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Bilateral foreign direct investment in forest industry between the U.S. and Canada ☆

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ABSTRACT

In this study we examine the trends and various factors influencing bilateral foreign direct investment (FDI) in the U.S. and Canadian forest industry between 1989 and 2008. Using panel data analysis methods, we find that bilateral FDI is positively influenced by depreciation of host country's real exchange rates and exchange rate volatility, and home country's forest product imports and exports and round wood production, and negatively by home country's GDP, current outward FDI position in the rest of the world, and current domestic capital expenditure has no effect on the FDI in the forest industry. These results imply that both imports and exports are complementary to outward FDI and that bilateral FDI is a substitute of FDI to the rest of the word.

1. Introduction

According to the International Monetary Fund (IMF) foreign direct investment (FDI) is an investment by a resident entity in one economy in an enterprise in another country with the objective of obtaining a lasting interest in the enterprise and an effective voice in its management. FDI transfers financial resources, technology, and managerial skills from home countries to host countries (Kiyota and Urata 2004). FDI also brings in various sales and procurement networks to expand business opportunities. Further, FDI increases competitive pressures on local firms to improve technical and allocative efficiency in the host countries, and enables efficient use of resources in the home countries. Economic analysis of FDI in the forest product industry is important for assessing the trade flows and changing comparative advantages of various countries.

The U.S. and Canada are the biggest trading partners in the forest products industry, comprising mainly the wood products (North American Industry Classification System, NAICS 321), and pulp and paper (NAICS 322) industries. Naturally they attract FDI in their forest industry from each other. In 1989, FDI from U.S. forest industry in all countries was (in 2000 constant) US$ 12.6 billion. This number reached US$ 16.1 billion in 1999, but declined to US$ 12.3 billion in 2008. But Canada's share of total U.S. outward FDI in forest industry decreased from US$ 6.5 billion (51.5%) to US$ 3.2 billion (25.8%) in the two decades. On the other hand, Canada's total FDI increased steadily from (in 2000 constant) C$ 4 billion in 1989, to C$ 8 billion in 1999, and further to C$ 10.7 billion in 2008. In the same period, Canada's outward FDI in the U.S. increased from C$ 2.6 billion to C$ 5.6 billion, but its share in the U.S. declined moderately from 64.3% to 52.5% (Table 1).

Forest products trade between the two countries had changing patterns as well. Although Canada remained the main source of U.S. imports of lumber and wood products, Canada's share of U.S. imports of paper and allied products declined between 1989 and 2008 (Table 2). China replaced Indonesia and Finland, respectively, as the second largest source of U.S. imports for lumber and wood products and paper and allied products. Meanwhile, Canada's share of U.S. exports more than doubled in both categories of products. Mexico replaced the U.K. as second largest destination for U.S. lumber and wood products exports and remained the second largest destination for U.S. paper and allied products exports.

In the case of Canada, the U.S. remained the main source of imports. U.S. share of Canadian imports declined for lumber and wood products, but increased for paper and allied products (Table 3). China replaced Indonesia as the second largest source of imports for lumber and wood products and Finland as the second largest source of imports for paper and allied products. For Canadian exports, the U.S. was the predominant destination. Japan replaced U.K. as the second largest destination of Canadian exports for lumber and wood products, and Brazil replaced U.K. for paper and allied products.

The purpose of this study is to analyze the trends of and factors influencing the bilateral FDI between U.S. and Canada. In particular we look into the relationship between FDI and forest products trade. Further and perhaps more important, we investigate the relationship between outward FDI in a host country and FDI to the rest of the world (ROW) and the relationship between FDI and domestic capital expenditure (DCE) in the home country. The latter has not yet been covered by previous studies on FDI in the forest industry (e.g., Pearse et al., 1995, Zhang 1997,

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Table 1
Spatial distribution of outward FDI in forest products industry, U.S. and Canada.
Source: U.S. Bureau of Economic Analysis, Dept of Commerce; Canada: CANSIM (database), Statistics Canada.

Country	1989		1999		2008	
	FDI	%	FDI	%	FDI	%
United States (billion 2000 constant US$)						
Canada	6.49	51.5	5.72	35.5	3.19	25.8
France	0.59	4.6	0.28	1.7	0.68	5.5
Italy	0.23	1.9	0.43	2.7	0.99	8.0
Total U.S.	12.6	100.0	16.10	100.0	12.34	100.0
Canada (billion 2000 constant C$)						
U.S.	2.59	64.3	4.78	60.2	5.62	52.5
UK	0.76	18.8	0.76	9.6	–	–
Other EU	0.60	14.8	1.31	16.5	2.00	18.7
Total Canada	4.03	100.0	7.95	100.0	10.70	100.0

Uusivuori and Laaksonen-Craig 2001, Laaksonen-Craig and Uusivuori 2006, Laaksonen-Craig 2004; 2008, and Nagubadi and Zhang 2008). The next section presents a brief review of literature, followed by a discussion of model specification and data. The remaining sections describe FDI trends, empirical results, and conclusions.

