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Assessing Pass-through Effect of U.S. Trade Remedy Investigations: Canadian softwood lumber

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Assessing Pass-through Effect of U.S. Trade Remedy Investigations: Canadian Softwood Lumber

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Abstract

This paper examines the tariff pass-through of Canadian softwood lumber in the presence of U.S. antidumping (AD) investigations. An important difference relative to standard tariffs and countervailing duties is that AD duties are recalculated by the U.S. government based on foreign firms' recent pricing behavior in the process of administrative reviews. This process provides an incentive for foreign firms to influence the amount of AD duties through their pricing decisions in both its export market and own home market. This paper employs a difference-in-differences approach and investigates the extent to which AD duties and the resulting administrative review process alter the pass-through of AD duties. Results from our study reveal that the pass-through is influenced not only by the degree of market competitiveness under investigation, but also by the possibility of inter-regional trade diversion.

Keywords: Pass-through; Antidumping; Countervailing duties; Trade diversion; Softwood lumber
JEL classification: F13; F14; L11

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1. Introduction

The softwood lumber dispute between the United States and Canada is known as one of the longest trade disputes in history; it has involved extensive litigation in the United States, the NAFTA, and the WTO over subsidization and dumping. Softwood lumber is one of Canada's largest exports to the United States, with 21.5 billion board feet of lumber shipped in 2005 alone. Indeed, Canada now supplies over a third of the United States' consumption of this product. Those exports were worth $8.5 billion, comprising an important element of the largest trading relationship in the world (Random Lengths, 2006).

The first dispute over softwood lumber dates back to the time of Great Depression. After several subsequent disputes, U.S. and Canada established the five-year Softwood Lumber Agreement in 1996. Upon its expiry on March 31, 2001, US initiated investigations and eventually imposed antidumping (AD) and countervailing duties to hinder imports of Canadian softwood lumber. Using a panel data set containing products of eight-digit Harmonized Tariff System (HTS) levels, this paper focuses a particular attention on the impact of AD investigations and estimates the resulting pass-through of both AD duties and exchange rates, using a difference-in-differences (DID) approach.

AD duties are levied when a foreign firm is found to price in their export market below “normal” value for the product, and cause material injury to domestic firms. An AD duty is supposed to be equal to the calculated dumping margin, i.e., the difference between the normal value and the export price of the product, and thus protecting domestic industries against dumping behavior. Recent research, including Blonigen and Haynes (2002) and Blonigen and Park (2004), has pointed out that the institutional structure regarding the determination and administration of AD duties provides intriguing incentives for foreign firms’ pricing behavior. Upon the request of investigated foreign parties, U.S. Department of Commerce (USDOC) initiates an administrative review each year, and recalculates AD duties using transactions from the 12 months immediately preceding the administrative review request. Once the USDOC recalculates an AD duty during the period, the newly calculated AD duties take over previously existing AD duty. If a review determines that the margin during the review period differs from the previous margin used as a basis for the importer’s cash deposit, a refund (or bill) in the amount of the difference plus interest is rebated (or charged). Thus, the administrative review process allows investigated firms to avoid the duty by raising their export prices into the United States.

This paper assesses whether foreign firms’ pricing behavior is altered by this institutional feature surrounding the AD administration. The data set used in the paper covers the periods of AD administrative reviews, along with the periods prior to the AD investigations. Thus, the paper is able to uncover the extent to which the export prices into the U.S. change during the administrative

review period, relative to the pre-AD investigation period. The paper uses a panel data with disaggregated lumber products at the level of eight-digit HTS, and employs a DID method. It finds that the AD duty pass-through increased in the range from 120 to 150 percent during the period of administrative review, implying that Canadian firms priced their softwood lumber substantially higher during the period. This finding complements with the result obtained in Blonigen and Haynes (2002), which examines Canadian export of iron and steel into the United States. Blonigen and Haynes (2002) reports that pass-through of the AD duty is 160%. However, this estimate is not particularly higher relative to their finding of pass-through of the ad valorem MFN tariff (See Table 3 on page 1054), the estimate of which is also more than complete. It is therefore not very clear in Blonigen and Haynes (2002) as to whether foreign firms indeed altered their pricing behavior in the period of administrative reviews. Using the pre-AD period allows us to recover the additional incentives for Canadian firms to determine their export price during the administrative review. This paper in passing finds incomplete exchange-rate pass-through in the range from 60 to 80 percent, the result consistent with those found in the existing literature surveyed in, for example, Goldberg and Knetter (1997).

This paper presents two additional extensions to the literature of the AD duty pass-through. First, we classify softwood lumber into categories of different competitive pressure, and separately estimate the pass-through of AD duties. In theory, it is difficult for foreign firms to raise their export prices in a competitive market, because the firms are not able to fully internalize the externalities accrued from competition. Interestingly, to the best of our knowledge, this hypothesis has not been tested in the literature. The unique feature of softwood lumber and our detailed product-level data allows us to test an implication of the hypothesis. Softwood lumber (HTS 44071010 – 44071090) includes two classes of species, pine (HTS 44071031 – 44071062 and 44071080) and cedar (HTS 44071071 – 44071079). It is known that the North American market of the former is far more competitive than that of the latter. The DID estimates support the prediction of the hypothesis; indeed, the AD duty pass-through of cedar more than doubles that of pine.

Second, we find evidence consistent with the presence of trade diversion effects. In our study, AD duties and countervailing duties (CVD) were imposed on softwood lumber manufactured primarily in the following four provinces; Alberta, British Columbia, Ontario and Quebec. Since the Maritime Provinces were exempt from CVD and mostly from AD, it is possible that firms located in one of the four provinces evaded the trade remedy sanctions by diverting the lumber to the Maritime Provinces before shipping to destinations in the United States. This trade deflection effect has been also observed in other work; Bown and Crowley (2007) for the case of U.S. AD and safeguards; Baylis (2008) for the case of U.S VER on tomatoes; and Ohashi (2002) for the case of European VER on VCR's. Since the province of British Columbia is located far from the Atlantic, firms that resided in British Columbia may have found prohibitively costly to detour their products to the Maritime

Provinces. We employ the DID on the data from the British Columbia, and compare the estimates with those from other Canadian provinces. The paper finds that the AD duty pass-through is more than 20 percent higher for British Columbia than the average Canadian provinces, implying that leakage might have occurred on trade remedies against Canadian softwood lumber.

The organization of the paper is as follows. The next section describes the U.S.-Canada softwood lumber disputes. It also discusses the institutional features of trade remedy policies in the United States. The description made in Section 2 has a direct bearing on the formulation of empirical strategies and the interpretation of quantitative results in the subsequent analyses of this paper. Section 3 introduces an estimation model, and Section 4 presents estimation results. Section 5 concludes, followed by Data Appendix.

