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UNIVERSITY OF ALBERTA

GLOBAL FACTORS AFFECTING THE CANADIAN FOREST INDUSTRY

by

Robert Gerhard Prins

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled GLOBAL FACTORS AFFECTING THE CANADIAN FOREST INDUSTRY submitted by Robert Gerhard Prins in partial fulfilment of the requirements for the degree of MASTER OF SCIENCE in FOREST ECONOMICS.

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ABSTRACT

Canada plays a major role in the global forest industry, accounting for 15% and 30% of the global production and export of forest products respectively. The forest industry also accounts for nearly 3% of Canada's GNP. Various global factors may affect the Canadian forest industry and domestic economy in the future including: tariff and nontariff trade barriers; trade agreements; fluctuating exchange rates; alternative sources of fibre; and stricter environmental regulations.

The model used to analyze the impacts of these global factors on the Canadian forest industry is a short run, inter-sectoral, inter-regional model specified in the proportional rate of change format. The Canadian forest industry is divided into five regions and five sectors. Canada is treated as an excess supplier of lumber, wood pulp, newsprint, and other paper products. Regional production is destined for the US, Japan, and the European Community (EC) which are treated as excess demand regions. Final demands for forest products are modeled using Armington equations which assume that products distinguished only by place of origin are imperfect substitutes. Primary and intermediate inputs are also modeled as imperfect substitutes. Multiple output industries are modeled using constant elasticity of transformation (CET) functions with individual output supply functions based on input and output prices. A system of linear equations is obtained which is solved by matrix inversion and multiplication.

Six global factors are analyzed with respect to their impact on the Canadian forest industry. First, import tariff reductions result in an increase in the export of Canadian forest products. Second, implementing new nontariff barriers such as export taxes negatively affects the Canadian forest industry. Third, exchange rate devaluations cause

exports of Canadian forest products to increase. Fourth, an increase in the supply of recycled paper negatively affects the pulping sector, but positively affects the newsprint and other paper sectors. Fifth, an increase in the supply of plantation fibre has small impacts on the Canadian forest industry. Sixth, stricter environmental regulations increase input costs and decrease the production and export of forest products.

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CHAPTER 1: INTRODUCTION AND PROBLEM IDENTIFICATION

Introduction

Canada's forest industry is important to the Canadian economy and to the global forest industry. Exports of forest products account for nearly 3% of Canada's GNP, and for more than 10% of Canada's total export value. The major export commodities of the industry are lumber, wood pulp, and newsprint. Within the Canadian forest industry, the pulp and paper sector accounted for 70% of the total value of production (TVP) of forest products in 1987. Woodbridge Reed and Associates (WRA) predict that this share of TVP will increase to 76% by 2010 (WRA 1988). The pulp and paper sector is also important to other sectors of the Canadian forest industry, notably the logging and sawmilling sectors. Pulp wood and pulp chips from the Canadian logging and sawmilling sectors are primarily consumed in the Canadian pulping sector. Thus, economic activity in the Canadian pulp and paper sector has a significant influence on the Canadian economy and on other sectors of the forest industry. Canada's forest industry also plays an important role in the global forest industry. Canada is the single largest exporter of forest products in the world accounting for nearly one in every four dollars earned from the global trade of forest products (WRA 1988).

Problem Identification and Objectives

Given the importance of forest product exports to the Canadian economy, it is important to have an analytical framework that allows one to understand the factors that regulate Canada's competitiveness in international markets. There are a number of factors that regulate economic activity in the Canadian forest industry including economical, political, environmental, and social/cultural factors. These may either be

domestic or foreign in origin. Relevant factors that regulate economic activity in the Canadian forest industry include: 1) trade barriers and trade agreements; 2) exchange rate fluctuations; 3) alternative sources of wood pulp; and 4) stricter environmental regulations. Given the importance of the Canadian forest industry, it is essential to know which factors will have large impacts on the industry, and what the magnitude of these impacts will be. This knowledge can be used in the development of government policy pertaining to the industry. The problem is to identify: 1) which factors have large impacts on the Canadian forest industry; 2) the magnitude of these impacts; and 3) the relative importance of each factor with respect to the Canadian forest industry.

