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OF

THE 1996 U.S.-CANADA SOFTWOOD LUMBER TRADE AGREEMENT

by

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Abstract

This paper investigates welfare impacts of the 1996 U.S.-Canada Softwood Lumber Trade Agreement (SLA), which set up a tariff regulated quota system to restrict softwood lumber export from Canada to the U.S. An aggregate price model was used to estimate the price impact of the SLA, and the implied quantity and welfare effects were examined. The results show that, while the anticipated change in lumber price is modest at about $53 in 1997 U.S. dollars or 14 percent on average for the first four years under the SLA, the gains to U.S. producers of softwood lumber are large and the losses to U.S. consumers are much larger. In addition, Canadian producers have benefited from the SLA, and the Canadian government has collected a small amount of additional tax revenue. As the overall efficiency costs of the SLA are relatively small, the SLA can be seen as an effective means of welfare transfer from U.S. consumers to the U.S. and Canadian producers. These results should provide information for ongoing trade policy debate.

I. Introduction

Over the last 20 years, U.S.-Canada trade in forest products has received a great deal of attention in the media, from politicians on both sides of the border, and in the discussions of international organizations such as GATT and the WTO. A dispute over softwood lumber imported from Canada to the U.S., a $7 billion business in 1999, has been the most controversial. Apparently this dispute is the largest forest products trade dispute in the world (Cashore 1998) and the largest and longest lasting trade dispute between these two countries. People involved in the dispute have described it as a "softwood lumber war," and in recent years the two countries have experienced four rounds of accusation, threats, investigation, negotiation, and settlement. The latest government-to-government consultation between the U.S. and Canada has resulted in a Softwood Lumber Trade Agreement (SLA) which set up a tariff-regulated quota system to restrict softwood lumber from Canada to the U.S. The SLA covers 5 years, from April 1, 1996, to March 31, 2001.

The SLA has been agreed to and welcomed by the Coalition for Fair Lumber Imports, a group representing some U.S. softwood lumber producers that has lobbied for restricting Canadian softwood lumber imports in the last two decades and some Canadian producers supporting its position. On the other hand, consumer groups in the U.S., led by the National Association of Home Builders and the National Lumber and Building Material Dealers Association, are firmly against the SLA. They allege that the SLA has led to high lumber prices which in turn hurt U.S. homebuilders and homebuyers (Wood Technology 2000). The parties in the debate tend to be polarized, and their arguments are uncompromising. With the SLA being scheduled to expire soon, policy makers are discussing whether both countries should renew the SLA or try to find a long-term solution to this trade dispute. Naturally, the welfare impacts of the

SLA—who gains, who loses, and how much is lost—has become the primary focus in the trade policy debate.

The purpose of this paper is to assess the economic consequences of the SLA. Specifically, we estimate the impacts of the SLA on price, imports of Canadian lumber, U.S. production of softwood lumber, and the consequent effects on producer profits and U.S. consumer costs. The results of this paper could be used for informed debate over U.S.-Canada softwood lumber and other trade policy. This paper begins with a summary of the SLA, followed by literature review and research methodology. The remaining sections present a price impact model and data, empirical findings, and conclusions and discussion.

II. The Structure of the SLA

The SLA defines Canada's tax-free export limit, tax level, fee collection, and trigger price mechanism. The main points of this complicated agreement are the following:

A. Untaxed Export Limit and Tax Level. Annual tax-free exports from British Columbia, Quebec, Ontario, and Alberta, which collectively account for more than 95% of Canadian softwood exports to the U.S., will be limited to 14.7 billion board feet (bbf).[1] The next 650 million board feet (mmbf) exports will initially be subject to a U.S. $50 per thousand board feet (mbf) export tax. Additionally covered exports will be subject to a $100/mbf tax. Thus, softwood lumber exports from these four provinces to the U.S. have been under a "tax-regulated quota system." The tax level is adjusted annually for the difference in inflation

[1] For convenience, we refer to lumber producers in these provinces as "Canadian producers" and producers from other Canadian territories and other countries such as Chile, Brazil, and New Zealand as "other producers." Other producers contribute less than 1 percent to the total U.S. softwood consumption. Therefore, they are treated as part of domestic producers in the price model. The welfare impacts for these producers are estimated separately.

rate between the two countries.