2. Literature review

Economists have long proposed that the propensity of a country to engage in outbound FDI and to attract inbound FDI is a function of (a) unique competitive advantages of its nationally owned firms, vis-à-vis those of foreign ownership; (b) competitive advantages of its location-bound assets, vis-à-vis other countries which might compete for the same FDI; and (c) actions taken by government which might affect (a) and (b) (Rugman 1980; Dunning 1988). In other words, the main elements of decision-making of multinational enterprises (MNEs) regarding investing abroad are their possession of ownership (O) advantages, access to locational (L) advantages, and ability to internalize (I) operations, constituting the OLI paradigm.

Although the relationship between FDI and market size is confirmed, its relationship with many of the variables, such as exchange rates, interest rates, tariff levels, growth, trade balance, taxes, wages, and openness, needs further research (Chakrabarti 2001). Blonigen (2005) reasons that the interconnectedness of FDI behavior with trade flows and the underlying motivation of the MNE behavior complicate the analysis. Foreign production and exports are often assumed to be substitutes. However, previous broad empirical work has overwhelmingly found strong evidence of complementary relationship (Blonigen 2001; Globerman and Shapiro 1999).

In case of the U.S. forest industry, Uusivuori and Laaksonen-Craig (2001) find that FDI and exports of forest products might have become full substitutes in the 1990s and for the Finnish and Swedish forest industries FDI is affected negatively by exports, while changes in FDI do not affect exports. On the contrary, Nagubadi and Zhang (2008) find a complementary relationship between FDI outflows and forest product exports in the forest industries in the U.S. and Japan which are major forest products importing countries, but engage in sizeable exports.

The empirical results of the impacts of exchange rates on FDI are mixed. Froot and Stein (1991) show a positive relationship between the depreciation of host country's currency and home country's FDI. Cushman (1985, 1988) presents diverse theoretical outcomes for the effect of real exchange rates on FDI decisions, depending on where the goods are produced, where the good are sold, and the source country of inputs used in the production process. Campa (1993) predicts a negative relationship between real home-country currency valuations and FDI in the host country. Empirically, several studies find a positive relationship between depreciating host-country currency (or appreciating home-country currency) and home-country's outward FDI (Cushman 1985, Marchant et al. 2002, Xing 2006, Schmidt and Broll 2009). In contrast, MacDermott (2008) finds that weaker currency in host countries discourages FDI from other countries. Goldberg (1993), Goldberg and Klein (1997), and Dorantes and Pozo (2001) find no relationship between exchange rates and the FDI. Chen et al. (2006) find that while depreciation of a host country's currency tends to stimulate FDI activity of cost-oriented firms, the depreciation tends to deter FDI activity for market-oriented firms and vice versa. In the case of forest products industry, a strong U.S. dollar increased the outward FDI from U.S. (Uusivuori and Laaksonen-Craig 2001) and from the U.S. and Japan (Nagubadi and Zhang 2008).

Theoretical predictions for the effect of exchange-rate volatility on FDI are also mixed in the literature. According to Schmidt and Broll

Table 2
Import sources and export destinations of forest products for U.S., in 2000 real US$.
Source: UN COMTRADE, 2009.

1989			1999			2008		
Country	Billions	%	Country	Billions	%	Country	Billions	%
Lumber and wood products								
Imports								
Canada	0.94	32.6	Canada	4.39	55.9	Canada	2.53	33.2
Indonesia	0.48	16.6	China	0.66	8.4	China	2.44	32.1
Mexico	0.14	5.0	Indonesia	0.50	6.3	Brazil	0.35	4.7
World	2.88	100.0	World	7.85	100.0	World	7.61	100.0
Exports								
Canada	0.27	20.3	Canada	0.65	34.3	Canada	0.93	45.9
U.K.	0.18	13.5	Mexico	0.20	10.6	Mexico	0.22	10.6
Germany	0.13	9.6	Japan	0.14	7.2	U.K.	0.10	4.8
World	1.34	100.0	World	1.90	100.0	World	2.03	100.0
Paper and allied products								
Imports								
Canada	8.14	71.6	Canada	9.37	65.2	Canada	8.00	51.2
Finland	0.52	4.6	Finland	0.70	4.8	China	2.08	13.3
Mexico	0.48	4.3	Germany	0.55	3.8	Finland	0.88	5.6
World	11.36	100.0	World	14.36	100.0	World	15.63	100.0
Exports								
Canada	0.96	17.7	Canada	3.43	33.2	Canada	4.32	35.2
Mexico	0.79	14.5	Mexico	1.93	18.7	Mexico	2.35	19.1
Japan	0.68	12.6	Japan	0.67	6.5	Japan	0.53	4.3
World	5.42	100.0	World	10.32	100.0	World	12.28	100.0

Table 3
Import sources and export destinations of forest products for Canada, in 2000 real C$.
Source: UN COMTRADE, 2009.