This study has two objectives. The first is to identify/select those factors which may have a large impact on the Canadian forest industry. This is done through a review of the literature which examines the Canadian forest industry. The second is to quantify the actual impact that selected factors have on the Canadian forest industry and indicate the relative importance of each factor. This is done through the development of a quantitative model of the Canadian forest industry that simulates the impacts of each factor on the industry.

CHAPTER 2: LITERATURE REVIEW ON THE CANADIAN FOREST INDUSTRY

Introduction

The objectives of this literature review are: 1) to examine the domestic and global context within which the Canadian forest industry operates; and 2) to identify those factors which may have the greatest impact on economic activity in the Canadian forest industry. In order to develop a suitable framework (model) to quantify the impacts that selected factors have on the forest industry, it is necessary to understand the domestic and global context within which the industry operates. The domestic context includes the contribution that the forest industry has to the Canadian economy, and the production structure of each regional forest industry. The global context of the Canadian forest industry includes Canada's trade (import and export) of forest products.

Domestic Context of the Canadian Forest Industry

Table 2.1: Value of Canadian Production and Exports of Forest Products in 1986 ($US).

	Production		Exports	
Product	$US million	%	$US million	%
Lumber	5019	16	3505	29
Wood Pulp	8353	26	2932	24
Newsprint	4410	14	4079	34
Other Paper Products	2611	9	950	8
Other Wood Products	11162	35	578	5
TOTAL	31554	100	12044	100

Source: FAO, Yearbook of Forest Statistics 1986.

The Canadian forest industry plays an important role in the Canadian economy. In 1986, Canada's value of production for softwood lumber (hereafter lumber), wood pulp, newsprint, other paper products (all paper products excluding newsprint), and other wood products was over $US 30 billion (See Table 2.1). Exports of these forest products contributed over $US 12 billion (or 2.5%) to Canada's GNP, and accounted for over 10% of the total value of all Canadian exports (Canadian Pulp and Paper Association (CPPA) 1989). Pulp and paper products account for nearly 70% ($US 8 billion) of Canada's forest product exports. The value of production for other wood products ($US 11 billion) is derived primarily from the consumption of intermediate solid wood products (i.e. pulp wood and pulp chips) by the Canadian pulp and paper sector. That is, the pulp wood and pulp chips produced by the domestic logging and sawmilling sectors are primarily consumed by the Canadian pulp and paper sector. Relatively small quantities of pulp wood and/or pulp chips are exported.

Production Structure of the Canadian Forest Industry

Regional Forest Resources

Differences between the production structure of each regional forest industry arise primarily from differences in the piece size (sawlogs vs. pulp wood) and species composition (softwood vs. hardwood) of each regions' forest resource. For example, BC has softwood forests within which most of the timber is of sawlog size. Thus, softwood lumber and softwood bleached kraft pulp are the primary outputs of the BC forest industry. Sawlogs are processed by the BC sawmilling sector to produce lumber and pulp chips. The lumber is exported while the pulp chips are used by the BC pulping sector.

The Prairies have forests which contain twice as much softwood timber as hardwood timber (primarily trembling aspen (*Populus tremuloides*) and balsam poplar (*Populus balsamifera*)). Present utilization of the hardwood timber is small, although there is great potential to utilize this hardwood timber to produce mechanical wood pulps and papers. Most of the timber is of pulp wood size and is used directly by the pulping sector. Softwood bleached kraft pulp is the primary output from the Prairies forest industry.

The forests in the Central region also contain twice as much softwood timber as hardwood timber, although there is a much larger variety of hardwood species. More of the hardwood timber is utilized in the Central region to produce wood pulps and solid wood products. Timber is equally divided in size between sawlogs and pulp wood. As a result, the sawmilling, pulping, and paper sectors play equally important roles in the Central forest industry which produces a wide variety of forest products.