B. Fee Collection. A tax-free quota is allocated to individual Canadian exporters by the Canadian government. "Quarterly band fees" will be collected when an exporter exceeds 28.75% of its annual tax-free quota. The tax can be refunded if the total exports from the four provinces are less than 28.75% of the annual tax-free quota (4.226 bbf). Similarly, the tax can be refunded if the total annual export is less than the tax-free export quota.

C. Trigger Price Mechanism. The trigger price is defined as the average for a complete calendar quarter of the price reported by Random Lengths Inc. for Eastern, Spruce-Pine-Fir, Kiln Dried, 2×4, Std & Btr (Standard and Better), delivered to the Great Lakes. If the trigger price meets or exceeds US$405/mbf in any quarter during the first two years, or $410/mbf thereafter, 92 mmbf of additional tax-free exports will be allocated in the subsequent quarters within one year of issuance. This arrangement makes increasing the tax-free export limit possible.

The agreement also covers custom procedures, reporting, monitoring, and dispute settlement systems, and is set for five years. The structure of this agreement makes individual firms report their export volumes each month and quarter to the Canadian government, but the quotas are set annually. Therefore, a firm paying a $50 or $100 fee for export volume exceeding its tax-free export limits in a particular quarter or year does not mean that Canadian exporters as whole are paying for that fee for that quarter or year. Consequently, the effectiveness and actual market impact of the SLA will rely on whether Canada as a whole exceeds its tax-free quota and on the amount by which it is exceeded in a particular year.

III. Literature Review and Methodology

In addition to "truckloads" of studies, briefings, and other materials financed or produced

by forest industry and governments in both countries and the U.S. softwood lumber consumer groups, many scholars have independently studied the softwood lumber trade issues (e.g., Irland 1986; Anderson and Cairns 1988; Fox 1991). Previous economic studies have been focused on stumpage difference between the two countries (e.g., Haley 1980; Uhler 1991), the impact of hypothetical trade restriction measures (Adams and Haynes 1980; Boyd and Krutilla 1987), the economic impact of an earlier agreement (the 1986 Memorandum of Understanding or MOU) between the two countries (Kalt 1988; Wear and Lee 1993), or ex ante estimations on the impact of the SLA and other supply constraints (e.g., Smyth 1997). In this study, we use a structural model to estimate the ex post economic impacts of the SLA.

This study first uses an aggregate price impact model based on U.S. demand, U.S. supply, and Canadian exporting supply. With our price impact estimate and estimates of structural market parameters (supply and demand elasticities) from previous studies, we then test for a discernible, though highly aggregate, change in price and quantity with the SLA. This will allow us to estimate changes in standard welfare measures.

Following Kalt (1988) and Wear and Lee (1993), we treat softwood lumber as a homogenous commodity and model the U.S. lumber markets in aggregate. This aggregate view will be instructive for looking at the overall impacts of the SLA. The model will not address the spatial structure of regional submarkets, transportation costs, and spatial distribution of consumption. Consumers are assumed to be indifferent to lumber sources, and demand and supply can be seen as a function of a single representative price, an assumption proven to be reasonable by Uri and Boyd (1990) and Murray and Wear (1998). This view of market structure has been used to examine U.S.-Canada trade in potash (Picketts et al. 1991) and poultry (Moschini and Meilke 1991).

Figure 1 shows the U.S. softwood lumber markets and illustrates our approach to estimating the market and welfare impacts of the SLA. The demand function is shown as D, shifting in response to demand factors such as housing starts, income, and the prices of substitutes. There is a two-part lumber supply with total supply (Q_0S_t) equal to the sum of Canadian supply (P_0S_c) and domestic supply (including supply from other Canadian territories and countries, Q_0S_o).[2]

Under the SLA, an export tax of $50/mbf is placed when the total export from Canada exceeds a certain quota (Q_1) until the additional 650 mmbf annual limit (ΔQ_1) is reached. Any additional export beyond ($Q_2 = Q_1 + \Delta Q_1$) is subject to a tax of $100/mbf.[3] Thus, the Canadian supply curve is changed from P_0S_c to P_0abcde. The total supply curve is changed from Q_0S_t to Q_0fghij.

The effectiveness of this "tax regulated quota system" will depend on the supply and demand factors. For example, if the demand curve is below point f and the total supply curve is Q_0fghij, then Canadian exports will be less than Q_1, and price will be less than P_1. Consequently, the SLA will have no welfare effect on consumers and producers in both countries. The Canadian supply curve shifts to the left (up) or the U.S. supply curve shifts to the right (down) could lead to the same result, as does a combination of these changes in supply and demand.

