The impacts of NAFTA on U.S. and Canadian forest product exports to Mexico

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Abstract* The North American Free Trade Agreement (NAFTA) will lower barriers to trade and investment across the continent. This paper presents predictions of the effects of NAFTA on Mexico's imports of intermediate wood products, scrap and waste paper, pulp, and newsprint from the United States and Canada. Predictions were made with a partial equilibrium model. Model development involved estimating (*i*) elasticities of Mexico's import demand with respect to price and demand shifters and (ii) elasticities of prices with respect to their determinants, and then predicting, with these elasticities, the impacts of NAFTA on imports and prices. The effects of NAFTA on the exogenous variables affecting import demand and prices were summarized for three scenarios, based on the predictions of broader studies of the agreement. The results suggest that the full long-term impact of the NAFTA would be to increase the value of all Mexican imports from the United States and Canada by 21 to 85%. The effect would vary greatly by product and country of origin. Mexican imports of particleboard, hardwood veneer, scrap and waste paper, and wood pulp would be the least affected, mainly because of their smaller tariffs and inelastic price responses. Imports of Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco) lumber, hardwood lumber, softwood plywood, and newsprint from the United States would increase the most under NAFTA.

Résumé : L'Accord de libre échange nord-américain (ALÉNA) éliminera les obstacles au commerce et à l'investissement à travers le continent. Cet article présente des previsions des effets de l'ALÉNA sur les importations mexicaines de produits intermédiaires du bois, de débris et rebuts de papier, de pâte et de papier journal en provenance des États-Unis et du Canada. Les prévisions ont été établies à l'aide d'un modèle d'équilibre partiel. Le développement du modèle impliquait l'estimation (i) des élasticités de la demande d'importation du Mexiquc relativement aux facteurs d'influence sur les prix et la demande, (ii) les élasticités des prix. en relation avec leurs déterminants et, par la suite, la prevision. avec ces élasticités, des impacts de l'ALÉNA sur les importations et les prix. Les effets de l'ALÉNA sur les variables exogènes influençant la demande d'importation et les prix ont été résumés dans trois scénarios bases sur les previsions d'études plus générales de l'entente. Les résultats tendent à indiqucr que l'impact global à long terme de l'ALÉNA se traduirait par une augmention de 21 à 85% de la valeur de toutes les importations mexicaines provenant des États-Unis et du Canada. L'effet serait très variable selon le produit et le pays d'origine. Les importations mexicaines de panneaux de particules, de placage feuillu, de débris et rebuts de papier et de pâte de bois seraient les moins affectées, surtout à cause de leurs plus faibles tat-ifs et des réactions inélastiques dcs prix. Les importations de bois d'oeuvre de Douglas taxifolié (*Pseudotsuga menziesii* (Mirb.) Franco), de bois d'oeuvre feuillu, de contreplaqué résineux et de papier journal provenant des États-Unis augmenteraient le plus sous l'ALÉNA.

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Introduction

When the North American Free Trade Agreement (NAFTA) took effect on January 1, 1994, it began a process of gradually liberalizing trade and investment among Canada, Mexico, and the United States, An issue relevant to the forest products sectors of these three countries is how the agreement may affect trade flows and prices.

This paper reports predictions of the impacts of NAFTA on Mexican imports of forest products from the United States and Mexico. To be useful to agents who deal with specific commodities, predictions were made at the most disaggregated levels of product classification allowed by the data. Because there have been few published studies on the structure of Mexico's demand for any forest product, the econometric estimates of demand and related price equations should be useful in several contexts. The equations provide the link between the macroeconomic studies of NAFTA and the microvariables pertinent to forest products trade, allowing for detailed predictions of the agreement's impacts,

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The agreement

NAFTA culminated several years of gradual trade liberalization. A free trade agreement between the United States and Canada in 1988 capped decades of progressive opening, cementing economic ties between the two countries, Still, NAFTA achieves a level of' economic integration among the United States, Canada, and Mexico not previously observed.

Table 1. Merchandise trade (millions of 1992 United States dollars) among the United States, Canada, and Mexico, 1992.

Importer	Exporter			Total imports (F.O.B.)
	U.S.	Canada	Mexico	
United States		103 860	18 657	532 670
Canada	90 156		785	126 115
Mexico	40 598	613		45 994
Total exports (F.O.B.)	448 164	134 435	27 772	

Note: Source: IMF (1994*a*). The values in the first three columns were recorded as exports (F.O.B.) to individual countries, while the values in the last column were **recorded** as total imports (F.O.B.) to all countries. F.O.B.. free on board.

Table 2. Forest products trade (millions of 1992 United States dollars) among the United States, Canada, Mexico, and Japan, 1992.

Importer	Exporter				Total imports (F.O.B.)
	U.S.	Canada	Mexico	Japan	
United States		11 863	126	192	14 685
Canada	2 053		1	20	2 290
Mexico	1 025	45		4	1 223
Japan	3 802	1 964	0		11 239
Total exports (FOB)	14 947	18 167	154	1633	

Note: Sources: FAO (1961–1994), United States Department of Commerce (1961–1993*b*), Statistics Canada (1961–1993*b*).

NAFTA, after a 15-year phase-in period, will create a free trade zone within the 6.5 trillion dollar North American economy of 370 million consumers (IMF 19946). Exemplifying this interdependence is the large volume of intra-North American trade (Table 1). Both Mexico and Canada sell over two-thirds of their exports to the United States. Canada is the largest purchaser of United States exports, taking 20% in 1492, Mexico was the third largest purchaser of United States exports, buying 9% in 1992. Trade between Canada and Mexico, however, is comparatively small.

Interdependence in forest products is similar. United States – Canada trade is very large compared with that with Mexico (Table 2). Still, Mexico was, in 1992, the third most important destination for United States forest products exports, after Japan and Canada. Furthermore, United States forest products exports to Mexico grew by 215% in nominal dollars between 1984 and 1992 (OECD 1992, 1993). Canada-Mexico trade in forest products, instead, has been small and relatively unimportant, especially in solid-wood products. Canadian exports of newsprint and wood pulp, mainstays of their trade with Mexico, have slipped in recent years, in favor of the United States.

In spite of, and in part because of, large differences among the United States, Canada, and Mexico (Table 3), all three countries should benefit from NAFTA (Francois et al. 1992; Hufbauer and Schott 1992). The differences should allow each country to specialize in those activities for which they have a comparative advantage. Enhanced interdependence with liberalization will stimulate greater industrial competition within North America, benefiting consumers. NAFTA will affect output, national income, wages, interest rates, exchange rates, prices of producer and consumer goods, and trade balances (Brown et al. 1992: Cox and Harris 1992: Sobarzo 1992; Trela and Whalley 1992; Trigueros 1989; United States International Trade Commission 199 1; Waverman 1992; Yúnez-Naude 1992). The changes in trade, therefore, will be caused not only by the lowering of barriers to imports, but also by impacts of the agreement on macroeconomic variables.