2. Background: US Trade Remedies on Canada Softwood Lumber

This section briefly describes trade disputes between U.S. and Canada over softwood lumber. The product under study includes wood produced from trees such as pine, spruce, fir and cedar. In 2005, imports of softwood lumber from Canada totaled US$7.01 billion, accounting for approximately three percent of trade between the two countries. Lumber refers to products of wood cut on all four sides to some particular length.

Canadian producers are normally required to pay a stumpage fee in order to obtain a right to harvest timber on crown lands, whose area covers a large part of forest in Canada. Lumber producers from the U.S. have claimed that this stumpage program should be viewed as a subsidy scheme for Canadian producers, in that the stumpage fee is much lower than that in the United States. The paper focuses on U.S.-Canada trade disputes in the period from 1997 to 2006. In this section, we first summarize the important events associated with the U.S.-Canada softwood lumber disputes. We then move to Section 2.2 and provide an overview of U.S. trade remedy investigation procedures with a particular emphasis on AD.

2.1. U.S. – Canada Softwood Lumber Disputes, 1996 to 2006

- Softwood Lumber Agreement (from 1996 to 2001)

From April 1996 and March 2001, softwood lumber exports from Canada were subject to tariff-rate-quota based on Softwood Lumber Agreement initiated in March 1996. Under the agreement, Canadian producers residing in the four provinces; Alberta, British Columbia, Ontario

and Quebec, could export 14.7 billion board feet of softwood lumber without fee, and additional 0.65 billion board feet exports were applied a fee of 50 USD per thousand board feet. Amounts in excess of 15.35 billion board feet were subject to a fee of 100 USD per thousand board feet. [1]

The fee levels were updated every year, and increased over the period of Softwood Lumber Agreement, as is indicated in Figure 1; the figure shows the calculated tariff rates, which indicate the average percentage of the tariffs in the unit value of exported softwood lumber.

- Trade Remedies (from 2002 to 2006)

Upon the termination of five-year pact of Softwood Lumber Agreement in 1996, a group of U.S. producers filed petitions of AD and CVD against Canadian exports of softwood lumber. USDOC and U.S. International Trade Commission (USITC) began investigation in response to their petitions filed.

The USDOC and USITC have distinct roles in legal procedures regarding AD and CVD. The USDOC calculates the respective AD and CVD margins, while the USITC determines whether the corresponding U.S. domestic industries had been materially injured by the import of products under investigation. AD and CVD follow the same procedure with slight differences in the duration of investigation taken before preliminary and final determinations are made.

In May 2001, USITC made the affirmative preliminary determination on both CVD and AD, and hence the legal process continued. The USDOC preliminary determination of CVD was released in August 2001 with a long delay from the schedule. The level of CVD in the preliminary determination was 19.3%, uniformly imposed on all Canadian provinces except for the Atlantic Canada. The USDOC declared that the CVD be retroactive to May 19; hence the CVD duty could be collected from the periods after May 19, should the final determination be also affirmative and retroactive. The preliminary determination of AD case was issued in October 2001. Since many firms were involved in exporting softwood lumber to the United States, the USDOC investigated the dumping margins only for the six largest companies in Canada, and imputed the weighted average of the investigated margins to the other Canadian firms. The average margin was calculated as 12.6%. Note that, contrary to the CVD determination, AD duty was found not retroactive. Under the non-retroactive determination, foreign firms never be applied the AD duty during the periods of investigation.

- AD and CVD Gap Period

AD and CVD laws rule that the duty be collected retroactively from up to 90 days before the USITC determination of preliminary determination of positive injury. Hence, firms have an incentive to alter their pricing strategy during the periods of investigation in case of the retroactive

[1] One board foot is equal to a 1-inch thick board 12 inches in width and 1 foot in length.

imposition of duty. [2] In the final determinations, neither AD nor CVD turned out to be retroactive.

The unique aspect of the softwood lumber case is the presence of the AD and CVD gap period. The USDOC and USITC were obliged to issue the final determination within 120 days after the preliminary determinations of AD and CVD came out. If the final determination were not issued within this time period, U.S. government would fail to collect duty retroactively until the issuance of final determination. This period is called the "gap" period.

The softwood lumber case began in 2001 turned out to be fairly complicated; the petitions from U.S. producers and the replies from Canadian producers accumulated over 265,000 pages in total, and thus the final determination failed to be issued within the scheduled timeframe. The incident occurred in September the 11th added another factor contributing to the delay. Accordingly, the preliminary CVD determination was expired on 15th December, 2001 and the preliminary AD determination expired on 5th May of the next year. The final AD and CVD determinations finally came out at the same time on May the 22nd of 2002, with affirmative determinations for both cases. As noted above, while the preliminary CVD determination was retroactive, the final determination ordered no retroactive AD and CVD duties, as indicated in Figure 1. The CVD duty was finalized at 18.79%, applied to the producers in Canadian provinces except for the Maritime Provinces, and the final AD duties tuned out 8.43% for the firms not investigated.

- Administrative reviews [3]

Once the AD and CVD duties were finalized and applied to a product, the importer of Canadian softwood lumber must pay U.S. Customs a cash deposit equal to the ad valorem AD and CVD duties times the value of the subject product. These cash deposit, however, do not necessarily represent the final amount of duties to be assessed on softwood lumber imported from Canada. Rather, the duties determined in the USDOC's final investigation are only used as a basis for estimating the duty liability of the importer. The actual liability of the importer may be determined in subsequent years by the USDOC. As described in Blonigen and Haynes (2002), before 1984, the determination of the actual liability was assessed by automatic yearly administrative reviews by the USDOC. For the case under study, on the anniversary of the date when the final AD and CVD were issued, the USDOC asked for requests by interested parties for administrative reviews of AD and CVD duties. Requests came from previously investigated Canadian firms and Canadian government. Upon the receipt of the requests, the USDOC recalculated the AD and CVD duties. While CVD duties are assessed presumably based on the amount of government's subsidy provided through a stumpage fee, the

[2] Also, firms tends to price higher during the periods of investigation to reduce the likelihood of positive final determination.

[3] This subsection and the next section are based on Blonigen and Haynes (2002) and Blonigen and Park (2004).

re-assessment of AD duties are based on the information from the twelve months immediately preceding the administrative review request. Once the USDOC calculates dumping and subsidy margins during the administrative review period, an AD duty (or CVD) equal to the newly calculated dumping margin (or the rate of government subsidy) replaces any previously existing AD duty (or CVD). If a review determines that dumping or subsidy margins differ from the previous margins used as a basis for the importer's cash deposit, a bill (or refund) in the amount of the difference plus interest is charged (or rebated). While CVD is based on governmental subsidy, which is presumably outside the control of firms' pricing decisions, the dumping margin is not. The administrative review allows foreign firms under investigation to evade the duty by altering either or both of their export and own domestic prices.