1989			1999			2008		
Country	Billions	%	Country	Billions	%	Country	Billions	%
Lumber and wood products								
Imports								
USA	0.38	69.6	USA	0.89	73.3	USA	0.78	55.0
Indonesia	0.04	7.4	China	0.06	4.8	China	0.28	19.5
Brazil	0.01	2.2	Indonesia	0.04	3.6	Germany	0.05	3.5
World	0.54	100.0	World	1.22	100.0	World	1.42	100.0
Exports								
USA	1.08	81.8	USA	6.69	93.9	USA	2.60	93.1
U.K.	0.10	7.3	Japan	0.25	3.6	Japan	0.05	1.7
Japan	0.03	2.5	U.K.	0.03	0.4	U.K.	0.02	0.6
World	1.33	100.0	World	7.13	100.0	World	2.80	100.0
Paper and allied products								
Imports								
USA	1.66	76.4	USA	4.92	86.5	USA	3.97	83.4
Finland	0.09	3.9	U.K.	0.11	2.0	China	0.22	4.7
Germany	0.08	3.5	Finland	0.11	2.0	Germany	0.09	1.9
World	2.17	100.0	World	5.69	100.0	World	4.76	100.0
Exports								
USA	8.57	82.2	USA	14.22	87.9	USA	8.19	80.5
U.K.	0.45	4.3	U.K.	0.27	1.7	Brazil	0.22	2.2
Japan	0.18	1.7	Japan	0.24	1.5	India	0.19	1.8
World	10.43	100.0	World	16.19	100.0	World	10.17	100.0

(2009), while standard exchange rate risk measure reveals a discouraging effect on FDI outflows in all industries, the alternative risk specification shows a clear distinction: in manufacturing industries, a negative relationship between increased exchange-rate risk and FDI flows and in non-manufacturing industries a positive relationship. Uusivuori and Laaksonen-Craig (2001) and Nagubadi and Zhang (2008) find that FDI is unaffected by exchange-rate volatility in forest industry.

The effect of exchange rate and its uncertainty on outward FDI from home country could depend on whether the host country's currency is appreciating or depreciating and whether the exchange rate volatility is increasing or decreasing. At one extreme, if the host country's currency is trending towards depreciation and its volatility is decreasing, it can be expected that the outward FDI from home country will increase. At the other extreme, if the host country's currency is trending towards appreciation and its volatility is increasing, it can be expected that the outward FDI from home country will decrease. There could be different situations in between these two extreme trends that would result in different effects on the outward FDI from home country to the host country. Consequently, the direction of the effect of the exchange rate and its uncertainty on outward FDI could differ for different periods, industries, countries.

For example, an increase in C$/US$ is expected to have a positive effect on FDI outflows from the U.S. to Canada. When this increase in the exchange rate is accompanied by lower exchange-rate volatility, it could still lead to a positive effect on FDI outflows from the U.S. to Canada. But if the increase in the exchange rate is accompanied by higher exchange-rate volatility, then the investors will have incentive for "wait and see" strategy, because the more volatility in the exchange rate, the greater the incentive for waiting becomes (Jeanneret 2005).

Studies on the relationship between outward FDI from a home country to a host country and ROW on the one hand, and home country's domestic capital expenditure, have been limited. Feldstein (1995) finds that outbound FDI reduces total domestic investment roughly dollar-for-dollar indicating substitution relationship, whereas inbound FDI contributes to total domestic investment by the same magnitude. However, Desai et al. (2005) suggest that greater foreign investment is associated with higher levels of domestic investment implying complementary nature. Braunerhjelm et al. (2005) argue that a complementary relationship can be expected to prevail in vertically integrated industries, whereas a substitution relationship can be expected in horizontally organized production.

Since forest industry is resource-based industry, firms from a country with relatively less forest resource endowment (with large domestic market) could be primarily motivated to secure raw materials (timber) when they invest in a foreign country. The trade impact of the resource-seeking FDI could be an increase in imports from the host country to the home country. On the other hand, firms from a country with relatively abundant forest resources (with small domestic market), would probably want to seek foreign market for its products. One way to gain familiarity and access to foreign markets is through FDI, including mergers with and acquisition of foreign firms. The trade impact of the market-seeking FDI would be an increase in exports from the home country to the host country.

Laaksonen-Craig (2004) concludes that there is no causal relationship between FDI and GDP in the U.S. and Canada, while bi-directional causality exists between FDI and GDP in Brazil and Chile. In contrast, Nagubadi and Zhang (2008) find a positive relationship between per-capita GDP and the FDI outflows in the case forest products industry in the U.S. and Japan. Laaksonen-Craig and Uusivuori (2006) find evidence of the firms' own research and development investments helping firms' exports rather than foreign sales (foreign production) during the 1980s, inferring a substitution relationship between exports and FDI, but this effect disappears in the 1990s. The study by Laaksonen-Craig (2008) on the relationship between the inflows of FDI in the forest industry and host-country specific factors in Brazil and Chile finds that the main motivation for FDI is both market-seeking and resource-seeking.