Three quarters of the timber in Atlantic Canada is classified as pulp wood. One third of the timber is hardwood, although less than half of the hardwood timber is utilized. Given the limited availability of sawlogs, the Atlantic sawmilling sector is small. Thus, softwood pulps are the primary outputs of the Atlantic forest industry.

In summary, Canada's forests contain a mixture of softwood and hardwood timber. However, only a small portion of the available hardwood timber is utilized. Increased utilization of the available hardwood timber will be accompanied by an increase in the size and importance of the pulp and paper sector. This sector will be the primary user of hardwood timber in the production of selected grades of wood pulp and paper products. With respect to timber size, regional sawmilling sectors are larger in those regions which have more sawlogs. In conjunction, the pulp chips produced by the sawmilling sector are used by the pulping sector of the same region.

Table 2.2: Canadian Forest Industry Input Shares in 1986.

	Input Shares (%)	
Industry	Primary Inputs*	Commodity Inputs
Logging	44	56
Sawmilling	46	54
Pulping	52	48
Newsprint	64	36
Other Paper	53	47

* Note: Primary inputs include labor, capital, and energy.
Sources: 1986 Statistics Canada Annuals 25-201, 35-250B, and 36-250B.

Table 2.3: Regional Logging and Sawmilling Output Shares in 1986.

Industry/Region	Output Shares (%)	
Logging	Pulp wood	Sawlogs
BC Coast	95	5
BC Interior	93	7
Central	39	61
Sawmilling	Lumber	Pulp chips
BC Coast	92	8
BC Interior	91	9
Central	75	25

Source: 1986 Statistics Canada Annuals 25-201, and 35-250.

Regional Forest Industry Input/Output Mixes

Input mixes vary across regions for a given forest sector and between forest sectors within a given region. Differences in input mixes across regions can be attributed to differences in regional forest resources. For example, pulp wood is the main commodity input used by the Prairies and Atlantic pulping sectors while pulp chips is the main commodity input used by the BC pulping sector. The Central pulping sector uses equal amounts of pulp wood and pulp chips. As noted above, this relates to the quantity of sawlogs growing in the forests of each region. Small quantities of pulp chips are used in the Prairies or Atlantic pulping sectors because they have small sawmilling sectors. Input mixes also vary across forest sectors due to different production technologies. For example, the logging and sawmilling sectors spend a greater share of their input costs on commodity inputs (56% and 54% respectively) than does the pulp and paper sector (36% to 48%) (See Table 2.2). Each regional newsprint sector spends a greater

share of its commodity input costs on wood pulp (92%) than does the regional other paper sector (75%). Considerable variation is also evident in the output mixes of the logging and sawmilling sectors of BC and Central Canada (See Table 2.3).

Regional Production of Forest Products

Based on production, nearly half of Canada's entire forest industry is located in Central Canada (See Table 2.4). The Central region produces the most lumber, wood pulp, newsprint, and other paper products of all the Canadian regions. However, many of the Central region's wood pulp and newsprint mills are old and technologically obsolete (WRA 1988). The BC coast region has the second largest regional forest industry, producing 15% of Canada's entire forest industry output. Although the BC interior region produces and exports significant amounts of lumber and wood pulp, it only has relatively small newsprint and other paper sectors. In contrast, the Prairies and Atlantic regions have relatively small sawmilling sectors. These two regions primarily produce wood pulp, although they also produce lesser amounts of newsprint and other paper products.

Table 2.4: Regional Production of Forest Products in 1986.

	Lumber		Wood Pulp		Newsprint		Other Paper	
	,000 m3	% of Canada	,000 MT	% of Canada	,000 MT	% of Canada	,000 MT	% of Canada
BC Coast	8925	16	2792	13	1504	16	1097	18
BC Interior	22542	42	3553	16	0	0	0	0
Prairies	NA	0	1064	5	163	2	130	2
Central	22696	42	11112	51	6058	65	4473	75
Atlantic	NA	0	3191	15	1564	17	270	5
Total	54163	100	21712	100	9289	100	5970	100

NA: not applicable. m3: cubic meters. MT: metric tonne.
Sources: 1986 Statistics Canada Annuals 35-002, 35-003; CPPA Reference Tables 1986.