In the softwood lumber dispute under study, the data period contains three periods of administrative reviews; the time period from April 2003 to March 2004; from April 2004 to March 2005; and from April 2005 to March 2006. We discuss further detail of AD investigation procedure in the next subsection.

2.2. Trade Remedy Investigations Procedure

While the CVD is calculated based on the amount of subsidies provided by the exporting government, the dumping margin associated with AD duties is more complicated in calculation. The USDOC typically compares sales transactions that occurred in both exporting and importing markets for the six months prior to the date when the petition is filed to determine both the preliminary and final AD duties. The dumping margin is usually calculated based on the difference between the foreign export price and home price of the good. The dumping margin for softwood lumber under study, however, is derived in a different method, which we will discuss shortly in this section. Finally, the USDOC converts the U.S. price into the investigated firm's home country currency, using the bilateral exchange rate of the subject country at the time of the U.S. transactions.

Unlike standard tariffs, the existence of administrative review process allows foreign firms to affect the level of the AD duty in the future by changing the dumping margin today. In principle, a forward-looking firm can reduce the future AD duty by changing either its exporting or domestic prices of the good. In case of softwood lumber under study, USDOC did not use the actual data on domestic price in the calculation of the dumping margin. Instead, they constructed the Canadian domestic prices based on the cost information privately obtained by Canadian producers. The dumping margin for softwood lumber imported from Canada was thus calculated as the difference between U.S. export price and the USDOC constructed domestic price in Canada. Therefore, the effective AD duty over the coming period entirely depends on Canadian firms' pricing decisions,

which form the basis of the dumping calculation in the administrative review. Thus, in theory, a forward-looking and profit maximizing firms should have considered increasing the export prices of softwood lumber into the U.S. in the period, say, from June 2002 to March 2003, in an effort to reduce the AD duty in the subsequent period from April 2003 to March 2004.

In this paper, we empirically examine whether and to what extent Canada producers increased prices of softwood lumber exported to the U.S. because of the presence of administrative reviews. The reviews were conducted for both AD and CVD in each of the following three periods; from April 2003 to March 2004; from April 2004 to March 2005; and from April 2005 to March 2006. We are particularly interested in testing the hypothesis that the administrative reviews associated with AD duties alters the firm's pricing behavior, because the firm anticipates that its export price reduce the level of AD duty in the coming period. Although the ex-post AD duties reduced little in the administrative reviews (as indicated in Figure 1. Note that the tariff rates also include CVD), it does not preclude the possibility that the firms increase export prices by a larger magnitude than that predicted by the absence of administrative reviews. In the next section, we discuss an estimation method to identify such Canadian firms' pricing behavior.

3. Empirical Specification

This section discusses an estimation approach used for us to examine how trade remedies, especially for AD, affected export prices of Canadian softwood lumber exported to the United States. The paper uses a panel data set that contains products disaggregated at the level of eight-digit HTS over the period from 1997 to 2006. This section also introduces a control group that allows us to perform a DID approach to assess the pricing of softwood lumber imported from Canada. The estimation results will be discussed in Section 4.

Similar to Blonigen and Haynes (2002), we extend a standard pass-through equation. This paper however contains three divergences from the existing work on the pass-through of AD duties. First, our data set includes not only the period of administrative reviews, but also the periods prior to the reviews when standard tariffs, including no tariffs. The Gap period from December 2001 to May 2002 provides us with the experimental situation, in that no tariffs were imposed during the period. The unique institutional feature of the market allows us to directly compare the pass-through of both standard tariffs and AD duties, conditional on the presence of CVD.

Second, our detailed product-level data of softwood lumber contains species that are known to be distinctively different in terms of market competitiveness. The species of pine is widely available throughout the Continent, and thus competition among lumber producers is known to be severe in

the North-American market, whereas cedar is rather scarce in resource and its lumber is more valuable. Indeed, Table 1 shows that export price of pine is 25 percent higher on average than that of cedar. Although it is in theory plausible that pass-through of AD duties is lower with market competitiveness, to the best of our knowledge, such empirical analysis has not been conducted. We estimate the regression, allowing for difference in pass-through by species, and find estimates consistent with the theoretical prediction. Finally, this paper examines whether the leakage of AD duties are observed in the data. As discussed in Section 2, since the trade remedies, including AD and CVD, were applied except for Atlantic Canada, it is possible that manufacturers, especially residing in the region of Eastern Canada, exported lumber to the Maritime Provinces before shipping to the U.S. so as to avoid the duty sanctions. We separately estimate the data from British Columbia to analyze this issue; because it is more costly for manufacturers in Western Canada to detour their exports through the Maritime Provinces. We find that the pass-through estimated from data of Western Canada is both statistically and economically higher than that from the whole sample. This result provides indirect evidence indicating that the leakage of trade remedies indeed occurred on Canadian softwood lumber.

Using disaggregated product level panel data of U.S. softwood lumber imported from Canada, we perform price regressions, extended from a standard pass-through equation:

$$\ln(p_{i,t}) = \alpha \ln(e_t) + \mathbf{X}_{i,t}\boldsymbol{\beta} + \mathbf{D}_{t,q}\boldsymbol{\gamma} + \varepsilon_{i,t}, \quad (1)$$

for product i and month t. Note that our data contain 29 lumber products in total with the subheading number of 44070000. Note that the tariff rates are usually updated on an annual basis, and hold at the same level within the year, as shown in Figure 1. Export price $p_{i,t}$ is measured in terms of Canadian dollar, and e_t is represented by US-Canada exchange rate. The coefficient of e_t, α, indicates pass-through of exchange rate. If α is found to be zero, Canadian firms fully adjusted their price in response to exchange rates. On the other hand, if α equals to one, Canadian firms do not change their price in response to exchange rates. Goldberg and Knetter (1997) reports that the existing work on exchange-rate pass-through mostly finds incomplete pass-through. A vector of $\mathbf{X}_{it}$ includes cost and demand shifters, along with product dummy variables at the level of eight-digit HTS, quarterly dummy variables and a constant term. For cost and demand shifters, we incorporate the variables of wage (in Canadian dollar); the number of housing units authorized by building permits in the United States; world crude oil prices; and average prices of log. The summary statistics of these explanatory variables are presented in Table 1, and data sources are described in the appendix.

Equation (1) also includes a set of policy dummy variables, $\mathbf{D}_{t,q}$. We define the subscript q as being ten distinct annual period. As Figure 1 shows, there are four periods prior to the AD and CVD

investigations (i.e., the period from April 1997 to March 1998; from April 1998 to March 1999; from April 1999 to March 2000; and April 2000 to March 2003); the AD and CVD investigation period from April 2001 to November 2001; the Gap period from December 2001 to May 2002; and four periods after the issuance of final positive determinations of AD and CVD (i.e., the period from June 2002 to March 2003; from April 2003 to March 2004; April 2004 to March 2005; and April 2005 to April 2006). We define q as taking the values of 1 through 10 in correspond to the chronological order of these policy events in Figure 1. The dummy variable, $\mathbf{D}_{t,q}$, receives one if time t falls into the policy period q. The last term in the RHS of (1), ε, is an error, and the Greek letters, α, $\boldsymbol{\beta}$, $\boldsymbol{\gamma}$ are the parameters to be estimated.