3. Model specification and data

Based on literature, we hypothesize that exchange rates, exchange rate variability, trade in forest products, market size, and forest resource endowment are factors influencing FDI in the forest sector. The FDI outward positions from the home country to the host country is thus

$$\mathrm{FDI} = \mathrm{f}(\mathrm{REX}, \mathrm{STDEV}, \mathrm{FPI}, \mathrm{FPX}, \mathrm{GDP}, \mathrm{RWP}, \mathrm{FDI}_{\mathrm{ROW}}, \mathrm{DCE}) + e$$

where, FDI is the outward FDI positions, REX real exchange rate defined as ratio between host country currency and home country currency, STDEV standard deviation of the real exchange rate, FPI is the real value of forest product imports, FPX the real value of forest product exports, GDP is real gross domestic product, RWP is round wood production in board feet as an indicator of domestic resource endowment, $\mathrm{FDI}_{\mathrm{ROW}}$ is outward FDI in the rest of the world, DCE is domestic capital expenditure, and e is a stochastic error term.

The variables used in this analysis, data sources, descriptive statistics, and their expected signs for the two countries are presented in Table 4. This analysis uses data from 1989 onwards, since the country-wise data on FDI from the U.S. Bureau of Economic Analysis are available from the year 1989 only. Data are in their respective country's real 2000 dollars. Our dependent variable, FDI, is the real value of FDI outward positions from home country to host country.[1] Data on outward FDI are obtained from Bureau of Economic Analysis (SIC 1980 and NAICS classification) of U.S. Department of Commerce for the United States and from CANSIM of Statistics Canada (SIC 1970 classification for 1989–1993, and NAICS classification for 1994–2008) for Canada. Combined outward FDI stock data for lumber and wood products, and paper and allied products, in their respective real 2000 dollars, deflated by their respective GDP deflators, are used. From these data, outward FDI from the U.S. to Canada and to ROW, and that from Canada to the U.S. and to ROW are estimated and used in the analysis.

The real exchange rate (REX) is constructed as the host country's currency divided by home country's currency. Thus, an increase in REX indicates depreciation of the host country's currency, which is expected to have a positive effect on outward FDI from the home country. As an indicator of exchange-rate volatility, the standard deviation of the real exchange rates, constructed from the monthly exchange rates for the corresponding year, is used. As noted, the effect of the exchange-rate risk on the outward FDI can be ambiguous.

Imports are represented by total forest product imports (FPI), consisting of lumber and wood products (SITC-3 code 63) and paper and allied products (SITC-3 code 64), to home country from the FDI host country and exports by total forest product exports (FPX) from home country to the FDI host country. The specific bilateral country-to-country specific data on FPI and FPX are obtained from the United Nations Commodity Database (UN COMTRADE 2009). As noted earlier, trade and FDI can be substitutes or complements. When trade is restricted due to higher tariffs, the two are more likely to be substitutes and when trade is unrestricted, these are more likely to be complements (Globerman and Shapiro 1999).

In this study, market size is represented by gross domestic product (GDP). GDP may have two diametrically opposed responses. On the one hand, as the home country's GDP increases, the resultant increase in the demand for forest products could lead to more domestic capital expenditure in the home country leading to a reduction in outward

[1] According to UNCTAD, FDI stock or position is defined as the value of the share of their capital and reserves (including retained profits) attributable to the parent enterprise (this is equal to total assets minus total liabilities), plus net indebtedness of associate or subsidiary to the parent firm (UNCTAD 2007).

Table 4
Variables used in the bilateral FDI analysis of the U.S. and Canada: 1989–2008.

Variable	Description	Source[a]	U.S.[b]	Canada[b]	Expected sign[c]
FDI	FDI outward stocks from home country in wood and paper products sector in billions of respective 2000 $ in the host country.	BEA and CANSIM	5.70 (1.21)	4.27 (1.35)	Dependent variable
REX	Respective country's real exchange rates.	USDA ERS	1.28 (0.17)	0.79 (0.10)	+
STDEV	Standard deviation of real exchange rates using monthly data for the respective years.	Estimated from USDA ERS	0.02 (0.02)	0.03 (0.02)	+/−
lagFPI	Bilateral imports of forest products in billions of respective 2000 dollars into home country by host country (lagged one-year).	UN COMTRADE (SIC-3)	11.80 (2.44)	4.44 (1.45)	?
lagFPX	Bilateral exports of forest products in billions of respective 2000 dollars into host country by home country (lagged one-year).	UN COMTRADE (SIC-3)	3.55 (1.13)	15.82 (4.47)	?
lagGDP	Gross domestic product in trillions of respective 2000 dollars (lagged one-year).	IMF	9.02 (2.59)	0.76 (0.26)	+/−
lagRWP	Round wood production in billion cubic meters (lagged one-year).	FAOSTAT	0.48 (0.02)	0.19 (0.01)	+/−
lagFDI	FDI outward stocks from home country in wood and paper products sector in billions of respective 2000 $ (lagged one-year).	BEA and CANSIM	5.87 (1.06)	4.11 (1.36)	+/−
FDI_{ROW}	FDI outward stocks from home country in wood and paper products sector in billions of respective 2000 $ in the rest of world.	BEA and CANSIM	8.88 (1.31)	2.80 (1.01)	−
DCE	Domestic capital expenditure in the home country in wood and paper products sector in billions of respective 2000 $ in the rest of world.	ASM, CIR (USCB) and CANSIM	10.52 (2.20)	6.38 (1.39)	−

