on either side of the border (Gilbert, 2005).

In the absence of a secure perimeter, what can Canadian exporters of food products expect to encounter in the future? Three general scenarios can be envisaged. The first and most optimistic scenario is that increased compliance investment reduces the frequency and duration of FDA holds, and that ‘offenders’ are given the necessary information to reduce the probability of future detentions. A second and less attractive scenario is that compliance investment fails to keep pace with new and even stricter import security measures. The fact that nobody will be able to enter the U.S. without a passport from 2009 onwards suggests that this scenario may already be unfolding. The worst-case scenario is that the border hardens to the point where large-scale trade diversion takes place, effectively truncating some of Canada’s agricultural exports to the United States. Presumably, this will not be good from a North American consumer welfare perspective?

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Table I

Regional Distribution of the Survey Firms by Holding Incidence

Location	Ontario	Quebec	Maritimes	Prairies	West	Total
n-size	43	39	13	16	33	144
% Distribution	29.9	27	9.1	11.1	22.9	100
Response Rate (%)	71	69	72	67	73	72
Holding Incidence (%)	72	68	65	69	74	70

Table II

The Incidence of FDA Holds by Perishable Versus Less-Perishable Shipments

[] = Column Percentage		Perishable	Less-Perishable	Total
FDA Holds	Yes	72 [88.8]	29 [46.0]	101 [70.1]
	No	9 [11.2]	34 [54.0]	43 [29.9]
Total		81	63	144

Chi-square = 11.76 p = 0.004

Table III

Business Impact of FDA Holds on Canadian Exporters (2004)

	Mean	High	Low
Hold Duration (Days)	4	183	1
Holding Index	0.72	1.26	0
Sales Losses	\$55,000	\$400,000	\$1000
Person Hours for Compliance	150	500	24

Table IV
 FDA Explanations for Holding

	Explanation Offered		p-value (t-test)
	Yes (n=23)	No (n = 78)	
Mean Employment Size	112	21	0.001
Export Experience (Years)	23	9	0.036
Export-Intensity (%)	35	10	0.024
Person Hours for Compliance	165	48	0.002
Completion of BTA Seminar (n)	19	7	0.001 *
C-TPAT Membership (n)	18	9	0.006 *

* = chi-square tests

Table V

Pre-BTA Versus Post-BTA Holding and Sales Losses

	Pre-BTA (2001)	Post-BTA
Holds (Days)	1.5	4.0*
Sales Losses	\$14,000	\$55,000*
Holding Incidence	25%	70% **

* = significantly different means (t-tests) at $p = < 0.05$

** = significant chi-square value at $p = < 0.05$ (2 x 2 cross-tabulation)

Table VI

C-TPAT Membership and BTA Seminar Completion: Group Contrasts

	C-TPAT *		BTA seminar *	
	(yes = 27)	(no = 117)	(yes = 26)	(no = 118)
Sales Losses	\$21.5K	\$59.2K	\$22.2K	\$58.7K
Holding Index	0.35	0.79	0.37	0.81

* = significantly different means (t-tests) at $p < 0.05$

Table VII

Factors Associated with the Holding Index (OLS Regression)

Independent Variables	Parameter ¹	Significance
a. Size of Firm	-0.675	0.003
b. Export Experience	-0.412	0.036
c. Export-Intensity	-0.404	0.041
d. Compliance Hours	-0.365	0.043
e. Perishability	0.321	0.058

Adjusted $r^2 = 0.347$

a = 2005 employment count

b = number of years exporting to the U.S.

c = U.S. export sales as a percentage of total sales (2004)

d = average annual hours spent on regulatory compliance (post-9/11)

e = shipment perishability (ranked along a 7-point scale)

¹ = unstandardized beta