Note that, unlike the standard pass-through regressions (see, for example, Feenstra, 1989), the above regression includes neither tariff rates nor AD duties. Note that the data cover the period of the 1996 Softwood Lumber Agreement, under which U.S. government imposed specific tariffs on softwood lumber imported from Canada. However, it is difficult to compare the rates of specific tariff and ad valorem tariff, as noted in, for example, Brander and Spencer (1984) and Krugman and Helpman (1989, chapter 4.8). Therefore, we include a set of policy dummy variables, $\mathbf{D}_{t,q}$, and calculate pass-through for each period q based on the estimates. The method of calculation is discussed in Section 4.

It is possible that the policy dummy variables, $\mathbf{D}_{t,q}$, may contain industry-wide supply shocks, which may be unable to controlled by the inclusion of the variables, $\mathbf{X}_{i,t}$. To cope with this concern, we also apply a DID approach:

$$\ln(p_{i,t}) = \alpha \ln(e_t) + \mathbf{X}_{i,t}\boldsymbol{\beta} + \mathbf{D}_{t,q}\boldsymbol{\gamma}_1 + \left(d_i \times \mathbf{D}_{t,q}\right)\boldsymbol{\gamma}_2 + \varepsilon_{i,t}\,. \tag{2}$$

Equation (2) looks closely into the third term in the RHS of Equation (1). The above equation introduces a new dummy variable, d_i, which identifies product i as either in the treatment (when d_i takes the value of one) and control groups (when it takes the value of zero). The treatment group is softwood lumber, which receives tariffs. Note that both specific and ad valorem tariffs were applied to the same categories of softwood lumber. In the next section, we further decompose the treatment group into species in an attempt to analyze the effect of market competitiveness.

As a control group, we choose a set of products associated with hardwood lumber. Hardwood lumber possesses product characteristics similar to softwood lumber; this might be seen by the fact that both lumbers are classified under the same subheading number of HTS. It is known that hardwood lumber is not considered as very substitutable to softwood lumber in terms of usage as housing material. Note that d_i is a linear combination of product dummy variables, already included in $\mathbf{X}_{i,t}$. Again the Greek letters, α, $\boldsymbol{\beta}$, $\boldsymbol{\gamma_1}$ and $\boldsymbol{\gamma_2}$ are the parameters to be estimated in the next section.

4. Estimation Results

This section applies the estimation models described in the previous section to the data set. The data used in this study are monthly observations from April 1997 to March 2006. The summary statistics pertaining to the important variables used in the estimation appear in Table 1, and the data sources are presented in the appendix.

Price data used in the dependent variable are unit values of Canadian export of disaggregated softwood lumber products at the eight-digit HTS with subheadings ranging from 44071010 and 44079990. Unit of measurement is cubic meters. Note that the duties under the Softwood Lumber Agreement in the period from 1996 to 2001 were directly collected by Canadian Government, while duties associated with AD and CVD were done by U.S. Customs. This institutional feature demands attentions in interpreting the unit value data taken from Statistics Canada, in that export prices in the period from 1997 to 2001 indicates the values after tariff, whereas the data afterwards are before tariff. To make the data consistent throughout the study period, we incorporate the AD duties and CVD in the unit value when constructing the export price variable. Thus, our dependent variable is the unit value inclusive of tariffs.

We now proceed to the estimation of the AD duty pass-through for Canadian softwood lumber exported to the United States. Table 2 presents four results based on methods with product-level fixed effects. Specifications (A1) and (B1) use the data of softwood lumber and estimate equation (1), whereas Specifications (C1) and (D1) further add the data of hardwood lumber as a control group to perform the DID regression of equation (2). Specifications (A1) and (C1) treats softwood lumber as a single product category, while Specifications (B1) and (D1) allow for different coefficients according to two distinct types of species, pine and cedar. The upper portion of Table 2 reports the estimates of the regression coefficients. Our inferences are based on heteroskedasticity-robust standard errors. All results obtained indicate that the models fit the data moderately well; the measure of the adjusted R^2 is approximately 0.7 or above.

The coefficient of exchange-rate pass-through is estimated to be over 0.6 in Specification (A1), indicating the export prices of softwood lumber were not fully responsive to exchange rates. The result of this incomplete exchange-rate pass-through is consistent with the findings in the existing literature, surveyed in, for example, Goldberg and Knetter (1997). The price elasticity with respect to wage is estimated 0.2 and differs from zero at the margin, while the elasticities with respect to oil price and log prices are found neither statistically nor economically significant. The estimates of cost elasticities may imply that the market of softwood lumber exported from Canada was not of

perfectly competitive during the study period.

Based on the estimates, we calculate the tariff pass-through. As discussed in the previous section, we do not directly include the tariff rates in the pass-through regressions, because both specific and ad valorem tariffs were used during our study period. We thus employ the policy dummy variables, $\mathbf{D}_{t,q}$, and construct the calculated tariff pass-through. Note that the reference period for $\mathbf{D}_{t,q}$ is the Gap period when the tariff was nil. Thus, we can obtain an export price under the counterfactual situation where tariffs had not been imposed at period q. Let us denote this counterfactual export price, $p^{C}_{i,t}$ where $t \in q$. We are thus able to calculate the average value of pass-through: $(p_{i,t} - p^{C}_{i,t})/T$ for the regime of specific tariffs (in the period from April 1997 to March 2001 during the study period), and $(p_{i,t} - p^{C}_{i,t})/\tau * p^{C}_{i,t}$ for the regime of ad valorem tariffs (in the period from June 2002 to April 2006), where T and τ are specific and ad valorem tariff rates, respectively. We calculate the tariff pass-through for each of the nine periods (note that we took the Gap period as a reference). Table 4 summarizes our findings. The block on the left in the table is based on the estimates from Table 2. The first row, calculated from Specification (A1), indicates that, though the difference is statistically insignificant, the tariff pass-through increased by the magnitude of 40 percent on average in the period of administrative review, relative to that in the period prior to the review.

Softwood lumber contains two main species, pine and cedar. It is known that the market structure of pine is more competitive than that of cedar. This difference in market structure must influence the degree of the tariff pass-through. In theory, it is more difficult to pass the tariff fully to the export price as the market becomes more competitive. To test this theoretical prediction, Specification (B1) includes the two species separately in equation (1). The second row in Table 4 shows that the calculated tariff pass-through indeed differs by species, and that the pass-through of cedar increased substantially in the period of administrative review.