[a] BEA = U.S. Bureau of Economic Analysis, Dept. of Commerce; CANSIM = CANadian Socio-economic Information Management system, Statistics Canada; USDA ERS = United States Department of Agriculture, Economic Research Service; UN COMTRADE (SIC-3) = United Nations Commodity Trade Database (Standard Industrial Classification, Version 3); IMF = International Monetary Fund; FAOSTAT = Food and Agriculture Organization Statistics; ASM, CIR (USCB) = Annual Survey of Manufactures, Current Industrial Reports, (U.S. Census Bureau).
[b] First number is mean, the number in ( ) is standard deviation.
[c] A "+" sign indicates positive effect, a "−" sign indicates negative effect, a "+/−" indicates sometimes positive effect and other times negative effect, and a "?" indicates that the effect is uncertain.

FDI or increase in inward FDI from other countries with market-seeking objective. On the other hand, an increase in the GDP of home country means increased availability of capital as investment which could lead to increased outward FDI in the resource abundant countries with resource-seeking objective (for example, FDI from the U.S. in Canada). The final outcome of capital allocation effects of GDP depends on which of these aspects dominate in the capital investment process.

Forest resource endowment is represented by round wood production (RWP) obtained from FAOSTAT (2009). As home country's resource endowment increases, outward FDI investment is expected to decrease, and as home country's resource endowment decreases, outward FDI is expected to increase. Since the U.S. is a major forest product importing and exporting country, the FDI from the U.S. may have both resource-seeking and market-seeking objectives. On the other hand, since Canada is a major forest product exporting country, FDI from Canada may have market-seeking objective.

4. Trends and empirical results

Fig. 1 shows total U.S. outward FDI in Canada and the rest of the world (ROW) between 1989 and 2008. The substitution nature of outward FDI from the U.S. to Canada and to ROW is evident. For much of the study period, U.S. FDI in the ROW was greater than that in Canada. For Canada, FDI in the U.S. was more important than that of the ROW, and the substitution between Canada's FDI in the U.S and ROW was not as strong (Fig. 2).

Fig. 3 shows domestic capital expenditure, outward FDI from the U.S. to Canada, and U.S. FDI in the rest of the world. Fig. 4 shows these data for Canada. For the U.S. the domestic capital decreased between 1989

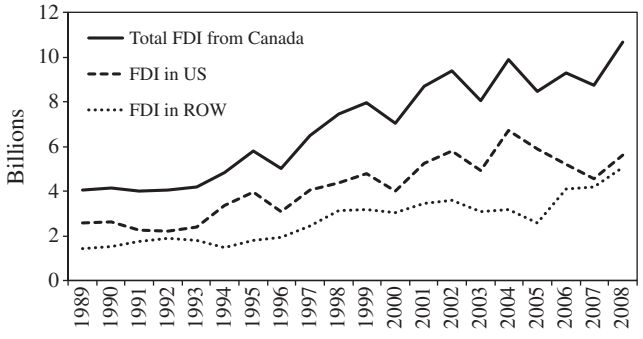

Fig. 2. Total Canadian outward FDI in forest products industry in U.S. and ROW, in 2000 Canadian dollars.
Source: CANSIM, Statistics Canada.

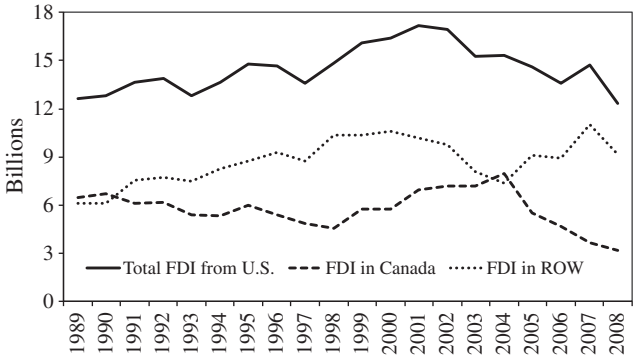

Fig. 1. Total U.S. outward FDI in forest products industry in Canada and ROW, in 2000 U.S. dollars.
Source: U.S. Bureau of Economic Analysis.