When the demand and supply curves cross above point f, the tariff-regulated quota system becomes effective. There are four possible scenarios where the demand curve crosses the supply

[2] Note that we assume $P_0>0$ in Figure 1. Thus, the U.S. supply curve (and the total supply curve) crossing with the horizontal axis mean that the U.S. producers will produce Q_0 amount of lumber at price=P_0, not at price=0.

[3] As Q_1 and ΔQ_1 change every year, they are adjusted accordingly in this study.

curve (Q_0fghij) above point f—between points f and g, between g and h, between h and i, and between i and j. Consequently, the market price will be between P_1 and P_1+50, P_1+50 and P_2, P_2 and P_2+50, and greater than P_2+50 (Figure 1). Which scenario becomes a reality in any particular year depends on the change in U.S. supply, Canadian exporting supply, and U.S. demand in that year.

Table 1 shows the tax-free quota for and the actual exports of Canadian producers in the first four years under the SLA. It indicates that Canadian producers as a whole paid a $50/mbf fee for export volume exceeding Q_1 in three years (1997-1998, 1998-1999, and 1999-2000) and that their total exporting quantity was just about equal to or slightly greater than Q_2. In the other year (1996-1997) they paid a $100 fee for export volume exceeding Q_2. In Figure 1, we only consider the scenario when they paid a $50 fee and when they collectively exported just about Q_2 amount of lumber. In this scenario, Canadian producers as a whole are paying a $50/mbf fee for the amount of export volume between Q_1 and Q_2.

When the Canadian exports equal Q_2, the demand curve crosses the total supply curve between points h and i. If the market equilibrium price is P_3 and the equilibrium quantity is Q_7, the U.S. supply equals Q_5 ($Q_7 = Q_2 + Q_5$). Had the SLA not been put in place, the total supply (and total demand) would have been at Q_8, and the market price would have been at P_4, which is not observable from the market. The Canadian export would have been at Q_4 and the U.S. supply at Q_6 ($Q_4 + Q_6 = Q_8$). Thus the change in Canadian supply (ΔS_c) will be ($Q_4 - Q_2$), and the change in U.S. supply (ΔS_o) is ($Q_6 - Q_5$). The change in total supply (ΔS_t) will be ($Q_8 - Q_7$), which equals $[(Q_4 - Q_2) - (Q_6 - Q_5)]$.

If we know the demand elasticity and supply elasticities for both the U.S. and Canada exporting supply functions, and the softwood lumber price under the no-SLA scenario (P_4), the

market and welfare impacts can be calculated. The change in lumber price with and without the SLA is

$$\Delta P = P_3 - P_4 \quad (1)$$

The change in total U.S. quantity demanded (ΔQ) is

$$\Delta Q = \eta * Q_7 * \Delta P / P_3 \quad (2)$$

where η is the own-price elasticity of lumber demand.

Similarly, the change in the U.S. supply (ΔS_o) and the total Canadian exporting supply without the SLA (Q_6) are

$$\Delta S_o = \delta_o * Q_5 * \Delta P / P_3 \quad (3)$$

and

$$Q_4 = Q_8 - Q_6 \quad (4)$$

where δ_o is the U.S. supply elasticity. Notice that $Q_8 = Q_7 + \Delta Q$ and $Q_6 = Q_5 - \Delta S_o$.

Furthermore, the price when Canadian exporting supply equals Q_1 can be calculated as

$$P_1 = P_4 - (Q_4 - Q_1) * P_4 / \delta_c * Q_4 \quad (5)$$

where δ_c is the price elasticity of Canadian exporting supply. And finally,

$$P_2 = P_4 - (Q_4 - Q_2) * P_4 / \delta_c * Q_4 + 50 \quad (6)$$

Consumer surplus, the area under the demand curve and above the price line, defines consumer benefits. Change in consumer surplus is defined by the total quantity and price changes shown in Figure 1:

$$\Delta CS = \Delta P * (Q_7 + Q_8)/2 \quad (7)$$

Producer surplus, the area above the supply curve and under the price line, defines producer profits. Change in domestic producer surplus also follows directly from Figure 1:

$$\Delta PS_0 = \Delta P^*(Q_5+Q_6)/2 \quad (8)$$

The change in producer surplus for Canadian firms under the SLA is based on treating the shifted Canadian exporting supply curve as an effective supply. Accordingly, change in producer surplus is defined as

$$\Delta PS_c = (P_4-P_1)^*(Q_1+Q_4)/2 - 50^*Q_1 - (P_2-P_1-50) * (Q_1+Q_3) - (P_3-P_2) * Q_2 \quad (9)$$

The first component of equation (9) is the portion of the consumer surplus where price is above P_1 under the no-SLA condition. The last three components of equation (9) are the portion of the consumer surplus where price is above P_1 under the SLA.