Given the pre-NAFTA tariffs on forest products imports. the largest relative changes should be in Mexico's imports. In 1992, Mexico had the highest tariffs: usually 15% ad valorem for lumber, panels, and paper, with lower rates for pulp. The United States and Canada had no tariff for nearly all lumber, pulp, and paper, but higher rates (up to 20%) for selected panels. During the first 10 years of the 15-year phase-in of NAFTA, all of these tariffs will be gradually lowered to zero (Governments of Canada. Mexico. and the United States of America 1993).

Related studies

Most macroeconomic studies of the impacts of NAFTA have been based on general equilibrium models that mirror

the interactions within and among economies. The equations in these models describe the economies of the three countries and connect them to determine imports, exports, international investment, and exchange rates. These equations are solved twice, one outcome with trade and investment barriers in place, reflecting a pre-NAFTA base equilibrium, and another with the barriers removed. By comparing the two solutions, one may predict, subject to the set of assumptions regarding the functioning of the economies, the effects of the agreement on economic variables such as the cost of capital, wages, income, output by major economic sector, trade, investment levels, and exchange rates (e.g., Francois et al. 1992; United States International Trade Commission 1991). While the models of NAFTA have been too broad to predict the effects of the agreement on output and trade in specific forestry commodities, they provide the data necessary to make these predictions.

Spatial partial equilibrium models have also been used to study single sectors or industries. Typically, these models are employed to predict the effects of an exogenous economic shock on regional industries. The principles and numerical solutions of these models were formulated by Samuelson (1952), Takayama and Judge (1964), and others, to compute regional prices and the geographic distribution of production and consumption. The models require partial equilibrium equations of supply and demand for each region and transfer costs between them. Therefore, they can predict the trade and welfare effects of changing transfer costs, such as those due to the elimination of import tariffs.

Spatial partial equilibrium models of trade in forest products include Boyd (1983), Buongiorno and Gilless (1984), Gilless and Buongiorno (1985), and Boyd and Krutilla (1987, 1988). Boyd et al. (1993) estimated the spatial and welfare effects of liberalizing the North American trade in pine and fir lumber. They found that North American tariff liberalization would result in a modest increase (by 9%) in Mexican imports of fir lumber from the United States and have no effect on Mexican imports of pine lumber.

Aggregate partial equilibrium models remain the most widely used means of studying the effects of changes in trade policies (see Olechowski 1987 and UNCTAD 1985 for examples involving forest products). These models rely on national-level elasticities of import demand, with respect to price and other variables, to measure the effects of an economic shock on imports. Therefore? a key element for partial equilibrium analysis is a good estimate of the import demand equation for the product of interest. If price is not exogenous, then price equations must also be estimated. The simplicity of the partial equilibrium model is that only national-level estimates of import demand are needed; but there lies also its weakness, since changes in the spatial distribution of import demand are not revealed.

Theoretical model

The effects of NAFTA reported here rely on partial equilibrium models. The predictions account for the tariff and nontariff barrier reductions scheduled in NAFTA and for the predicted impact of NAFTA on macroeconomic variables such as wages, interest rates, exchange rates, and output levels of industries that consume forest products.

Table 3. Economic indicators fur 1992 for the United States, Canada, and Mexico.

	U.S.	Canada	Mexico
Population (millions)	255	27	90
GDP (US$ billions)	6 020	569	329
GDP/person (US$/year)	23 607	20 755	3678
Imports/person (US$/capita)	2 172	4 596	514
Exports/person (U S$/capita)	1 757	4 899	310
(Imports + exports)/GDP	0.163	0.458	0.224

Note: Sources: IMF (1994*a*, 1994*b*). Dollar figures are 1992 United States dollars. GDP, gross domestic product.

The estimates of NAFTA's impacts rely on predictions of previous macroeconomic studies of the agreement.

Partial equilibrium model of import demand

Because most imported forest products are inputs into a final production process, demand for imports derive from the input demands of final products manufacture. For example, imported fir lumber may be an input into the building of Mexican houses, and so demand for fir lumber imports can be derived from the production function for houses in Mexico.

Assume that among the inputs into the production process, $g(\cdot)$, of a domestic final product, y, is an imported forest product, M, with a price, P_M, in Mexican pesos. The domestic product manufactured by firm f in Mexico can be made from a combination of domestic inputs (h = 1, ... H), contained in vector $\mathbf{x}_f$, with prices $\mathbf{w}$, and the imported forest product. Assume that the firm chooses its inputs, including imports, so as to minimize the cost of its output (Varian 1992, pp. 49-61):

$$[1] \quad C_f(y_f, P_M, \mathbf{w}) = \min_{M_f, \mathbf{x}_f} [P_M M_f + \mathbf{w}'\mathbf{x}_f : g(M_f, \mathbf{x}_f) = y_f]$$

The envelope theorem in the form of Shephard's Lemma leads to the conditional demand for imports as a function of the final product output, the price of imports, and the prices of other inputs:

$$[2] \quad \frac{\partial C_f(y_f, P_M, \mathbf{w})}{\partial P_M} = M_f(y_f, P_M, \mathbf{w})$$

If all importing firms face identical prices and use similar technologies, the elements of [2] may be summed across all firms to get the total demand for imports, $M_{f,.}$ as a function of total output of the final product, $Y = \sum_{f=1}^{F} y_f$, the price in pesos of the imported forest product, P_M, and the prices of other inputs, w

$$[3] \quad M_d = M_d(Y, P_M, \mathbf{w})$$

NAFTA is likely to affect all of the variables in [3] that determine imports. The total derivative of [3] shows the effects of changes in each variable, other things being equal:

$$[4] \quad dM_d(Y, P_M, \mathbf{w}) = \frac{\partial M_d}{\partial P_M} dP_M + \frac{\partial M_d}{\partial Y} dY + \sum_{h=1}^{H} \frac{\partial M_d}{\partial w_h} dw_h$$

Table 4. Price equations for United States lumber exported to Mexico, 1960-1992.

Explanatory variable[a]	Expected sign	Product					
		Douglas-fir	Ponderosa pine	Southern pine	Other softwood	Oak	Other hardwood
Mexico PPI	±		−0.86* (0.40)		−0.27** (0.12)	0.77* (0.32)	0.50** (0.09)
Mexico wage	±	−0.10** (0.03)	0.96** (0.23)		0.23 (0.15)	0.35** (0.05)	
Opening dummy	+	0.18 (0.12)		0.12 (0.20)			
Tariff equivalent, exchange rate	−		-0.08 (0.23)	−0.24** (0.06)		−0.26** (0.05)	−0.66** (0.18)
Lagged import quantity	±	0.04* (0.02)		0.08* (0.04)		−0.19** (0.02)	
U.S. real GDP	+						1.83** (0.64)
U.S. PPI	±	1.61* (0.73)	3.11* (1.31)	5.59** (1.67)	2.07** (0.67)	0.89** (0.08)	
U.S. wage	±	0.59 (0.33)	−1.64** (0.60)				-0.68 (0.59)
U.S. cost of capital	±	-0.13 (0. IO)					
US. cost of energy	±	-0.48 (0.26)	-0.37 (0.42)	−1.89** (0.59)	−0.71* (0.33)		0.51* (0.25)
Observations		31	33	30	33	30	33
Durbin–Watson		1.86	1.51	1.45	1.81	1.60	1.91
R^2		0.97	0.93	0.76	0.92	0.98	0.97

Note: Standard errors are in parentheses. Asterisks indicate results of one-tailed significance tests on coefficients of expected positive or expected negative sign and two-tailed tests on others, where ** and * indicate 1% and 5% significance. respectively.