Table 2.5: Canadian Exports of Forest Products by Destination in 1986.

	Lumber			Wood Pulp			Newsprint			Other Paper		
Export Destination	,000 m3	% of CE	% of CC	,000 MT	% of CE	% of CC	,000 MT	% of CE	%of CC	,000 MT	% of CE	% of CC
US	32920	87	30	3669	48	7	7055	82	56	1415	65	3
Japan	2168	6	7	1000	13	9	166	2	6	79	4	1
EC	2085	6	5	2024	27	12	432	5	8	352	16	1
ROW	653	1	NA	929	12	NA	938	11	NA	326	15	NA
Total	37826	100	NA	7622	100	NA	8591	100	NA	2172	100	NA

CE: Canadian exports. CC: importing countries consumption. ROW: rest of world.
Source: FAO Yearbook of Forest Statistics 1986.

Future Structure of the Canadian Forest Industry

Over the next two decades, it is expected that three major trends will change the structure of the Canadian forest industry. First, the Canadian pulp and paper sector is expected to shift production to higher value added products. This includes selected grades of mechanically based paper products produced from hardwood timber (Wiewel 1988; WRA 1988). As evidence of this trend, several mechanical wood pulp mills and world class white paper mills are presently under construction in Canada (Wiewel 1988). Second, the forest industry is expected to become more integrated. Economic pressure will force the pulp and paper sector and the solid wood products sector to integrate to reduce costs and increase efficiency (Aurell and Poyry 1988; WRA 1988). Third, ownership of pulp and paper mills is expected to become more concentrated and more international (Aurell and Poyry 1988). For example, Noranda Inc. owns a major share of the Royal Dutch Papermills (KNP) in the Netherlands. Also, Japanese firms are interested in buying new and existing wood pulp mills worldwide.

Global Context of the Canadian Forest Industry

Historical Trade Patterns

In the early 1900's, Canada's forest industry primarily served the domestic market. By the 1920's, Canada's forest industry had become a major exporter of forest products to the US. Two factors caused this change in the Canadian forest industry. First, provincial legislation was implemented to prohibit the export of unmanufactured pulp wood cut on Crown land (Uhler et al. 1987). The prohibition of pulp wood exports led to US investment in the Canadian forest industry. New sawmills and wood pulp mills were constructed. Second, the US government eliminated import tariffs levied against Canadian wood pulp and newsprint. This allowed greater penetration of the US market by Canadian producers and consequently led to an expansion in the Canadian wood pulp and newsprint sectors. On the other hand, the Canadian other paper sector did not have an opportunity to expand since the US import tariffs levied against Canadian other paper products remained intact. The Canadian forest industry is presently a major producer and exporter of lumber, wood pulp, and newsprint, and a minor producer of other paper products destined for the domestic market (Uhler et al. 1987).

Present Trade Patterns

Today, Canada plays a major role in the global forest industry, especially in the export of lumber, wood pulp, and newsprint. This position has not changed significantly over the last decade (See Tables 2.6 and 2.7). In 1976, Canada accounted for 11% of the global production of lumber, and 40% of the global export of lumber. By 1986, Canada's lumber production had increased by nearly 20 million cubic meters, increasing its share of total world production to 15%. Exports of Canadian lumber increased by

15 million cubic meters, increasing Canada's share of total world exports to 51%. Between 1976 and 1986, Canadian production of wood pulp increased by 4 million tonnes while exports of wood pulp grew by 3 million tonnes. During the same period, Canada's share of global wood pulp production dropped from 16% to 15% while Canada's share of global wood pulp exports dropped from 36% to 33%.