Sources for elasticities used in this study are Adams and Haynes (1996), Spelter (1992), and Adams et al. (1986). Adams and Haynes (1996) and Spelter (1992) estimated η= -0.174. Support for the demand elasticity estimate can be found in Mckillop et al. (1980) and Spelter (1985) who estimated demand elasticities of -0.173 and of -0.11 to -0.28, respectively. Adams et al. (1986) estimated δ = 0.239, 0.460, and 0.510 for Pacific, Interior, and South supply regions of the U.S., respectively (each provides roughly one-third of U.S. production) (Wear and Lee 1993). These supply elasticities are generally consistent with previous analyses (e.g., Robinson 1974, Adams and Haynes 1980), but are lower than those (δ = 0.572, 0.574, and 0.950) reported in Adams and Haynes (1996). Adams et al. (1986) also estimated the elasticity of Canadian exporting supply δ_c =0.917, which is close to the estimate of 0.89 by Boyd and Krutilla (1987) but higher than the estimate of 0.625 by Adams and Haynes (1996). For this study, we first calculated the market and welfare impacts using the equations defined above, η = -0.17, δ_o = 0.40, and δ_c = 0.90. We then conduct a sensitivity analysis by changing the elasticity values to δ_o = 0.60 and δ_c = 0.70.

IV. Price Impact Model and Data

Notice that P_3, Q_5, Q_7, Q_1, and Q_2 are observable from the market. However, the above welfare impact equations can only be solved when the price under the no-SLA scenario (P_4 in Figure 1) is provided. In this study, we used a highly aggregated, reduced-form econometric model of the U.S. softwood lumber market to estimate this value. Our price impact model is derived from the supply and demand relation in the U.S. softwood lumber market:

$$L_{demand} = f(P, \text{demand factors}) \quad (10)$$

$$L_{supply} = f(P, \text{supply factors, policy dummy variables}) \quad (11)$$

where P is the price of softwood lumber in the U.S. market, represented by the trigger price defined in the SLA.[4] The demand factors include housing starts, gross domestic products (GDP), the prices of substitutes, and seasonality. The supply factors include U.S. softwood lumber production capacity, log prices (cost of raw material), wage rates, interest rates (cost of capital), and exchange rates (as a Canadian exporting supply shifter). The policy dummy variables cover the period of 1987-1991 under the MOU and the period under the SLA.

Because the price (P) and quantity are simultaneously determined through the interaction of the supply and demand equations, we use a reduced form equation for our econometric estimation (see, for example, Freeman 1983, p. 31). Because the quantity supplied equals the quantity demanded, we set these two equations equal:

$$L_{supply}(P, \text{supply factors, policy dummy variables}) = L_{demand}(P, \text{demand factors}) \quad (12)$$

Then solve for the price of softwood lumber

$$P = f(\text{demand factors, supply factors, policy dummy variables}) \quad (13)$$

[4] This price is highly correlated with Random Lengths' framing lumber price index (correlation coefficient=0.98) and the softwood lumber price index by U.S. Bureau of Labor Statistics (correlation coefficient = 0.93).

However, several variables are highly correlated with other variables and are dropped from the final model to avoid multicollinearity.[5] All variables included in the model are not correlated to each other (with $r < \pm 0.52$). In addition, several insignificant variables are dropped from the final model as well.[6] The final model that we estimated is:[7]

$$P = f [P(-1), HS, CAPA, WAGE, EXCH, D_{mou}, D_1, D_2, D_3, D_{97}, D_{9800}] \quad (14)$$

where

P is the real lumber price in 1997 dollars ($/mbf/consumer price index) (data from Random Lengths, Inc.);

P(-1) is the lagged price;[8]

HS is U.S. housing starts in 1,000 units, not seasonally adjusted (data from U.S. Census Bureau);

CAPA is the U.S. softwood lumber production capacity in bbf (Adams. 2000. Pers. Comm.);[9]

[5] These variables include U.S. GDP, industrial production, a trend variable, and the price index of plywood. They are highly correlated with three other variables used in the model (CAPA, WAGE, and EXCH).