[a]PPI, producer price index.

or, in relative terms

$$[5] \qquad \frac{dM_d}{M_d} = \beta_{P_M} \frac{dP_M}{P_M} + \beta_Y \frac{dY}{Y} + \sum_{h=1}^{H} \beta_h \frac{dw_h}{w_h}$$

where $\beta_{\cdot}$ is the elasticity of import demand with respect to the subscripted variable. With estimates of the elasticities and predictions on the changes that NAFTA induces in the import price, P_M, the Ievel of domestic final product output, Y, and the prices of other inputs, **w**, one can predict the effect of' the agreement on demand fur imports.

While predictions of the effects of NAFTA on Y and w may be available from previous studies, those on import prices are not. The price in dollars, P, that Mexicu's importers face is determined by market variables, **z**, that may be affected by NAFTA.

Furthermore, the price in pesos, P_M, depends on the tariff (τ) and the exchange rate (E) between the Mexican peso and the United States dollar:

$$[6] \qquad P_M = \theta E P(\mathbf{z})$$

where $\theta = 1 + \tau$.

Following a procedure similar to that used to get [5], a prediction of the effects of NAFTA on the import price in pesos is given by

$$[7] \qquad \frac{dP_M}{P_M} = \alpha_E \frac{dE}{E} + \alpha_\theta \frac{d\theta}{\theta} + \sum_{i=1}^{I} \alpha_i \frac{dz_i}{z_i}$$

where $\alpha_{\cdot}$ is the elasticity of the price with respect to the subscripted variable.

Incorporating eq. 7 into the import demand [5], and noting from [6] that $\alpha_E = \alpha_\theta = 1$, leads to

$$[8] \qquad \frac{dM_d}{M_d} = \beta_{P_M} \left[\frac{dE}{E} + \frac{d\theta}{\theta} + \sum_{i=1}^{I} \alpha_i \frac{dz_i}{z_i} \right] + \beta_Y \frac{dY}{Y} + \sum_{h=1}^{H} \beta_h \frac{dw_h}{w_h}$$

Specification of import demand and price equations

The elasticities in eq. 8 were obtained by estimating a Mexican import demand equation and a reduced-form price

Table 5. Price equations for United States panels exported to Mexico, 1960-I 992.

Explanatory variable	Expected sign	Product: Particle-board	Hardwood veneer	Softwood plywood	Hardwood plywood
Mexico PPI	±		*-0.44* *(0.28)*		
Mexico wage	±		0.64* *(0.29)*	0.58** *(0.1 5)*	
Lagged import yuanti ty	±	−0.12** (0.04)		-0.14 (0.08)	*-0.04* (0.08)
U.S. PPI	±	-0.92 (0.80)	−5.61** *(0.7 1)*	−3.68** (1.32)	-2.64 (2.05)
U.S. wage	±	2.19:': (0.77)		4.70* (1.65)	3.43 *(2.78)*
U.S. cost of energy	±		2.48** *(0.37)*		
observations		26	27	32	31
Durbin–Watson		2.57	1.93	1.75	1.43
R^2		*0.89*	*0.66*	*0.99*	*0.97*

Note: Standard errors are in parentheses. Asterisks indicate results of one-tailed significance tests on coefficients of expected positive or expected negative sign and two-tailed tests on others, where ** and * indicate I % and 5% significance, respectively.

equation for each product. Severe data limitations led us to choose a simple dynamic version (Chou and Buongiorno 1984) of the generalized Cobb-Douglas function for import demand:

$$[9]\quad \ln M_{d,t} = \underset{(\pm)}{\xi_1} + \underset{(-)}{\xi_{P_M}}(\ln E_t + \ln \theta_t + \ln P_t) + \underset{(+)}{\xi_Y} \ln Y_t + \underset{(\pm)}{\boldsymbol{\xi}_w} \ln \mathbf{w}_t + \underset{(+)}{\xi_D} D_t + \underset{(+)}{\xi_{t-1}} \ln M_{t-1} + U_t \qquad 0 \le \xi_{t-1} \le 1$$

where t is a year, Y is an index of output of the Mexican industry that uses the import, w is the prices of other Mexican inputs used together with this import, D is a dummy variable reflecting reductions of some nontariff barriers from 1987 to 1992, and U is an error term. The expected signs of the elasticities, $\boldsymbol{\xi}$, are in parentheses. The prices of the Mexican inputs, w, could affect imports positively or negatively, depending on whether these inputs are substitutes or complements with imports.

Export supply was deemed to be affected by domestic demand and supply in the exporting country and formulated as an excess supply:

$$[10]\quad \ln M_{s,t} = \underset{(\pm)}{\Upsilon_1} + \underset{(+)}{\Upsilon_P} \ln P_t + \underset{(-)}{\Upsilon_C} \ln C_t + \underset{(\pm)}{\boldsymbol{\Upsilon}'_s} \ln \mathbf{s}_t + \underset{(+)}{\Upsilon_{t-1}} \ln M_{s,t-1} + v_t, \qquad 0 \le \Upsilon_{t-1} \le 1$$

where M_s is the quantity exported, P is the export price, in dollars, C is the main shifter of demand in the exporting country (such as construction activity), and $\mathbf{s}$ is a vector of other shifters of demand or supply, such as wages.

Equilibrium between import demand and export supply ($M_{d,t} = M_{s,t}$) leads then to the following reduced-form price equation:

$$[11]\quad \ln P_t = \underset{(\pm)}{\alpha_1} + \underset{(-)}{\alpha_P}(\ln E_t + \ln \theta_t) + \underset{(+)}{\alpha_Y} \ln Y_t + \underset{(\pm)}{\boldsymbol{\alpha}'_w} \ln \mathbf{w}_t + \underset{(+)}{\alpha_D} D_t + \underset{(+)}{\alpha_C} \ln C_t + \underset{(\pm)}{\boldsymbol{\alpha}'_s} \ln \mathbf{s}_t + \underset{(\pm)}{\alpha_{t-1}} \ln M_{t-1} + V_t$$

where V is an error term and other variables are as previously defined. Expected signs of the parameters are in parentheses.