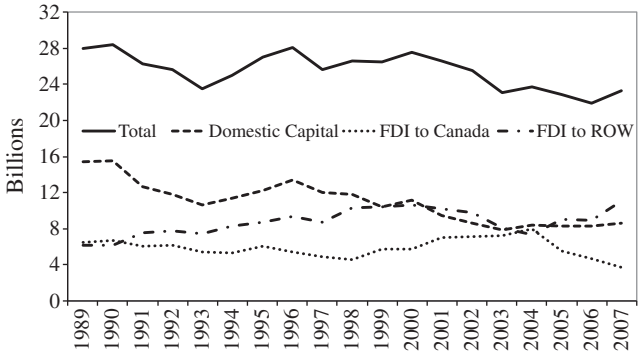

Fig. 3. U.S. domestic capital expenditure, FDI in Canada and ROW in forest products industry, in 2000 U.S. dollars.
Source: U.S. Bureau of Economic Analysis.

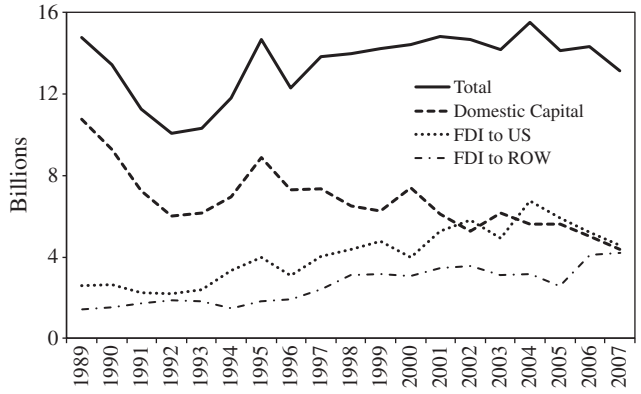

Fig. 4. Canadian domestic capital expenditure, FDI in U.S. and ROW in forest products industry, in 2000 Canadian dollars.
Source: CANSIM, Statistics Canada.

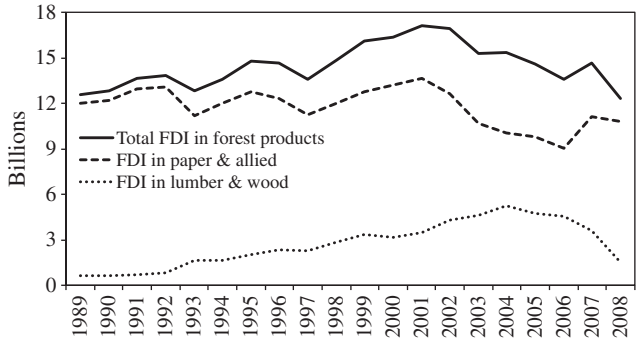

Fig. 5. U.S. FDI in Canadian forest products industry, in 2000 U.S. dollars.
Source: U.S. Bureau of Economic Analysis.

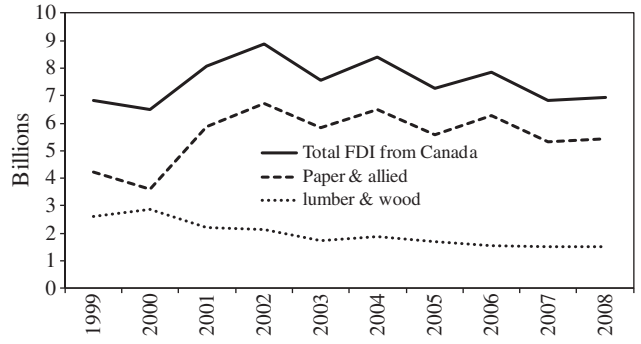

Fig. 6. Canadian FDI in U.S. forest products industry, in 2000 Canadian dollars.
Source: CANSIM, Statistics Canada.

and 2003, the FDI to Canada remained stagnant, while FDI to ROW increased. These three converged around 2003–2004. After that, U.S. FDI to ROW increased and to Canada decreased. In Canada, as domestic capital expenditure declined, both FDI to the U.S. and ROW increased up to 2004 and then diverged.

For both U.S. and Canada, a major portion of bilateral FDI goes to paper and allied products sector (Figs. 5 and 6).[2] This is perhaps related to economies of scale and capital intensity of the paper industry (Pearse, Zhang, and Leitch 1995). Further, the demand for paper is more responsive to rising incomes than that for solid wood products (Buongiorno, 1978; 1979).

[2] Due to unavailability of industry-wise data for Canada as per SIC-1970 classification, we have used NAICS data for lumber and wood products (NAICS code 321) and paper and allied products (NAICS code 322) from 1999 onwards, in Fig. 6.