The results from Specifications (A1) and (B1) do not control for, and thus are susceptible to industry-wide supply shocks. We thus perform the DID approach presented in equation (2). In the preliminary analysis, we considered three control groups; hardwood lumber, softwood log, and softwood plywood. Export volumes for the three goods, along with softwood lumber, are shown in Figure 2. Export of softwood lumber grew at an annual rate of 10 percent in the Gap period. It is interesting to note that the export also increased substantially in the administrative review period. This was probably attributable to the effect of housing bubble in the Untied States. The growth in export of softwood log continued except for the period when the first AD and CVD were imposed. According to newspaper, multinational American manufacturers, including Westhauser, delivered softwood log to manufacture lumber in the Untied States in order to avoid high tariffs on softwood lumber. The export surge in softwood log may have reflected this incentive for multinational companies. Since hardwood lumber has characteristics similar to softwood lumber, but its usage is not considered as substitutable to the usage of softwood lumber, we take hardwood as a control

group to conduct the DID regression based on equation (2). The results shown in Specifications (C1) and (D1) in Table 2 and the corresponding pass-through are qualitatively the same to those discussed above.

Tariffs on softwood lumber, both specific tariff and ad valorem tariff of AD duties and CVD, are imposed on those manufactured in four provinces, Alberta, British Columbia, Ontario and Quebec. Since the Maritime Provinces were exempt from the tariffs, it is in theory possible that firms residing in the four provinces may have evaded the tariffs by diverting the lumber to the Maritime Provinces before shipping to destinations in the Untied States. This trade diversion has been pointed out in various contexts of trade policies, including AD, safeguards, and VER. In an effort to identify such trade diversion effect, and obtain clearer estimates of tariff pass-through, we focus on the data from British Columbia, and re-estimate equations (1) and (2). Since British Columbia is located far from Atlantic Canada, we believe that the data from the province is less contaminated by the effect of trade diversion. The estimates are shown in Table 3. Specifications (A2) – (D2) corresponds to those of (A1) – (D1). While the exchange-rate pass-through is estimated larger than that of Table 2, other estimates are found at similar levels. The estimates reported in the right block of Table 4 show that the tariff pass-through during the administrative review is found much larger than those obtained from Table 2. For example, the comparison from the results of Specifications (C1) and (C2) shows that the average pass-through during the administrative reviews is 60-percent higher when we focus on Western Canada. The implication for the market competitiveness also becomes clearer; based on the estimates of Specification (D2), the tariff pass-through of pine remained statistically constant throughout the study period, whereas the pass-through of cedar more than doubled.

5. Conclusion

The softwood lumber dispute between the United States and Canada has been one of the longest running trade disputes in history, producing extensive litigation in the United States, the NAFTA, and the WTO spanning questions of subsidization, dumping, and injury. For the moment at least, the dispute appears to have been settled by the entry into another round of U.S.- Canada Softwood Lumber Agreement, under which Canada has agreed to impose a tiered system of export taxes, quantitative controls and export licenses on its softwood lumber exports.

This paper assessed whether foreign firms' pricing behavior was altered by the institutional features surrounding the AD administration with an application to U.S.-Canada softwood lumber disputes in the period from 1997 to 2006. The paper used the panel data of U.S. disaggregated softwood lumber data with the coverage beyond the period of AD and CVD administrative reviews,

and performed the DID regressions. The unique features of the softwood lumber market helped us identify the role of market competitiveness in the tariff pass-through. By focusing on two distinctive species of softwood lumber, the paper found that the tariff pass-through is lower as the market becomes more competitive. This result was robust to the possibility of trade diversion effect.

Data Appendix:

The data used on the LHS of equations (1) and (2) were monthly value and quantity of Canadian exports to U.S. for selected lumber related products in the period from April 1997 to March 2005. *Canadian International Merchandize Trade* provides the eight-digit HTS codes with subheading numbers ranging from 44071010 to 44079990. The treatment group, which is subject to tariffs, is softwood lumber (HTS 44071010 － 44071090), while the control group is defined as hardwood lumber (HTS 44072400 － 44071090).

The timeline of events associated with AD and CVD along with their duties is obtained from *Federal Register*. Monthly exchange rates between Canada and U.S. are taken from *International Financial Statistics*. The variable of the number of housing units authorized by building permit is used as a proxy for U.S. softwood lumber demand. The data are from U.S. Census Bureau. Three variables were employed to capture marginal cost of exporting Canadian softwood lumber to the Untied States. Data on average monthly wage for all manufacturing are taken from Statistics Canada, and those on world crude oil prices are from the EIA. These two variables are associated with marginal cost of producing and delivering softwood lumber. The last cost variable is average prices of log, taken from the Ministry of Forests and Range in the Province of British Columbia. This variable reflects an opportunity cost of producing softwood lumber in Canada, instead of shipping logs and manufacturing lumber in the United States.

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FIGURE 1
Tarriff Rates and Export Prices:
Canadian Softwood Lumber, 1997-2006