Reduced-form import demand equations

Substituting the price equation [1 1] into the equation for the import demand [9] gives the following reduced-form for import quantity:

$$[12]\quad \ln M_{d,t} = \Pi_1 + (\xi_{P_M}\alpha_P + \xi_{P_M})(\ln E_t + \ln \theta_t) + (\xi_{P_M}\alpha_Y + \xi_Y) \ln Y_t + (\xi_{P_M}\boldsymbol{\alpha}'_w + \boldsymbol{\xi}'_w) \ln \mathbf{w}_t + (\xi_{P_M}\alpha_D + \xi_D) D_t + \xi_{P_M}\alpha_C \ln C_t + \xi_{P_M}\boldsymbol{\alpha}'_s \ln \mathbf{s}_t + (\xi_{P_M}\alpha_{t-1} + \xi_{t-1}) \ln M_{t-1} + W_t, \quad 0 \le \xi_{t-1} \le 1$$

where the coefficients of variables are short-term elasticities. The long-term elasticities (i.e., $\boldsymbol{\beta}$) corresponding to [8] that show the full adjustment from pre-NAFTA to post-NAFTA equilibrium are the coefficients in [12] divided by (1 − $\xi_{P_M}\alpha_t$. I ξ_{t-1}). Therefore, the long-term effect of NAFTA due to the cut in tariffs only is

Table 6. Price equations for United States newsprint, scrap and waste paper, and sulfate pulp exported to Mexico, 1960–1992.

Explanatory variable	Expected sign	Product: Newsprint	Scrap + waste paper	Bleached sulfate pulp	Semibleached sulfate pulp	Unbleached sulfate pulp
Mexico paper output	+			0.50* (0.23)	0.35 (0.29)	
Mexico PPI	±		−0.88** (U.23)	−0.15** (0.04)	−0.55** (0.12)	-0.19 (0.19)
Mexico wage	±				0.50** (0.13)	0.20 (0.20)
Opening dummy	+		0.70* (0.41)	0.38** (0.11)		
Lagged import quantity	±	−0.03 (0.03)		0.02 1 (0.022)		0.05 (0.03)
U.S. PPI	±	0.75* (0.23)	4.52 (2.33)	4.39** (0.77)	4.58** (1.01)	
U.S. wage	±		− 1.32 (1.02)	−2.33** (0.50)	−2.72** (0.60)	
U.S. cost of capital	±	0.23 (0.17)		−0.42** (0.13)		
U.S. cost of energy	±		− 1.26 (0.84)	-0.38 (0.29)	-0.66 (0.40)	0.55** (0.07)
Observations		32	32	32	33	26
Durbin-Watson		1.79	2.11	1.88	1.82	2.40
R^2		0.95	0.55	0.97	0.94	0.87

Note: Standard errors arc in parentheses. Asterisks indicate results of one-tailed significance tests on coefficients of expected positive or expected negative sign and two-tailed tests on others, where ** and * indicate 1% and 5% significance. respectively.

$$[13] \quad \frac{dM}{M} = \frac{\xi_{P_M} + \xi_{P_M}\alpha_P}{(1 - \xi_{P_M}\alpha_{t-1} - \xi_{t-1})} \frac{d\theta}{\theta}$$

Then, the long-run effect of NAFTA on the export price caused only by a tariff reduction is, from [11]

$$[14] \quad \frac{dP}{P} = \alpha_P \frac{d\theta}{\theta} + \alpha_{t-1} \frac{dM}{M}$$

where dM/M is given by [13]. Likewise, the long-term effect of NAFTA through changes in all shifters of import demand and export supply are

$$[15] \quad \frac{dM}{M} = \frac{1}{(1 - \xi_{P_M}\alpha_{t-1} - \xi_{t-1})} \left[(\xi_{P_M} + \xi_{P_M}\alpha_P) \times \left(\frac{dE}{E} + \frac{d\theta}{\theta} \right) + (\xi_{P_M}\alpha_Y + \xi_Y) \frac{dY}{Y} + \ldots + \xi_{P_M} \times \sum_{k=1}^{K} \alpha_{s_k} \frac{ds_k}{s_k} \right]$$

and the corresponding effect on price is given by

$$[16] \quad \frac{dP}{P} = \alpha_P \left(\frac{d\theta}{\theta} + \frac{dE}{E} \right) + \left[\alpha_Y \frac{dY}{Y} + \ldots + \sum_{k=1}^{K} \alpha_{s_k} \frac{ds_k}{s_k} \right] + \alpha_{t-1} \frac{dM}{M}$$

where dM/M is given in [151.

Empirical estimation of price and import demand equations

Product coverage and data description

Twenty-five commodities were studied (see Prestemon 1994 for definitions in terms of harmonized codes). Annual quantity and value data were those recorded in United States Department of Commerce (196 l-l 993*a*) and Statistics Canada (1961–1993*a*) as exports to Mexico. Import prices (in pesos) in Mexico were estimated by multiplying unit values (free alongside ship in United States or Canadian dollars) by exchange rates, E (IMF 196 l-l 993), and tariff equivalents, Θ.

Table 7. Price equations for United States sulfite, dissolving, and mechanical plus semichemical pulp exported to Mexico, 1960-I 992.

Explanatory variable	Expected sign	Product: Bleached + semibleached sulfite Pulp	Unbleached sulfite pulp	Dissolving pulp	Mechanical + semichemical pulp
Mexico Paper output	+	0.36** (0.13)	0.37* (0.21)	0.59** (0.08)	
Mexico PPI	±			0.69* (0.28)	
Mexico wage	±	−0.19** (0.02)		−0.13** (0.02)	−0.86** (0.3 1)
Opening dummy	+	0.24** (0.08)		0.23** (0.08)	
Lagged import quantity	±	0.04 (0.03)		0.27** (0.07)	
Tariff equivalent, exchange rate	−	−0.03 (0.03)			
U.S. PPI	±	1.70** (0.22)		−2.22** (0.35)	
U.S. wage	±			2.20** ((1.6 1)	
U.S. cost of' capital	±	−0.38** (0.11)	0.16 (0.16)	−0.49** (0.11)	−1.03** (0.38)
U.S. cost of' energy	±		0.80** (0.08)		
Observations		32	33	33	29
Durbin-Watson		1.36	1.72	1.60	1.53
R^2		0.96	0.73	0.97	0.82

Note: Sta ndard errors are in parentheses. Asterisks indicate results of one-tailed significance tests on coefficients of cxpcctcd positive or expected negative sign and two-tailed tests on others, where ** and * indicate 1% and 5% significance, respectively.