Although wood pulp is a major export commodity making up some 40% of Canada's pulp and paper exports, over 65% of Canada's wood pulp production is consumed domestically to produce newsprint and other paper products (Uhler et al. 1987). Canada accounted for 32% of global newsprint production in 1986, down from 37% in 1976. Similarly, Canada's share of global newsprint exports dropped from 68% in 1976 to 61% in 1986. Canadian newsprint production and exports increased by over 1 million tonnes between 1976 and 1986. Canada's other paper production and export volumes also increased between 1976 and 1986, although Canada's position in the global market for other paper products remained the same. Between 1976 and 1986, domestic consumption of lumber, wood pulp, and other paper products increased while domestic consumption of newsprint declined (See Tables 2.6 and 2.7).

Future Trade Patterns

Canada is expected to continue playing an important role in the global forest industry. However, Canada is expected to shift its emphasis to higher value added products (i.e. other paper products) (Wiewel 1988). The Canadian other paper sector has excellent long term export opportunities with its inherent competitive advantage (Aurell and Poyry 1988). In response to increasing foreign demand for Canadian other paper products, domestic wood pulp production should increase and/or wood pulp exports should decrease. Production and exports of newsprint are projected to grow

steadily into the next century with the production of newsprint using increasing amounts of recycled wastepaper. In general, the outlook for the production and export of pulp and paper products is very good. In contrast, the outlook for the production and export of solid wood products (primarily lumber) is not so good. Increasing competition for scarcer supplies of timber may negatively affect the sawmilling sector. Domestic and export demand for lumber is projected to grow at a slower rate than for pulp and paper products through to 2010 (WRA 1988).

Spatial Trade Patterns

Canada's primary export markets for forest products are the US, Japan, and the European Community (EC). In 1986, 87% of Canada's lumber exports were to the US, making up 30% of total US consumption. The Japanese and the EC markets each received 6% of Canada's total lumber exports, making up 7% and 5% of domestic consumption respectively (See Table 2.5). Global trade in wood pulp is heavily concentrated in North America, Japan, and Europe. In fact, these regions accounted for close to 90% of global wood pulp imports in 1984 (Jegr 1985). In 1986, 88% of Canada's wood pulp exports were destined for these three markets. Canadian wood pulp made up 7% of total US consumption, 9% of total Japanese consumption, and 12% of total EC consumption (See Table 2.5).

Table 2.6: Canadian Production and Trade of Forest Products in 1976.

	Lumber		Wood Pulp		Newsprint		Other Paper	
	,000 m3	% of world	,000 MT	% of world	,000 MT	% of world	,000 MT	% of world
Production (P)	35463	11	17688	16	8062	37	3729	3
Imports (I)	1048	2	84	1	0	0	554	4
Exports (E)	22634	40	6115	36	6997	68	1069	6
Domestic Consumption	13877	NA	11657	NA	1065	NA	3214	NA

NA: not applicable. m3: cubic meter. MT: metric tonne.
Source: FAO Yearbook of Forest Statistics 1976.

Table 2.7: Canadian Production and Trade of Forest Products in 1986.

	Lumber		Wood Pulp		Newsprint		Other Paper	
	,000 m3	% of world	,000 MT	% of world	,000 MT	% of world	,000 MT	% of world
Production (P)	54163	15	21712	15	9289	32	5970	3
Imports (I)	794	1	267	1	0	0	629	2
Exports (E)	37826	51	7622	33	8591	61	2172	7
Domestic Consumption	17131	NA	14357	NA	698	NA	4427	NA

Source: FAO Yearbook of Forest Statistics 1986.

Canada exported 8.5 million tonnes of newsprint in 1986. 82% of these exports were to the US. Only 2% and 5% of Canada's newsprint exports reached the Japanese and EC markets respectively. Canadian newsprint made up 56% of total US consumption, 6% of total Japanese consumption, and 8% of total EC consumption. As discussed earlier, Canada plays a minor role in supplying the US, Japan, and EC with other paper products (3%, 1%, and 1% of domestic consumption respectively).