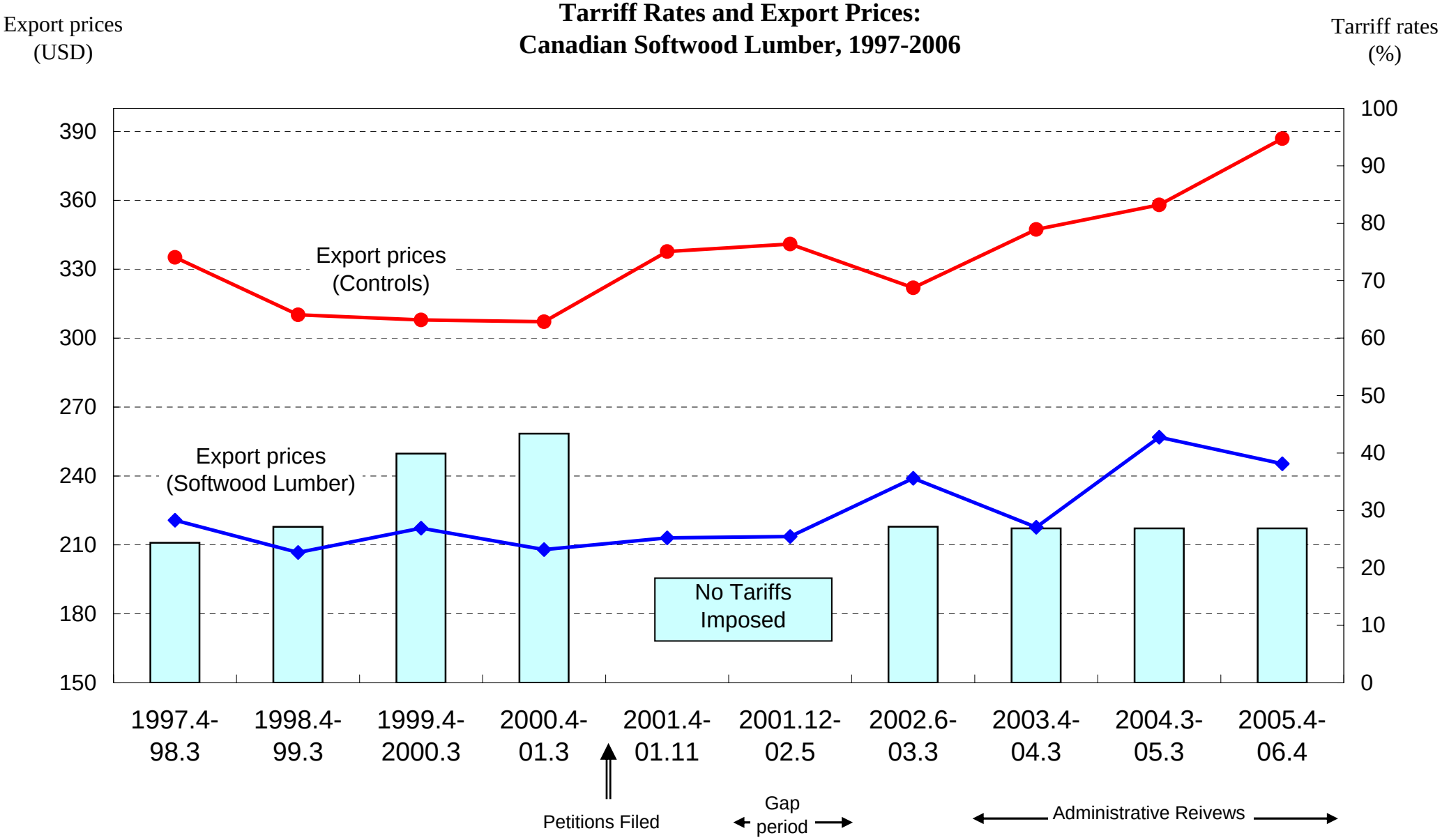

FIGURE 2
Export Volumes for
Alternative Control Groups

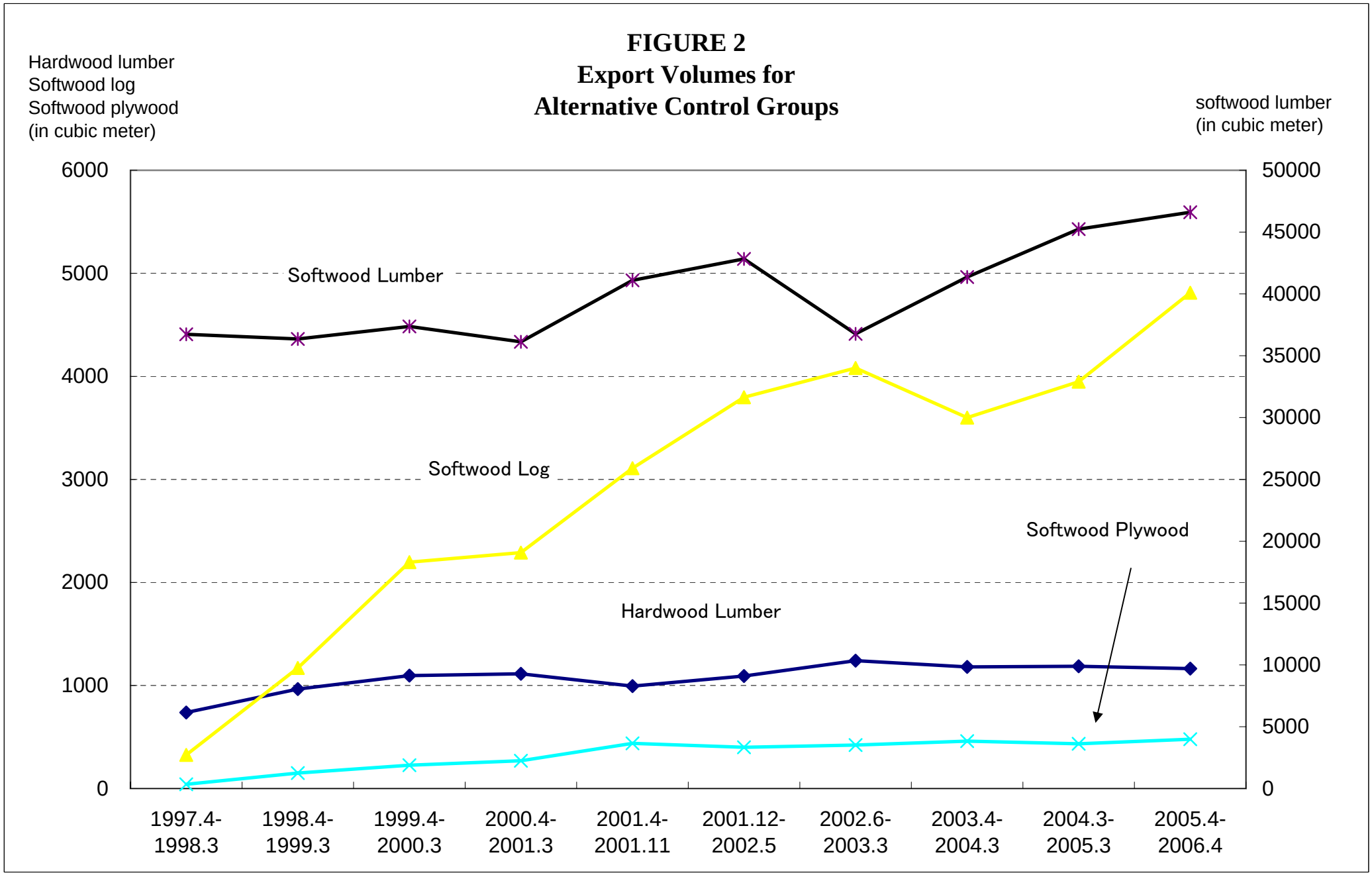

TABLE 1
Summary Statistics, All Canadian Provinces

Period	Prices of Log *	Housing Starts *	Wage *	Oil Prices *	Exchange Rates *
1997.4-98.3	4.672	11.975	2.966	3.091	0.338
1998.4-99.3	4.552	12.048	2.973	2.796	0.409
1999.4-2000.3	4.601	12.139	3.018	3.389	0.386
2000.4-01.3	4.626	12.125	3.053	3.661	0.408
2001.4-01.11	4.673	12.161	3.033	3.507	0.440
2001.12-02.5	4.655	12.174	3.135	3.424	0.459
2002.6-03.3	4.747	12.263	3.096	3.687	0.436
2003.4-04.3	4.487	12.174	3.106	3.579	0.301
2004.3-05.3	4.438	12.173	3.085	3.852	0.245
2005.4-06.4	4.362	12.414	3.124	4.115	0.177
Average	4.581	12.165	3.059	3.510	0.360