The tariff equivalent was the sum of the ad valorem tariff and the ad valorem tariff equivalent of nontariff barriers applied by Mexico on each commodity (Governments of Canada, Mexico, and the United States 1993; Office of the United States Trade Representative 1987-1993). The dummy variable, D, accounted for two nontariff barriers that were not easily converted into tariff equivalents, import licenses, and customs valuation procedures. These were applied by Mexico on imports previous to 1987 (Office of the United States Trade Representative 19x7-1993). The dummy therefore had a value of zero for 1960 to 1986 and one for 1987 to 1992, reflecting the relaxation of these two trade impediments.

Different output variables served as shifters in the price and demand equations, depending on the commodity (see Tables 9 to 15). The real value of Mexican construction was the nominal value (INEGI 1987-1993; World Bank 1976) divided by the producer price index (IMF 196 1-l 993). The quantity of pine molding imported by the United States came from the United States Department of Commerce (1961–1993*b*). Real gross domestic product was the nominal gross domestic product divided by the gross domestic product deflator (IMF 196 l-l 993). Paper and paperboard production was from FAO (1961 to 1994). United States housing starts came from United States Department of Commerce (1965–1975, 1993). Newspaper circulation in the United States and Canada were obtained from the Editor and Publisher Company (196 l–l 993).

Domestic Mexican prices for inputs, w, were measured by the index of manufacturing wages and the producer price index (IMF 1961-l 993). The shifters of the export supply, **s**, included, for the United States, an index of manufacturing wages (IMF 196 l– 1993), the producer price index of all producer goods (IMF 1961-l 993), the producer price index of energy (United States Department of Labor 196 l-l 993), and the cost of capital for forest industries. The cost of capital was computed as in Hall and Jorgenson (197 1), with a forest products industry capital

Table 8. Price equations for Canadian newsprint, sulfate pulp, and mechanical plus semichemical pulp exported to Mexico, 1960-I 992.

Explanatory variable	Expected sign	Product			
		Newsprint	Bleached + semibleached sulfate pulp	Unbleached sulfate pulp	Mechanical A-- semichemical pulp
Mexico paper output	+		0.65** (0.26)	1.15* (0.4 1)	
Mexico PPI	±		−0.19** (0.05)	1.23 (0.80)	
Mexico wage	±		−0.64 (0.54)		
Opening dummy	+	0.12 (0.08)	0.76** (0.16)	0.29 (0.34)	
Tariff equivalent. exchange rate				−0.76* (0.38)	
Lagged import quantity	±			-0.04 (0.05)	−0.04* (0.02)
Canadian PPI	±	1.99** (0.38)	2.71** (0.36)		0.99 (0.64)
Canadian wage	±	−0.84** (0.29)	−1.48** (0.42)		0.43 (0.52)
Observations		32	33	22	27
Durbin-Watson		1.74	1.40	1.84	1.57
R^2		0.98	0.95	0.88	0.98

Note: Standard errors are in parentheses. Asterisks indicate results of one-tailed significance tests on coefficients of expected positive or expected negative sign and two-tailed tests on others, where ** and * indicate 1% and 5% significance, respectively.

price index (United States Department of Labor 1961–1993) and the prime lending rate (IMF 1961-l 993). For Canada, s was limited to the manufacturing wage index and the producer price index of all producer goods (IMF 1961–1993) because no consistent indexes of energy and forest industry capital could be found.

A more detailed description of the data and their sources is in Prestemon (1994).

Estimation procedures

The estimation aimed at getting parsimonious models wirh few coefficients (Box and Jenkins 1970, pp. 17-l 8) and r-ratios at least equal to one (Houthakker and Taylor 1970, p. 8) that agreed with theoretical expectations. Because of the high collinearity of several explanatory variables, keeping all the explanatory variables would have led to inefficient and unstable coefficients. The preferred parsimonious models had the drawback that some parameters could be biased due to the omission of potentially relevant variables.

The price equation [11] was estimated by seemingly unrelated regression (SUR), to get efficient parameters. Products were grouped so that the equations of similar products were in the same system (lumber products; panels; pulp. scrap, and waste paper; and newsprint). Instrumental variables within SUR (equivalent to three-stage least squares) were used to estimate the import demand equation [9] when complete data series were available. The instrument variable for the endogenous price was predicted with the price equation [11].

For a few products, such as United States southern pine and oak lumber and Canadian mechanical plus semichemical pulp, imports were nil in some years, so that eq. 9 could not be used. Import demand was then estimated with a Tobit model (Tobin 1958). The Tobit model predicted the probability of imports in a year and the expected value of imports, conditional or unconditional on the occurrence of imports. Estimation was by maximum likelihood. A static form was used for simplicity and to save degrees of freedom. Unconditional elasticities (McDonald and Moffitt 1980) were calculated at the means of the observations. and standard errors were estimated using a numerical version of the method of Mood et al. (1974, pp. 180-l 8 l).

Estimation results for price equations

The estimated parameters of the price equations are in Tables 4 to 8. These parsimonious equations eliminated several variables that were highly correlated with each other. The final equation was usually found at the second trial estimation, but more were sometimes needed. Since each trial used up degrees of freedom, the statistics must be

Table 9. Demand equations for Mexican imports of United States **lumber,** 1960–1992.

Explanatory variable	Expected sign	Product: Douglas-fir	Ponderosa pine	Southern pine[a]	Other softwood	Oak[a]	Other hardwood
Import price		−2.30** (0.29)	-0.72 (0.31)	−0.77* (0.31)	-0.32 (0.31)	−0.66** (0.08)	−0.53 (0.76)
Mexico construction output	+			0.36* (0.11)	2.82** (0.41)		
Mexico real GDP	+					0.89** (0.17)	0.66 (0.68)
Molding exports	+				1.24** (0.39)		
Mexico PPI	±		−2.26** (0.49)	−1.16** (0.35)	1.08** (0.31)	0.45** (0.08)	0.10 (1.05)
Mexico wage	±	2.06** (0.28)	3.09** (0.47)	2.38** (0.15)		0.11 (0.08)	0.40 (0.83)
Opening dummy	+	0.54 (0.36)		0.13 (0.11)		0.46** (0.07)	0.86 (0.61)
Lagged import quantity	+	0.61** (0.10)	0.30** (0.11)		0.55** (0.20)		0.83* (0.39)
Observations		31	31	33	31	33	31
H, DW[b]		1.93	-0.01		5.51**		2.43*
R^2		0.83	0.88		0.93		0.63

Note: Standard errors are in parentheses. Asterisks indicate results of one-tailed significance tests on coefficients of expected positive or expected negative sign and two-tailed tests on others, where ** and * indicate 1% and 5% significance, respectively.
[a]Tobit estimate. elasticities calculated at the means of variables; three-stage least squares for other equations.
[b]Durbin's *H*-statistic for equations with lagged quantity, Durbin-Watson for those without, after correction for serial correlation.

interpreted cautiously. A Wald test indicated that in most cases, the omitted variables were significant as a group, although their omission had little effect on the predictive power of the model, measured by the coefficient of determination, R^2, which was usually high. The Durbin-Watson statistics suggested that the residuals in the final price models were independently and identically distributed.