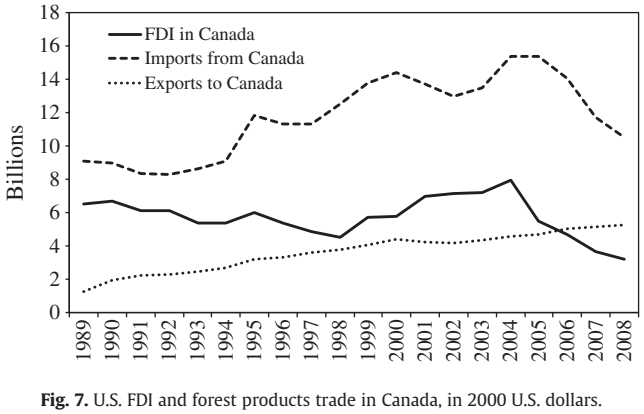

Fig. 7. U.S. FDI and forest products trade in Canada, in 2000 U.S. dollars.
Source: U.S. Bureau of Economic Analysis and UN COMTRADE.

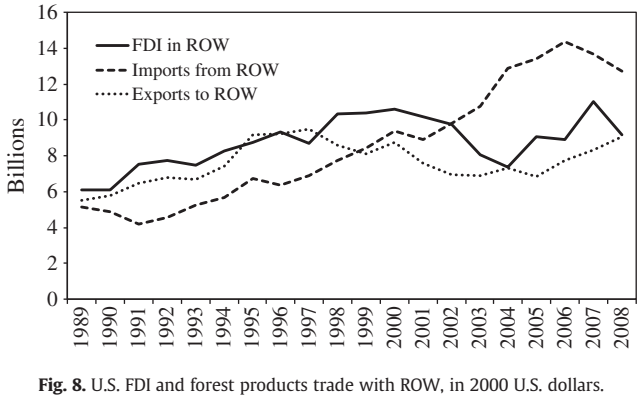

Fig. 8. U.S. FDI and forest products trade with ROW, in 2000 U.S. dollars.
Source: U.S. Bureau of Economic Analysis and UN COMTRADE.

Fig. 7 shows U.S. FDI and exports to Canada and imports from Canada. It seems that FDI from the U.S. to Canada had a weak correlation with U.S. imports of forest products from Canada (Correlation, $r = 0.17$) and with the U.S. exports to Canada ($r = -0.31$). However, U.S. FDI in ROW was more highly correlated with exports to ROW ($r = 0.68$) than imports from ROW ($r = 0.47$) (Fig. 8). On the other hand, Canada's FDI in the U.S. was highly correlated with imports from the U.S. ($r = 0.84$) as well as exports to the U.S. ($r = 0.72$) (Fig. 9). However, Fig. 10 shows that Canada's FDI in ROW is

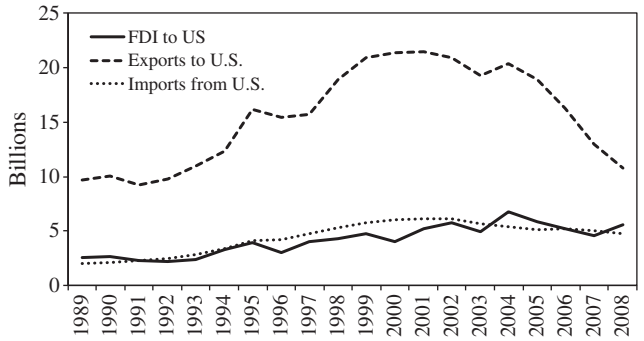

Fig. 9. Canadian FDI and forest products trade with U.S., in 2000 Canadian dollars.
Source: CANSIM, Statistics Canada and UN COMTRADE.

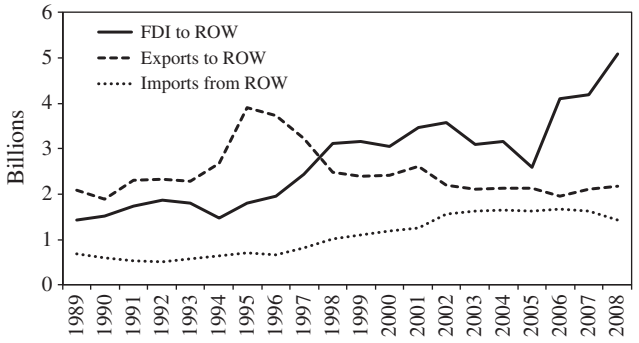

Fig. 10. Canadian FDI and forest products trade with ROW, in 2000 Canadian dollars. Source: CANSIM, Statistics Canada and UN COMTRADE.

positively correlated with imports from the ROW (r = 0.82), but negatively with the exports to ROW (r = −0.32).

We ran our model with two variants of panel data analysis: fixed effects model and random effects model. According to Greene (1993) the fixed effects model is a reasonable approach if the differences between units can be viewed as parametric shifts of regression function and this model might be viewed as applying only to the cross-sectional units in the study, not to additional ones outside the sample. In contrast, a random-effects analysis is more appropriate when individual specific constant terms are randomly distributed across cross-sectional units, which are drawn from a large population. The most fundamental difference between them is with respect to inference. In the fixed-effects analysis, we can infer about the actual groups we have, the actual subject pool we have looked at, while random-effects analysis allows us to infer something about the population from which we have drawn the sample.