The US will continue to be Canada's major export market for all forest products in the future (WRA 1988). It is expected that pulp and paper exports to the US, especially of other paper products, will grow at a much faster rate than for lumber exports (WRA 1988). The US market will grow fastest in absolute terms, while exports to the Japanese and Pacific Rim countries will grow faster in relative terms, especially for western producers (WRA 1988). Future exports of pulp and paper products to Japan are expected to depend heavily on three things: 1) how much pulp chips Japan imports; 2) how much the Japanese invest in overseas pulp mills; and 3) to what extent recycled wastepaper replaces wood pulp in Japanese production of paper products (Kawake 1988). Similarly pulp and paper exports to the EC are expected to depend on the extent to which timber use is decreased through: 1) small scale chemi-thermo-mechanical pulp (CTMP) mills; 2) recycled wastepaper separation units; substitution of plantation eucalyptus pulp for Canadian softwood pulp; and 4) the development of the Organosolv pulping process in as much as its claims of environmental safety and small scale are valid (De Korver 1989). However, consumption of pulp and paper products in the EC is expected to grow faster than production (Clark 1988).

Factors Regulating the Canadian Forest Industry

Five major issues dominate the literature concerning the present and future of the Canadian forest industry. These five factors include: 1) trade barriers, both tariff and nontariff barriers (NTB's); 2) trade agreements such as the Canada/US Free Trade Agreement (FTA); 3) exchange rate fluctuations, especially in the Canada/US exchange rate; 4) the availability of substitute fibre sources for Canada's wood pulp such as recycled wastepaper and plantation eucalyptus; and 5) stricter environmental regulations specifically limiting the allowable pollution/effluent levels of the pulping sector.

Trade Barriers

i. Import Tariffs

Import tariffs can play an important role in regulating the trade of forest products. In Canada, the US, Japan, and the EC, import tariffs are larger for higher value added forest products (i.e. tariff escalation) (See Table 2.8). For example, other paper products face higher import tariffs than the lower value added products such as wood pulp and newsprint. Traditionally, these higher tariffs on other paper products have been designed to protect their respective domestic industries. Import tariffs on other paper products may not be important today, however, they affect the paper grades in which Canada is competitive and may restrict Canada's market potential in the future (WRA 1988). In addition to these general import tariffs, the US has also imposed a temporary 35% import tariff on Canadian wood shakes and shingles.

Table 2.8: Import Tariff Rates (% ad valorem) on Forest Products Imposed by Canada, the US, Japan, and the EC in 1986.

	COUNTRY			
PRODUCT	CANADA	US	JAPAN	EEC
Wood Pulp	0	0	2.2	0
Newsprint	0	0	3.1	5.4
Other Papers	9.2	4.2	*5.1	3.0

Source: GATT Publication MTN.GNG/NG3/W/15 1988.
*Note: This is an weighted average (See Appendix 4).

ii. Nontariff Barriers

Import tariffs tend to be the most visible barriers to trade, but are usually not the most troublesome barriers (Meister 1988). Meister discusses Japanese 'invisible' or 'systemic' nontariff barriers (NTB's) which are rooted in Japanese business practices and cultural affinities and favor domestic paper products over imports. Three relevant NTB's affect Canada's trade in forest products. First, Canada imposed a 15% export tax on softwood lumber exported to the US. This was done in response to complaints by the US lumber producers that the Canadian stumpage pricing system provides unfair subsidies to the Canadian sawmilling sector. The alternative to this 15% export tax was a US 15% countervailing duty collected by the US treasury (Percy and Constantino 1987). Second, the EC imposes a 600 000 tonne per year (tpy) quota on imports of waterlined newsprint. This may limit future Canadian access to the EC market. Third, Japan imposes technical standards and barriers regarding the fire safety and structural characteristics of solid wood products (i.e. lumber, plywood, and particle board) (Laschinger, 1990).