[6] These variables include price indexes of concrete and steel, U.S. South log price, and U.S. softwood lumber export.

[7] This model is similar to ones used by Kalt (1988) and Wear and Lee (1993) and its assumptions are reasonable (Uri and Boyd 1990; Murray and Wear 1998). This model is relatively simple, requires less data, and serves the purpose of this study well.

[8] The hypothesis of no serial correlation cannot be rejected at the 5 percent level when this lagged price variable is removed from the model.

[9] Data obtained from Adams (2000) for U.S. softwood lumber production capacity only covers the period from 1955 to 1995. Therefore, the capacity data for 1996-2000 was estimated based on the following regression results.

CAPA=22624.07+137.88 *Trend +0.3672 *Production

WAGE is real hourly earnings of total production labor employed in U.S. sawmill industry (SIC 242) in 1997 dollars ($/producer price index) (U.S. Bureau of Labor Statistics);

EXCH is the real U.S.-Canada exchange rate (Canadian $/U.S $) (Data from Bank of Canada), which is equal to nominal exchange rate adjusted for difference in the Consumer Price Index between the two countries;

D_{mou} is a policy dummy variable, taking the value of one when the quarter is between the fourth quarter of 1986 and the third quarter of 1991 (when the MOU was in force), and zero otherwise;

D_1 - D_3 are three seasonal dummy variables, taking the value of one when the quarter is the first, second, or third quarter, respectively, and zero otherwise;

D_{97} - D_{00} are policy dummy variables, taking the value of one for the first four years (1996-1997, 1997-1998, 1998-1999, 1999-2000, respectively) under the SLA, and zero otherwise.

The demand variable for housing starts is expected to have a positive sign. The capacity variable—an increase of which shifts the supply curve downward—is expected to be negative. As an increase in the WAGE variable reduces U.S. supply, its coefficient is expected to be positive. As demonstrated by Adams et al. (1986), the variable for the exchange rate is expected to be negative. The result of Wear and Lee (1993) is sufficient to justify a positive sign on D_{mou}, and the signs for the four dummy variables measuring the price impact under the SLA are

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where CAPA is capacity in mmbf, Trend is a trend variable (1955=1), and Production is the total actual softwood lumber production in mmbf. The R^2-adjusted for the regression is 0.6611, and the t-ratio for the intercept, trend and production variables are 8.111, 4.497, and 3.540, respectively.

expected to be positive.

V. Price and Welfare Impact of the SLA

Ordinary least squares (OLS) regression was applied to equation (14) with a data series from the first quarter of 1976 to the first quarter of 2000. A linear functional form was used,[10] and the results are shown in Table 2. In general, the model fits well. The adjusted R^2 is quite high. The Durbin-h statistic indicates that the hypothesis of no serial correlation cannot be rejected at the 5 percent level.[11] More importantly, all variables have expected signs. Nine of the fourteen variables are significant at the 5 percent level or better. The results show that lumber price in the previous quarter, housing starts, production capacity, hourly earnings, exchange rate, seasonality, and the SLA are significant determinants of quarterly lumber price.

The results show that, after controlling for other supply and demand factors, the lumber price increased by $91.55, $26.58, $31.46, and $61.77 in the first four years, respectively, and $52.84 on average (all in 1997 dollars) under the SLA. In other words, the SLA made the softwood lumber price increase by 22.96, 6.85, 9.04, and 17.04 percent annually for the first four years, respectively, or 13.97 percent on average.

To estimate the market and welfare impacts of the SLA, we applied equations (2)-(9) to actual production, consumption, and price data for the first four years under the SLA. In this way, we simulated what the market results would have been had the SLA not been in place. We present the price and other market impacts in Table 3 and welfare impacts in Table 4.

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[10] We have also run three other commonly used functional forms (linear, semi-log, and inverse semi-log). The results are all similar to those reported in this paper.

[11] However, the Breusch-Pagan test shows that the hypothesis of no heteroskedasticity cannot be accepted at the 5% level. Therefore, we used the White's (1978) correction procedure to correct for the heteroskedasticity.