* expressed in logarithm

Export Prices:
Unit value in logarithm

Softwood Lumber Period	Mean	Std. Dev.	Num. of Obs.
1997.4-98.3	5.676	0.337	204
1998.4-99.3	5.664	0.362	204
1999.4-2000.3	5.716	0.304	204
2000.4-01.3	5.671	0.377	204
2001.4-01.11	5.671	0.440	136
2001.12-02.5	5.692	0.460	102
2002.6-03.3	5.756	0.507	170
2003.4-04.3	5.599	0.403	201
2004.3-05.3	5.722	0.372	204
2005.4-06.4	5.606	0.379	199
Average	5.677	0.394	183
Pine			
1997.4-98.3	5.642	0.351	132
1998.4-99.3	5.611	0.374	132
1999.4-2000.3	5.686	0.310	132
2000.4-01.3	5.612	0.337	132
2001.4-01.11	5.598	0.451	88
2001.12-02.5	5.616	0.457	66
2002.6-03.3	5.653	0.489	110
2003.4-04.3	5.477	0.310	129
2004.3-05.3	5.598	0.299	132
2005.4-06.4	5.469	0.306	127
Average	5.596	0.368	118
Cedar			
1997.4-98.3	5.736	0.301	72
1998.4-99.3	5.761	0.318	72
1999.4-2000.3	5.771	0.286	72
2000.4-01.3	5.777	0.422	72
2001.4-01.11	5.805	0.388	48
2001.12-02.5	5.830	0.438	36
2002.6-03.3	5.945	0.488	60
2003.4-04.3	5.817	0.457	72
2004.3-05.3	5.949	0.387	72
2005.4-06.4	5.847	0.376	72
Average	5.824	0.386	65
Hardwood Lumber			
1997.4-98.3	6.052	0.482	71
1998.4-99.3	6.040	0.494	72
1999.4-2000.3	6.033	0.436	72
2000.4-01.3	6.014	0.533	72
2001.4-01.11	6.164	0.495	48
2001.12-02.5	6.184	0.515	36
2002.6-03.3	6.103	0.507	59
2003.4-04.3	6.050	0.495	72
2004.3-05.3	6.046	0.432	72
2005.4-06.4	6.039	0.478	72
Average	6.073	0.487	65

TABLE 2
Estimation Results, All Canadian Provinces

	(A1) FE		(B1) FE By Product		(C1) DID		(D1) DID By Product	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
LN(Exchange Rate)	0.636 [a]	0.201	0.651 [a]	0.191	0.731 [a]	0.175	0.746 [a]	0.169
LN(Wage)	0.284 [c]	0.162	0.302 [c]	0.160	0.183	0.145	0.197	0.144
LN(Housing Start)	0.006	0.014	-0.012	0.015	0.002	0.013	-0.013	0.013
LN(Log Price)	0.105	0.077	0.106	0.076	0.095	0.066	0.094	0.065
LN(Oil Price)	0.013	0.047	0.021	0.046	0.029	0.039	0.035	0.038
D_Quarter2	-0.020	0.017	-0.012	0.017	-0.027 [c]	0.015	-0.021	0.015
D_Quarter3	0.011	0.019	0.018	0.018	-0.007	0.018	-0.001	0.017
D_Quarter4	-0.024 [c]	0.014	-0.022 [c]	0.014	-0.026 [b]	0.012	-0.025 [b]	0.012
D_SLA1	0.089 [b]	0.045	-	-	-0.001	0.051	0.001	0.050
D_SLA2	0.043	0.044	-	-	-0.047	0.055	-0.044	0.055
D_SLA3	0.090 [a]	0.034	-	-	-0.069 [c]	0.037	-0.068 [c]	0.037
D_SLA4	0.014	0.031	-	-	-0.120 [a]	0.045	-0.121 [a]	0.045
D_Investigation	-0.003	0.037	-	-	0.015	0.040	0.013	0.040
D_ADCVD1	0.064 [c]	0.036	-	-	-0.073 [c]	0.040	-0.073 [c]	0.040
D_ADCVD2	0.021	0.042	-	-	0.000	0.045	0.001	0.045
D_ADCVD3	0.171 [a]	0.053	-	-	0.037	0.052	0.038	0.051
D_ADCVD4	0.099	0.068	-	-	0.072	0.064	0.075	0.063
Treatment*D_SLA1	-	-	-	-	0.102 [a]	0.046	-	-
Treatment*D_SLA2	-	-	-	-	0.101 [b]	0.051	-	-
Treatment*D_SLA3	-	-	-	-	0.165 [a]	0.044	-	-
Treatment*D_SLA4	-	-	-	-	0.137 [a]	0.051	-	-
Treatment*D_Investigation	-	-	-	-	-0.013	0.051	-	-
Treatment*D_ADCVD1	-	-	-	-	0.139 [a]	0.050	-	-
Treatment*D_ADCVD2	-	-	-	-	0.037	0.046	-	-
Treatment*D_ADCVD3	-	-	-	-	0.153 [a]	0.047	-	-
Treatment*D_ADCVD4	-	-	-	-	0.050	0.049	-	-
D_Pine*D_SLA1	-	-	0.141 [a]	0.054	-	-	0.150 [a]	0.055
D_Pine*D_SLA2	-	-	0.076	0.054	-	-	0.128 [b]	0.060
D_Pine*D_SLA3	-	-	0.144 [a]	0.047	-	-	0.216 [a]	0.054
D_Pine*D_SLA4	-	-	0.032	0.044	-	-	0.156 [a]	0.059
D_Pine*D_Investigation	-	-	0.001	0.054	-	-	-0.007	0.063
D_Pine*D_ADCVD1	-	-	0.033	0.051	-	-	0.108 [c]	0.062
D_Pine*D_ADCVD2	-	-	-0.021	0.049	-	-	-0.006	0.054
D_Pine*D_ADCVD3	-	-	0.125 [b]	0.060	-	-	0.106 [c]	0.056
D_Pine*D_ADCVD4	-	-	0.037	0.071	-	-	-0.013	0.057
D_Cedar*D_SLA1	-	-	0.009	0.044	-	-	0.020	0.048
D_Cedar*D_SLA2	-	-	0.003	0.044	-	-	0.056	0.053
D_Cedar*D_SLA3	-	-	0.005	0.031	-	-	0.078 [c]	0.043
D_Cedar*D_SLA4	-	-	-0.022	0.029	-	-	0.103 [b]	0.052
D_Cedar*D_Investigation	-	-	-0.010	0.031	-	-	-0.018	0.050
D_Cedar*D_ADCVD1	-	-	0.110 [a]	0.034	-	-	0.186 [a]	0.050
D_Cedar*D_ADCVD2	-	-	0.096 [b]	0.044	-	-	0.113 [b]	0.048
D_Cedar*D_ADCVD3	-	-	0.261 [a]	0.051	-	-	0.243 [a]	0.048
D_Cedar*D_ADCVD4	-	-	0.197 [a]	0.066	-	-	0.147 [a]	0.049
CONSTANT	3.674 [a]	0.637	3.791 [a]	0.621	3.993 [a]	0.523	4.106 [a]	0.513
Adj R squared	0.68		0.69		0.77		0.78	
Obs	1828		1828		2474		2474	

Note
Product dummy variables at the level of HS are included in the estimation, but results are not shown in the table.
The subscripts a, b and c indicate significance at the respective 99-, 95- and 90-percent confidence levels.