Mexican import demand variables had statistically significant effects on prices for most commodities. Thus, if NAFTA changed these variables, they would in turn affect prices and imports.

Estimation results fur import demand equations

Tables 9-l 3 show final, parsimonious import demand equation estimates. When there was significant serial correlation, consistent estimates were obtained with lagged independent variables serving as instruments for lagged imports (Johnston, 1984, pp. 362–366). With the static Tobit models, serial correlation was not tested.

Homogeneity of degree zero in prices was rejected by Wald tests, and it often resulted in equations that did not agree with theory, Thus, homogeneity was not imposed on the final import demand models.

For particleboard and United States unbleached sulfite and dissolving pulps, import prices did not seem to influence imports, leaving output and other prices as explanatory variables. Conversely, for Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco) and ponderosa pine (*Pinus pondrosa* P. Laws. ex C. Laws.) lumber, softwood plywood, and United States and Canadian newsprint, output variables did not appear in the final models.

Elasticities of demand with respect to nonprice determinants had varying degrees of statistical significance. In most cases where both producer prices and manufacturing wages appeared in the equation, the coefficient of the former was negative and of the latter, positive. This suggests that import demand responded positively to real wages. A rise in real wages increased the cost of forest products made in Mexico, thus encouraging substitution by imports.

The coefficient of the dummy variable was typically not significant. It may have been too crude a measure. Or, the incorporation of tariff equivalents, Θ, in import prices may have accounted adequately for the effects of the relaxation of all nontariff barriers in the late 1980s.

For three minor commodities (United States softwood veneer, Canadian bleached plus semibleached sulfite pulp, and Canadian dissolving pulp) import demand equations with acceptable statistical and theoretical characteristics could not be found. For those, the impacts of NAFTA were nut predicted.

Table 10. Demand equations fur Mexican imports of United States panels, 1960–1992.

Explanatory variable	Expected sign	Product: Particle-board	Hardwood veneer[a]	Softwood plywood	Hardwood plywood
Import price	−		−0.24* (0.11)	−0.68* (0.28)	−0.99** (0.27)
Mexico real GDP	+		1.60** (0.08)		
Mexico construction output	+	3.37** (0.33)			2.43** (0.49)
Mexico PPI	±	-0.65 (4.82)	−0.45 (0.52)	-0.68 (0.82)	
Mexico wage	±	0.28* (0.12)	0.42** (0.11)	1.58 (0.80)	1.51** (0.27)
Opening dummy	+	1.17* (0.65)			
Observations		26	28	31	31
DW[b]		1.37		2.89**	2.68**
R^2		0.89		0.85	0.91

Note: Standard errors are in parentheses. Asterisks indicate results of one-tailed significance tests on coefficients of expected positive or expected negative sign and two-tailed tests on others, where ** and * indicate 1% and 5% significance, respectively.

[a]Tobit estimate, elasticities calculated at the means of variables; three-stage least squares for other equations.

[b]Durbin–Watson statistic, after correction for serial correlation.

Table 11. Demand equations for Mexican imports of United States newsprint, scrap plus waste paper, and sulfate wood pulp, 1960-1992.

Explanatory variable	Expected sign	Product: Newsprint	Scrap + waste paper	Bleached sulfate pulp	Semibleached sulfate pulp[a]	Unbleached sulfate pulp[a]
Import price		−1.74** (0.26)	−0.66* (U.34)	−0.73* (0.50)	-0.07 (0.07)	**-0.06** (0.06)
Mexico paper output	+		2.43** (0.29)	2.91* (1.42)	0.92** (0.04)	0.19** (0.04)
Mexico PPI	±		2.38** (0.50)	0.48 (0.44)	−0.75** (0.08)	-0.08 (0.07)
Mexico wage.	±	1.68** (0.25)	−1.76** (0.47)		0.63** (0.09)	0.06 (0.09)
Lagged import quantity	+	0.40** (0.11)		0.42* (0.27)		
Observations		32	33	32	33	33
H, DW[b]		0.93	1.34	1.69		
R^2		0.83	0.94	0.94		

Note: Standard errors are in parentheses. Asterisks indicate results of one-tailed significance tests **on coefficients** of expected positive or expected negative sign and two-tailed tests on others, where ** and * indicate 1% and 5% significance, respectively.

[a]Tobit estimates, elasticities calculated at the means of variables; three-stage least squares for other equations.

[b]Durbin's H-statistic for equations with lagged quantity, Durbin-Watson for **those** without. **after correction for** serial correlation.

Table 12. Demand equations for Mexican imports of United States sulfite pulp, dissolving grades of wood pulp, and mechanical plus semichemical wood pulp, 1960-1992.

Explanatory variable	Expected sign	Product: Bleached + semibleached sulfite pulp	Unbleached sulfite pulp[a]	Dissolving pulp	Mechanical + semichemical pulp[a]
Import price	−	-0.46 (0.54)			−1.44** (0.31)
Mexico paper output	+	2.19** (0.60)	1.45 (7.16)	0.78* (0.41)	1.13 (2.02)
Mexico PPI	±	2.26** (1.11)	-1.11 (1.96)	-0.46 (0.33)	1.67** (0.16)
Mexico wage	±	−2.42** (0.81)	0.41 (1.49)	0.51 (0.34)	-0.57 (0.46)
Opening dummy	+	1.68** (0.46)			0.36 (0.65)
Lagged import quantity	+			0.52 (0.54)	
Observations		33	33	31	33
H, DW[b]		1.43		2.73*	
R^2		0.65		0.82	

Note: Standard errors are in parentheses. Asterisks indicate results of one-tailed significance tests on coefficients of expected positive or expected negative sign and two-tailed tests on others, where ** and * indicate 1% and 5% significance, respectively.

[a]Tobit estimates, elasticities calculated at the means of variables; three-stage least squares for other equations.

[b]Durbin's H-statistic for equations with lagged quantity. Durbin–Watson for those without, after correction for serial correlation.

Macroeconomic effects of NAFTA

The demand equation [9] and the price equation [11] being known, predicting the effects of NAFTA on forest products with eqs. 13–16 required predictions of the agreement's effects on the exogenous variables, Published studies of NAFTA (usually done with general equilibrium models) provided several predictions of changes in key economy-wide and sectoral variables.

Five studies (Brown et al. 1992; Roland-Holst et al. 1992; Hufbauer and Schott 1992; Bachrach and Mizrahi 1992; Cox and Harris 1992) led to three scenarios of the impacts of NAFTA. Each consisted of predictions of the effects of the agreement, relative to a base case of no free trade agreement, on the output of consuming industries and on macroeconomic variables, including those affecting import demand. Because the studies made differing assumptions regarding the functioning of United States, Canadian, and Mexican economies, the scenarios predicted quite different effects of NAFTA on wages, employment, capital costs, exchange rates, and outputs (Table 14).