Initial pooled OLS model runs showed multicollinearity and autocorrelation in the FDI outward position equations. Hence, we have used Parks (1967) method to correct for errors related to first-order auto-correlation by a two-stage generalized least squares procedure, and the Da Silva (1975) method to correct for hetero-skedasticity by mixed variance component moving average procedure. Our discussion is based on the results from Parks method which are better in terms of consistency of results of various models experimented.

In the final panel analysis models, we use one-year lags for FPI, FPX, GDP, RWP, and FDI variables as we expect that the current outward FDI responds to the changes in the value of these variables in the previous year. Table 5 reports the results for both fixed effects and random effects versions of panel analysis. As Hausman test is insignificant (P-value = 0.9994), the estimated results are indifferent from both models. In the following discussion we use the results from random effects model. Except the domestic capital expenditure, the coefficients for all the other variables are significant. The coefficient of determination (R^2) shows a good fit.

The effect of real exchange rate depreciation (REX) is positive, which is in line with most previous findings, including Uusivuori and Laaksonen-Craig (2001) and Nagubadi and Zhang (2008) in the forestry sector. However, our finding on the effect of the exchange-rate volatility between the two countries is different from previous findings of Uusivuori and Laaksonen-Craig (2001) and Nagubadi and Zhang (2008). A possible explanation could be that when the volatility of the host country's currency increases, the option value of home-country's currency in the host country increases. Exercising the option leads to more outward FDI.

The coefficients for forest product imports and exports are both positive, implying that bilateral imports and exports have a complementary relationship with the bilateral outward FDI position between these two countries. This result differs from the finding of Uusivuori and Laaksonen-Craig (2001) and Nagubadi and Zhang (2008). Perhaps this relationship is unique between these two countries. As for the effect of increases in home country's GDP on its outward FDI, we find that an increase in GDP limit outward FDI. Perhaps all investment, including FDI between the countries, is market-seeking. The coefficient for home country's round wood production (RWP), as an indicator of forest resource endowment, is significant and positive towards increasing the outward FDI from home country to host country. This reinforces that bilateral FDI in each other are resource-seeking.

The coefficient for the outward FDI in rest of the world (FDI_{ROW}) is negative and significant, indicating that the current bilateral outward FDI between the U.S. and Canada is in competition with the outward FDI in ROW from these two countries. The domestic capital expenditure (DCE) has no significant effect on the outward FDI in the forest products industry. Finally, the current outward FDI is positively related to one-year lagged outward FDI. Perhaps outward FDI is conducted in a continuous phased manner.

Table 5
Panel analysis results for bilateral FDI between the U.S. and Canada: 1989–2008.

Variable	Fixed effects[a]	Random effects[a]
Intercept	–	−3.7781**
		(0.017)
REX	0.5828	2.7726***
	(0.226)	(0.007)
STDEV	11.4044**	21.6798***
	(0.044)	(0.002)
lagFPI	0.3657***	0.3946***
	(0.007)	(0.002)
lagFPX	−0.0087	0.0863*
	(0.747)	(0.061)
lagGDP	−0.4084***	−0.3812***
	(0.001)	(0.001)
lagRWP	12.2862**	17.2058***
	(0.032)	(0.002)
lagFDI	0.4973***	0.3659***
	(0.001)	(0.01)
FDI_{ROW}	−0.2927*	−0.566***
	(0.062)	(0.002)
DCE	−0.198*	−0.13203
	(0.100)	(0.238)
R^2	0.9866	0.9116
TS length	19	19
EDF	29	29

Note: TS = time series; EDF = effective degrees of freedom.
[a] Figures in parentheses are P-values.and ***, **, and * indicate the significance of the coefficients at the 1%, 5% and 10% levels.

5. Conclusions

In this paper we attempt to shed some light on the trends and determinants of bilateral FDI in the forest industry between the U.S. and Canada in recent decades. Using panel data analysis methods, we find that depreciation in the host country's currency and volatility in the real exchange rates have a positive impact on the bilateral FDI between these two countries. Further, a complementary relationship exists between bilateral imports, exports, and outward FDI in the forest products sector between the two countries. Third, there is evidence for market-seeking, as well as resource-seeking, nature of the outward FDI between these countries. Finally, FDI between these two countries and outward FDI in the rest of the world are substitutes.

We have noted that the U.S. reduced its FDI in Canadian forest industry and increased its FDI elsewhere. In addition, Canada's own domestic investment in its forest industry declined in the study period. Both suggest that, compared to the U.S. forest industry, the competitiveness of Canadian forest industry declined and may decline further in the future. Perhaps the dynamics and interdependence of

forest industry between the two countries have changed. Future research could be conducted on the competitiveness of the forest industry in the two countries in comparison with major forest producing countries as well as the relationship between FDI in ROW and forest products trade with the ROW.

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