TABLE 3
Estimation Results, Western Provinces

	(A2) FE		(B2) FE By Product		(C2) DID		(D2) DID By Product	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
LN(Exchange Rate)	0.665 [a]	0.237	0.681 [a]	0.234	0.886 [a]	0.212	0.898 [a]	0.211
LN(Wage)	0.033	0.144	0.053	0.144	0.046	0.122	0.061	0.123
LN(Housing Start)	0.017	0.015	0.008	0.015	0.008	0.013	0.000	0.013
LN(Log Price)	0.147 [c]	0.084	0.148 [c]	0.083	0.109	0.074	0.108	0.074
LN(Oil Price)	0.031	0.053	0.035	0.052	0.066	0.046	0.069	0.046
D_Quarter2	-0.029	0.019	-0.025	0.019	-0.023	0.017	-0.019	0.017
D_Quarter3	-0.002	0.021	0.002	0.021	-0.011	0.019	-0.008	0.019
D_Quarter4	-0.022	0.016	-0.022	0.016	-0.023 [c]	0.014	-0.023	0.014
D_SLA1	0.122 [a]	0.049	-	-	0.042	0.063	0.045	0.063
D_SLA2	0.065	0.048	-	-	-0.045	0.067	-0.040	0.067
D_SLA3	0.125 [a]	0.038	-	-	-0.046	0.049	-0.044	0.049
D_SLA4	0.048	0.036	-	-	-0.054	0.046	-0.054	0.046
D_Investigation	0.017	0.042	-	-	-0.012	0.048	-0.011	0.048
D_ADCVD1	0.084 [c]	0.043	-	-	-0.026	0.046	-0.025	0.046
D_ADCVD2	0.084 [c]	0.050	-	-	0.012	0.057	0.015	0.057
D_ADCVD3	0.237 [a]	0.064	-	-	0.010	0.066	0.012	0.066
D_ADCVD4	0.168 [b]	0.081	-	-	0.064	0.076	0.066	0.076
Treatment*D_SLA1	-	-	-	-	0.122 [b]	0.059	-	-
Treatment*D_SLA2	-	-	-	-	0.143 [b]	0.063	-	-
Treatment*D_SLA3	-	-	-	-	0.191 [a]	0.057	-	-
Treatment*D_SLA4	-	-	-	-	0.107 [b]	0.055	-	-
Treatment*D_Investigation	-	-	-	-	0.037	0.060	-	-
Treatment*D_ADCVD1	-	-	-	-	0.113 [c]	0.060	-	-
Treatment*D_ADCVD2	-	-	-	-	0.098 [c]	0.058	-	-
Treatment*D_ADCVD3	-	-	-	-	0.255 [a]	0.063	-	-
Treatment*D_ADCVD4	-	-	-	-	0.132 [b]	0.059	-	-
D_Pine*D_SLA1	-	-	0.162 [a]	0.058	-	-	0.160 [b]	0.066
D_Pine*D_SLA2	-	-	0.080	0.057	-	-	0.154 [b]	0.069
D_Pine*D_SLA3	-	-	0.167 [a]	0.050	-	-	0.231 [a]	0.065
D_Pine*D_SLA4	-	-	0.060	0.047	-	-	0.120 [c]	0.062
D_Pine*D_Investigation	-	-	0.013	0.057	-	-	0.032	0.071
D_Pine*D_ADCVD1	-	-	0.055	0.059	-	-	0.084	0.072
D_Pine*D_ADCVD2	-	-	0.055	0.057	-	-	0.065	0.064
D_Pine*D_ADCVD3	-	-	0.196 [a]	0.072	-	-	0.210 [a]	0.070
D_Pine*D_ADCVD4	-	-	0.144 [c]	0.087	-	-	0.106	0.066
D_Cedar*D_SLA1			0.058	0.057	-	-	0.054	0.068
D_Cedar*D_SLA2			0.051	0.056	-	-	0.121 [c]	0.071
D_Cedar*D_SLA3			0.057	0.048	-	-	0.117 [c]	0.065
D_Cedar*D_SLA4			0.023	0.047	-	-	0.082	0.063
D_Cedar*D_Investigation			0.027	0.052	-	-	0.044	0.069
D_Cedar*D_ADCVD1			0.132 [a]	0.051	-	-	0.161 [b]	0.066
D_Cedar*D_ADCVD2			0.140 [b]	0.062	-	-	0.152 [b]	0.070
D_Cedar*D_ADCVD3			0.317 [a]	0.070	-	-	0.333 [a]	0.073
D_Cedar*D_ADCVD4			0.207 [b]	0.087	-	-	0.173 [b]	0.068
CONSTANT	3.997 [a]	0.610	4.009 [a]	0.598	4.019 [a]	0.506	4.044 [a]	0.499
Adj R squared	0.59		0.60		0.69		0.70	
Obs	1825		1825		2468		2468	

Note
Product dummy variables at the level of HS are included in the estimation, but results are not shown in the table.
The subscripts a, b and c indicate significance at the respective 99-, 95- and 90-percent confidence levels.

TABLE 4
Average Estimates of Pass-Through
Analysis of Pricing Incentives in Administrative Reviews

			All Canadian Provinces (Based on Table 2)		Western Provinces in Canada (Based on Table 3)	
			Pre-Administrative Reviews April 1996 - March 2001	Administrative Reviews June 2002 - April 2006	Pre-Administrative Reviews April 1996 - March 2001	Administrative Reviews June 2002 - April 2006
FE		Est.	0.246	0.347	0.354	0.573
		Std Err.	(0.152)	(0.206)	(0.159)	(0.264)
FE	Pine	Est.	0.385	0.168	0.444	0.458
		Std Err.	(0.177)	(0.230)	(0.296)	(0.291)
	Cedar	Est.	0.001	0.671	0.215	0.820
		Std Err.	(0.166)	(0.219)	(0.223)	(0.316)
DID		Est.	0.351	0.274	0.390	0.442
		Std Err.	(0.128)	(0.147)	(0.149)	(0.195)
DID	Pine	Est.	0.586	0.189	0.577	0.458
		Std Err.	(0.188)	(0.228)	(0.205)	(0.292)
	Cedar	Est.	0.254	0.695	0.396	0.845
		Std Err.	(0.200)	(0.217)	(0.270)	(0.324)