Results in Table 3 show that Canadian lumber exports to the U.S. fell 11.3 bbf in the first four years from the otherwise open market solution, U.S. production increased by 6.5 bbf, and imports from other producers increased by 525.0 mmbf. The consequent change in U.S. consumption shows a 4.3 bbf reduction. Nearly 40 percent of this reduction took place in the first year under the SLA.

Detailed welfare impacts of the SLA (Table 4) show that U.S. lumber producers receive the gains anticipated from such policy—profit increases by $6.9 billion (in 1997 dollars) for the first four years. The costs to U.S. consumer, however, are much larger, with $11.1 billion. Net loss to the U.S. is therefore $4.2 billion. Canadian producers lost some as their export volume was curtailed under the SLA but gained even more because the lumber price rose. The net results are nearly $2.8 billion profits for Canadian producers and $155 million in export tax revenue gains for the Canadian government. Thus, the net gains to Canada are $2.9 billion. Other suppliers to the U.S. market gain $560 million. The overall impact of the SLA for the first 4 years was a net loss of $758 million. About half of these welfare impacts took place in the first year of the SLA. Sensitivity tests show that quantity shifts between the U.S. and Canada are sensitive over the elasticities tested but that the welfare impacts for either U.S. or Canada, or both countries are not sensitive.

Comparing to the results of Wear and Lee (1993), our results indicate that the SLA has had a bigger impact than the 1986 MOU. The price impact of the SLA is higher than that of the MOU (Table 2). Our welfare estimates for the first four years under SLA are higher in U.S. consumer surplus, producer surplus, and total impact for the U.S. than those of Wear and Lee (1993). On the other hand, Canadian producers gained under the SLA and lost slightly under the MOU. The difference in Canadian producer welfare is that these producers have to pay (in the

form of high stumpage fee) for all lumber exported to the U.S. under the MOU, while they only pay for export volume exceeding their tax-free quota under the SLA.

VI. Conclusions and Discussion

The primary contribution of this paper is on the economic consequences and of the SLA. By clearly defining the supply and demand relationships of softwood lumber and using price estimates of a reduced impact model and market parameters from previous studies, this study isolates the market and welfare impact of the SLA. While the price impact is about $52.84 on average in the first four years, the overall welfare impact of the SLA is modest. However, the welfare impacts for U.S. producers, and to a less extent, Canadian producers, are large. The welfare impacts for U.S. consumers are even larger. Thus, the SLA can be seen as an effective measure of welfare transfer from U.S. consumers to U.S. producers and Canadian producers.

The results of this paper reflect effective rent-seeking by U.S. lumber producers and Canadian producers. The SLA has succeeded in restricting Canadian softwood exports to the U.S. and has boosted U.S. production. This, coupled with the consequent change in lumber price, led to considerable improvement in the competitive position of U.S. lumber producers in the home market and provided an important source of relief for U.S. producers as domestic environmental pressure caused softwood lumber inventory to contract. The U.S. production has increased 16 % between 1995 and 1999 while the exporting supply from the Canadian four provinces remained constant. On the other hand, the U.S. consumers have suffered because they did not buy as much lumber as they could have under a lower price condition.

The benefits for Canadian producers and the Canadian government may be somewhat dissipated due to the fact that they have to go through all kinds of quota allocation, reporting, and monitoring processes. Furthermore, some Canadian producers are unhappy with the quota they

received under the SLA, and others are eager to export more to the ever-expanding U.S. softwood lumber market under free-trade condition. Finally, there are strong sentiments in Canada against allegations (such as Canadian lumber producers are subsidized due to low stumpage and log export restrictions) that might have infringed on the country's resource sovereignty. Nevertheless, the results of this study raise the possibility of U.S. producers and some Canadian producers working together to effectively seek wealth transfer from U.S. consumers to them. Since British Columbia accounts for about half of all Canadian softwood lumber exports to the U.S., it is not surprising that the SLA was proposed by the provincial government of British Columbia in consultation with the lumber producers in the province. Any efforts undertaken by U.S. lumber manufacturers, through their government, to secure this trade regulation would also be rational from the standpoint of political economy. Nevertheless, the benefits obtained by these groups came at the greater expenses to U.S. consumers.