No prediction was available for the effect of NAFTA on United States imports of standard pine molding from Mexico, the producer price index in the three countries, and the price of energy in the United States. To predict the impact of NAFTA on molding imports, import quantity was regressed on housing starts, United States real gross domestic product, and lagged import quantity. The indexes of producer prices and price of energy in the United States were each regressed on manufacturing wages, gross domestic product, and cost of capital, with data from 1960 to 1992. The regressions were then applied to predict the impacts of NAFTA on the desired variables from the changes in the independent variables predicted by the three scenarios (Table 14).

Predicted effects of NAFTA

The predictions of the effects of NAFTA are in Table 15. The first two columns provide the base year (1992) quantities and values of imports. The columns under the heading "Zero tariff' isolate the effects of eliminating tariff barriers only. and the remaining columns refer to the complete effects of NAFTA, given each scenario.

The zero-tariff results show that for nearly all United States solid-wood products and newsprint, cutting tariffs would, by itself, significantly increase exports to Mexico. Mexican imports of pulp products were unaffected by the tariff cut, since they had small price elasticities and because their tariff in 1992 was low. The predicted effect of tariff elimination on imports of United States lumber was higher than that predicted by Boyd et al. (1993).

Table 13. Demand equations for Mexican imports of Canadian newsprint, sulfate wood pulp, **and** mechanical plus semichemical wood pulp, 1960–1 992.

Explanatory variable	Expected sign	Product: Newsprint	Bleached + semibleached sulfate pulp"	Unbleached sulfate pulp[a]	Mechanical + semichemical pulp"
Import price	−	−0.82*	-0.80	−0.21	−0.46
		(0.38)	**(0.96)**	(1.20)	(0.50)
Mexico paper output	+		I.68	*0.91*	0.82
			(2.98)	**(2.46)**	**(2.01 j**
Mexico PPI	±	1.29	**-0.26**	**0.12**	-0.12
		(0.7 1)	**(0.47)**	**(2.11)**	(0.11)
Mexico wage	±	1.71**	-0.0 1	-0.11	0.60
		(0.39)	**(0.20)**	(1.18)	**(0.32)**
Opening dummy	+	1.15**	**0.09**	0.08	**0.09**
		(0.30)	**(I** .65)	(0.48)	**(0.29)**
No. of observations		33	**33**	33	33
DW[b]		1.55			
R^2		**0.82**			

Note: Standard errors are in parentheses. Asterisks indicate results of one-tailed significance tests on coefficients of expected positive or- expected negative sign and two-tailed tests on others, where ** and * indicate 1% and 5% significance, respectively.

[a]Tobit estimates, elasticities calculated at the means of variables; three-stage least squares for other equations.

[b]Durbin–Watson **statistic, after** correction for serial correlation.

The total effects of NAFTA under each scenario reflects (1) the reduction in price due to tariff cuts, (2) the change in price of imports due to shifts of demand and supply in the three countries, and (3) the change in imports due to changes in shifters of the demand for imports, caused by NAFTA. The general equilibrium impacts of NAFTA would increase imports beyond the increases caused by the mere elimination of tariffs. For example, under scenario 3, the total impact of NAFTA on imports of newsprint was three times the effect due to tariff cuts alone.

Scenario 3 showed the strongest impacts on imports, for at least two reasons. First was the strengthening of the Mexican peso relative to the dollar. Hufbauer and Schott (1992) predicted that a long-run effect of NAFTA will be to strengthen the peso by 30% relative to United States and Canadian dollars, primarily because of the stronger growth **and** investment in Mexico. For newsprint and lumber, the price effect alone of this rise in the peso would be to double imports. Even for products with inelastic demand, such as most pulp and hardwood veneer, the impact of a stronger peso would be substantial, increasing imports by 20 to 30%.

In addition, scenario 3 predicted expanded construction and gross domestic product in Mexico. Hufbauer and Schott (1992) and Bachrach and Mizrahi (1992) estimated that NAFTA would boost manufacturing output by 8% and real domestic product by nearly 5%. Such expansion in sectors using forest products would stimulate imports.

Dollar values of imports would change indeterminately by product because economy-wide variables would have differing effects on prices. For example, rising labor costs could push price up, while simultaneously rising capital costs could drive down the price by lowering final product industry output. However, in general, changes in prices were small, so that the percent change in dollar import value was close to the percent change in import quantity for most products and scenarios.

According to the last three rows of Table 15, Mexico's total dollar value of imports of United States forest products would increase by 21 to 83%, while the import value of Canadian newsprint and pulp would increase by 21 to 117%, depending on the scenario. However, these predicted overall value increases ignore a third of United States forest products exports to Mexico and a small quantity of Canadian exports to Mexico. United States forest products exports not considered in this study included logs. worth $23 million in 1992; other panels (fiberboard, waferboard. oriented strand board, etc.), $17 million; and paper and paperboard excluding newsprint, $283 million. Canadian forest products exports to Mexico not included were other paper and paperboard worth US$3 million in 1992.

Summary and conclusions

This study set out to predict the effects of NAFTA on Mexico's imports of some United States and Canadian forest products. The method was a partial equilibrium

Table 14. NAFTA's impacts on macroeconomic and sectoral variables.

Variable	Percent changes in variables. under Scenario 1 [a]	Scenario 2"	Scenario 3"
	United States		
GDP	**0.0**	1.3	0.0
Capital cost	0.2	2.49	**0.0**
Wage	**0.2**	0.0	**0.0**
Output in			
Construction	**0.05**	0.9	-0.03
Paper	0.21	1.30	0.0
Printing-publishing	0.11	0.9"	**0.0** I
Producer prices	**0.2** I[c]	**0.02**	**0.0"**
Energy prices	0.47"	**-2.04"**	**0.0'**
Imports of Mexican			
standard pine molding	0.05[e]	1.92[e]	−0.03[e]
	Canada		
GDP	**0.0**	1.30	4.67
Capital cost	0.4	13.57	0.0
Wage	0.4	0.0	5.53
Output in			
Construction	0.13	2.30	7.96[f]
Paper	−0.29	1.40	7.96'
Printing-publishing	-1.19	3.4"	7.96[f]
Producer prices	0.40[e]	2.5 I[e]	7.48[e]
	Mexico		
GDP	**0.0**	2.57	2.0
Capital cost	**0.6**	5.77	0.0
Wage	0.7	0.0	0.0
Exchange rate			
US$/peso	0.3	2.96	29.0
Can$/peso	0.8	-0.4 1	27.74
Output in			
Construction	-0.33	1.80	7.41
Paper	-1.14	-0.30	9.68
Printing-publishing	-2.26	2.1"	6.04
Producer prices	0.69'	0.0[e]	0.0'

[a]From the A-scenario in Brown et al. (1992).
[b]From Experiment 3 in Roland-Holst et al. (1992).
[c]U.S. and Mexican effects derived from Hufbauer and Schott (1992) and Bachrach and Mizrahi (1992). Canadian effects include those of the Canada-U.S. free trade agreement (Cox and Harris 1992).
[d]Effect on output in the transport and communication sector.
[e]Estimated in this study.
[f]Real output effect of NAFTA on all sectors.

model of import demand, which required estimates of demand and price equations for each product.