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Table 1. Tax-free quota and actual Canadian softwood lumber exports to the U.S.[*]

Year	Base quota	Bonus	Total tax – free export	Export under lower fee[‡]		Export under higher fee[‡]	
				Reported by the Canadian customs	Reported by the U.S. customs	Reported by the Canadian customs	Reported by the U.S. customs
96-97	14,700	276	14,976	650	n.a.	271	n.a.
97-98	14,700	368	14,976	580	650	0	142
98-99	14,700	0	14,700	723[†]	793	0	70
99-00	14,700	368	15,068	611	650	0	20

Source of Data: Canadian Forest Service. Various issues. Canada-United States Softwood Lumber Agreement Quarterly Statistical Monitor (Tables 2 and 3 in various issues).

Note:

[*] All in million board feet (mmbf)

[†] Seventy-three of the 723 mmbf are accounted as low fee export for the previous year.

[‡] The difference between the numbers reported by the U.S. and Canadian Customs may be due to conversion factors and product classification (e.g., softwood lumber and remanufactured softwood lumber which is not part of the SLA). Nevertheless, the difference is small, and it is clear that Canadian export is just about or slightly above Q_2 in the second, third, and fourth years of the SLA.

Table 2. Results of OLS regression of price as a function of supply, demand, and policy variables

Variables	Coefficient	t-ratio
Lagged real lumber price in 1997 dollars	0.517	6.380**
Capacity (bbf)	-9.994	-2.148**
Real hourly wage of production labor in 1997 dollars	45.800	2.804**
Housing starts (1,000 units)	0.218	2.511**
Real exchange rate (Canadian $/U.S.$)	-151.232	-3.068**
D_{mou} (Policy dummy variable: measuring the effect of the MOU)	22.667	1.321*
D_1 (Dummy variable: measuring seasonality, first quarter)	39.636	3.824**
D_2 (Dummy variable: measuring seasonality, second quarter)	-11.679	-0.915
D_3 (Dummy variable: measuring seasonality, third quarter)	3.742	0.361
D_{97} (Policy dummy variable: measuring the effect of the SLA in 1996-97)	91.553	6.538**
D_{98} (Policy dummy variable: measuring the effect of the SLA in 1997-98)	26.578	1.415*
D_{98} (Policy dummy variable: measuring the effect of the SLA in 1997-98)	31.457	3.016**
D_{98} (Policy dummy variable: measuring the effect of the SLA in 1997-98)	61.765	3.401**
Intercept	214.851	0.941
R^2	0.850	
R^2-adjusted	0.826	
Durbin-h statistic	-0.034	
Breusch-Pagan test for heteroskedasticity (df=11)	30.730	

* significant at the 20 percent level.

** significant at the 5 percent level.

Table 3. Estimated market impacts for the first 4 years under SLA (η=0.17, δ=0.40, δ_c=0.90)*

Year	Price (in1997 $/mbf)	U.S. consumption (mmbf)	Canadian exporting supply (mmbf)	Other supply† (mmbf)	U.S. production (mmbf)
96-97	+91.55 (+22.96)	-1,585.3 (-3.2)	-4,127.8 (-20.6)	+127.7 (+7.5)	+2,414.8 (+7.5)
97-98	+26.58 (+6.85)	-559.6 (-1.1)	-1,477.3 (-7.6)	64.3 (+2.6)	+853.4 (+2.6)
98-99	+31.46 (+9.04)	-740.0 (-1.4)	-1,969.6 (-11.3)	100.9 (+3.3)	+1128.7 (+3.3)
99-00	+61.77 (+17.04)	-1371.7 (-2.5)	-3686.4 (-19.0)	217.3 (+5.8)	+2097.3 (+5.8)
Average/Total	+52.84 (+13.97)	-4,256.6 (-2.0)	-11,261.1 (-15.3)	525.0 (+4.8)	+6,494.2 (+4.8)

Note:

* Numbers in parenthesis are percentages.

† Other supply includes exports from Canadian territories that are not covered by the SLA and from other countries.

Table 4. Estimated welfare impacts for the first 4 years under SLA[a]

Year	U.S. producer surplus	U.S. consumer surplus	Total U.S. impact	Canadian producer surplus	Canadian export tax	Total Canadian impact	Other producer surplus[b]	Net impact
96-97	+2,848.8	-4,643.8	-1,795.0	+1,196.1	+59.6	+1,255.7	+150.7	-388.6
97-98	+872.7	-1,371.5	-498.8	+356.4	+29.0	+385.4	+65.7	-47.8
98-99	+1,052.8	-1,663.2	-610.3	+413.9	+36.4	+450.1	+94.1	-66.1
99-00	+2,160.2	-3,466.3	-1,306.2	+796.3	+30.6	+826.9	+223.8	-255.4
Total	+6,909.2	-11,144.9	-4,235.7	+2,762.7	+155.3	+2,918.0	+559.8	-757.9

Note:

[a] All in millions of 1997 U.S. dollars.

[b] Other producer surplus is the gain of Canadian exporters in provinces that are not covered by the SLA and of exporters from other countries that supply softwood lumber in the U.S. market.

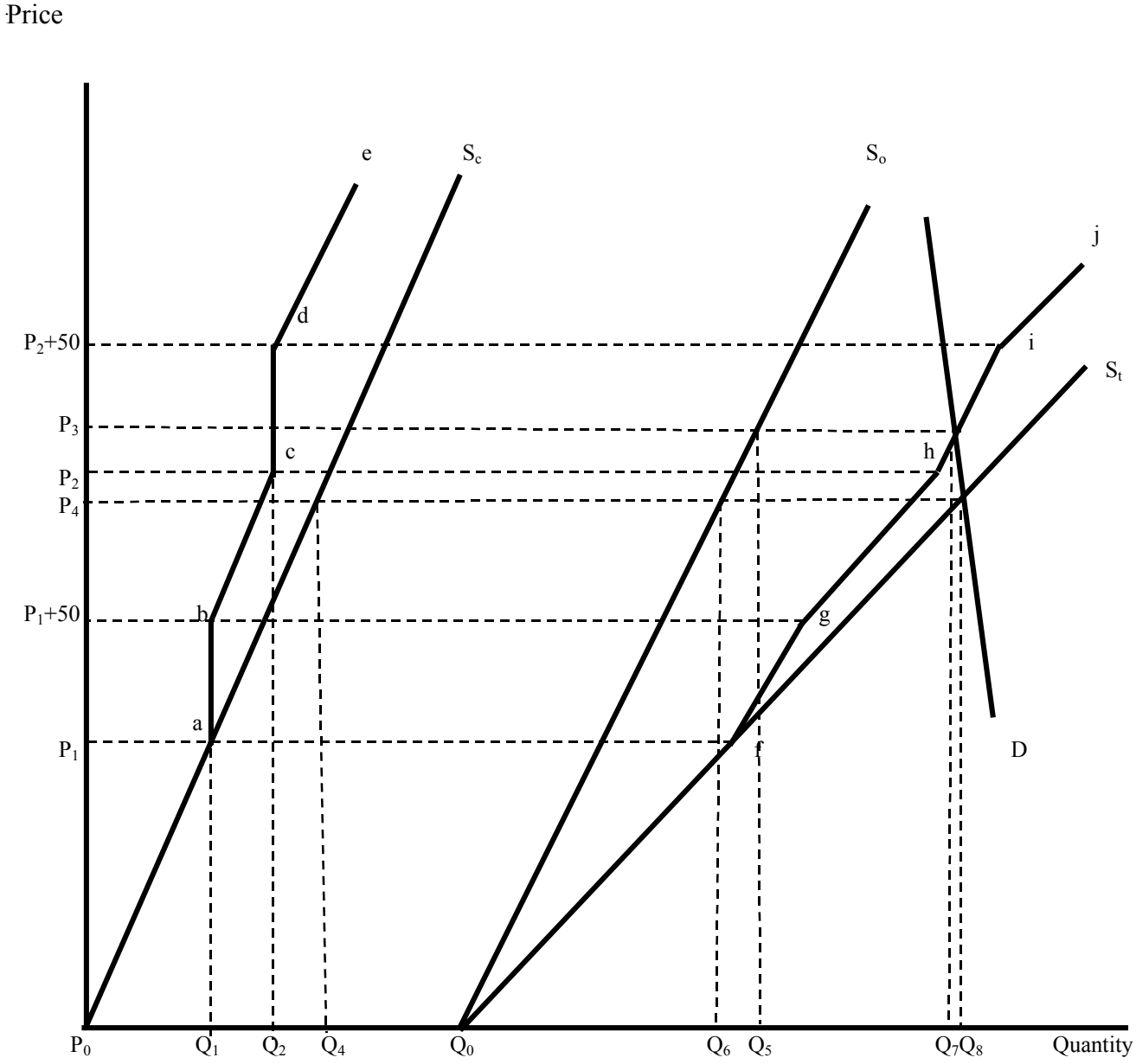

Figure 1. Structure of the U.S. softwood lumber market