Three of the main findings were (1) long-run Mexican import demand is price elastic for most imported solid-wood products and newsprint but inelastic for hardwood veneer, scrap and waste paper, and imparted pulp; (2) demand and supply in Mexico can influence the prices of some forest products that it imports from the United States and Canada; and (3) NAFTA's impact on output, wages, and exchange rates may work to fuel an increase in forest products imports from the United States and Canada that goes beyond the effects of merely reducing tariffs.

The first finding is important from an industry and policy making standpoint: relatively modest price changes. resulting from supply restrictions, exchange rate realignments, or other economic phenomena, can have a large effect on Mexico's demand for United States and Canadian forest products. United States and Canadian exporters of lumber, newsprint, and plywood should be aware that changes in prices such as those resulting from increased production costs are likely to reduce significantly their share in Mexico's market.

The second finding has implications for empirical research, If the Mexican economy can significantly affect

Table 15. Effects of NAFTA on Mexico's forest products imports from the United States and Canada.

Product	1992 import: Quantity"	1992 import: Value (US$ millions)	Percent change in quantity (*Q*) and value (*V*), given: Zero tariff Q	Zero tariff V	Scenario 1 Q	Scenario 1 V	Scenario 2 Q	Scenario 2 V	Scenario 3 Q	Scenario 3 V
U.S. forest products										
Lumber										
Douglas-fir	101	15	66	70	73	73	86	87	207	207
Ponderosa pine	312	95	13	14	17	19	19	22	47	52
Southern pine	93	16	8	12	15	20	17	21	44	58
Other softwood	457	83	10	10	10	10	29	31	77	77
Sum total softwood	962	209	17	16	19	19	31	30	77	73
Oak	72	26	10	12	19	24	23	29	58	75
Other hardwood	56	17	14	25	74	90	94	116	247	345
Sum total hardwood	127	43	12	17	43	50	53	63	140	180
Hardwood veneer	3 576	5.0	3	7	4	9	7	7	25	32
Plywood										
Softwood	181	37	85	63	89	90	103	103	266	266
Hard wood	76	15	23	22	26	27	28	28	72	72
Sum total	257	53	67	51	70	72	Xl	81	208	210
Particleboard	81	22	0	0	0	0	0	0	0	0
U.S. wood pulp										
Bleached sulfate	284 819	126	l	l	l	l	4	4	43	50
Semibleached sulfate	25 810	10	0	0	0	0	l	2	3	6
Unbleached sulfate	6 582	22	0	0	0	l	0	- 1	2	2
Bleached + semibleached sulfite	8 537	2.8	0	0	0	0	l	0	15	19
Unbleached sulfite	4 593	1.1	0	0	0	- 1	0	0	0	5
Dissolving grades	79 943	38	0	0	0	0	0	- 3	0	6
Mechanical + semichemical	11 462	4.2	8	10	9	9	8	6	50	50
Sum total	410 284	180	l	l	l	l	3	2	31	37
Scrap + waste paper	828 084	110	l	l	l	l	4	7	20	20
Canadian wood pulp										
Rlcached + semibleached sulfate	7 315	3.2	2	2	2	2	10	17	41	66
Unbleached sulfate	964	0.4	0	4	2	6	2	6	14	56
Mechanical + semichemical	36 009	13	3	2	3	4	5	8	20	32
Sum total"	45 790	16	2	2	3	3	6	10	24	40
Newsprint										
U.S.	119	63	44	42	47	47	55	56	136	136
Canada	46	23	11	11	12	13	18	24	44	58
Sum total	165	87	35	33	37	38	45	47	111	115
Total'										
United States		686		14		21		29		83
Canada		39		9		21		42		117
U.S. + Canada		725		14		21		30		85

"Quantities shown for lumber, plywood, and particleboard are in thousands of cubic meters; hardwood veneer, thousands of square meters (1 /8 in. basis); newsprint. scrap and waste paper, and wood pulp, thousands of metric tonnes.

"Excluding sulfite and dissolving pulps.

(Excluding 1992 imports from the United States of paper and paperboard worth US$283 million in 1992 and logs and panels worth US$40 million in 1992; and excluding imports from Canada of paper and paperboard worth US$3 million and pulp worth less than US$1 million in 1992.

import prices, then forecasting models should account fur this. To forest products manufacturers and consumers in North America, it suggests that the health of the Mexican economy, despite its relatively small size, may influence demand and supply throughout North America.

That Mexico's output, wages, and value of the peso drive imports to a significant degree, should be useful for policy makers and industry analysts. In particular, policy makers in Mexico may brace for large changes in imports as demand for wood-using final products expands in Mexico.

wages rise in response to rapid industrial growth, and the value of the peso changes in relation to the dollar. United States and Canadian exporters could likewise prepare by planning for additional new wood manufacturing and pulping capacity at home.

But the estimates of NAFTA's impacts on forest products trade are very uncertain. They hinge upon scenarios largely built from results of computable general equilibrium models. These models made strong assumptions about the behavior of the North American economy. Perhaps the most contentious concerned international and North American capital markets. For example, no one is certain whether the agreement will work to stimulate capital flows to Mexico, thereby affecting exchange rates and domestic investment, or whether such capital flows will affect the prices of capital there or in the United States and Canada. Related to forest products, it is unclear whether new capital in Mexico would be invested in Mexico's forest sector and therefore enhance the ability of domestic primary and secondary forest product manufacturers to compete with United States and Canadian exporters.

Additionally, no predictions were made in this study regarding important trade in logs, other panel products, and most paper products. For United States forest products exports, these were significant omissions. Furthermore, the predictions reported here attempt to isolate the impacts that NAFTA alone would have in the long run on Mexican imports of United States and Canadian forest products, relative to levels in 1992. In fact, actual import levels could be much smaller or larger in a few years than the levels predicted here, due to normal fluctuations in the economy and events that could occur independently of the agreement. For example, the recent decline of the peso, 45% from September of 1994 to September of 1995, may affect imports much more than NAFTA. To predict the effects of this devaluation would require predictions of its impacts on Mexican inflation, wages, and production, which lie outside the scope of this study.

Still, the scenarios provide a framework for understanding the range of possible impacts of NAFTA. Results indicate that the agreement's long-run impacts on the North American trade in forest products will be large. Mexico is now nearly as important as Canada as a market for United States forest product exports. The results indicate that Mexico could overtake Canada, upon the full implementation of the agreement. Further, even though Canadian exporters are likely to gain less than United States exporters in sales of newsprint and pulp to Mexico, thereby continuing to lose market share, these gains may still make Mexico an important destination for Canada's exports.

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