Trade Agreements

Those trade agreements which directly involve Canada, such as the Canada/US Free Trade Agreement (FTA), are designed to eliminate the trade barriers discussed above, and to prevent future trade disputes. Those trade agreements which do not directly involve Canada, but have a negative effect on the Canadian forest industry can be seen as a class of NTB's. An example of such an agreement is the EC's trade agreement with European Free Trade Association (EFTA) which gives the EFTA tariff free access to the EC's market with respect to all forest products.

i. Canada/US Free Trade Agreement

The Canada/US Free Trade Agreement (FTA) calls for the elimination of all import tariffs on forest products on both sides of the border over a five year period (WRA 1988). In essence, the FTA will lead to the elimination of Canada's 9.2% and the US's 4.2% import tariffs levied against other paper products. In addition, the FTA also provides a framework within which trade disputes may be settled, such as those disputes for the export of Canadian lumber, wood shakes, and shingles. The impact of this agreement appears to be beneficial to the vast majority of participants in the forest industry. In effect, it provides an opportunity for the Canadian forest industry to achieve a substantial boost to its exports by focusing on the market opportunities in the US. Removal of imports tariffs will probably be of only limited impact, mostly beneficial, although there is some threat to small scale, high cost producers. Removal of other impediments to market access will probably be of greater importance to the Canadian industry (WRA 1988).

ii. Integrated Europe 1992

The integration of Europe planned for 1992 which will remove the internal trade barriers between present EC member countries may have a positive impact on Canada's trade with the EC. The prospect of a unified EC market should facilitate the distribution of Canadian forest products in the EC market. This integration will be of considerable importance to eastern Canadian suppliers. Focusing on the scheduled unification of EC trade policies in 1992 should receive high priority for Canada in trade discussions (WRA, 1988).

Exchange Rates

Exchange rates do, and will continue to, play an important role in determining Canada's competitive position (WRA 1988). As evidence of this, major changes in currency exchange rates, particularly against the US and Canadian dollars since mid 1985, have improved Canada's competitive position in the global market for pulp and paper products with respect to Nordic producers (Slinn 1988). A recent strengthening in the Canadian dollar has hurt exports of wood pulp and newsprint to the US (Pulp and Paper 1990). In applied work, Muller (1978) found less than unit elasticities for prices and quantities in the Canadian pulp and paper industry with respect to changes in the Canada/US exchange rate. More changes in Canada's exchange rate may further alter Canada's competitive position with respect to forest products.

Alternative Fibre Sources

i. Plantation Fibre

Increasing competition from Brazilian eucalyptus and Chilean pine plantations is expected to continue into the future (WRA 1988). Eucalyptus pulp from Brazil and

the Iberian peninsula provides exceptional bulk properties, good opacity, and improved formation properties and can provide some distinct advantages in the cost and efficiency of paper production (Molleda 1988; Wiewel 1988). However, the lower cost of eucalyptus pulp results from its faster growth. Faster growth leads to shorter fiber length and lower quality relegating eucalyptus pulp as only a partial substitute for softwood pulp (Gourlay 1989). The technology associated with paper production has evolved to a point where paper producers mix and match different wood pulps to obtain paper with the desired characteristics. Within this framework, Canada's softwood pulp is used to provide strength in the wet web and tear in the finished product (Molleda 1988).

Table 2.9: World Paper Making Fibre Capacity Distribution (%).

	YEAR		
GRADE	1976	1986	1990*
Wood pulp	74	68	64
Recycled Wastepaper	21	26	29
Other Fibre	5	6	7
TOTAL	100	100	100
Million Tonnes	176	228	252

* Estimated Values
Source: FAO.

ii. Recycled Wastepaper

Recovery and consumption of recycled wastepaper has increased steadily since 1970, and this trend is expected to continue into the future (Slinn 1988; WRA 1988) (See Table 2.9). Recycled wastepaper use is expected to increase dramatically in North America where until recently little recycled wastepaper was used (WRA 1988). However, increasing the use of recycled wastepaper use may be restricted by the cost

of collecting wastepaper from small urban centers and delivering it to remote paper mills (Wood 1988). In other countries, serious efforts have been directed to increasing recycled wastepaper use. This may negatively affect the demand for Canadian wood pulp, especially since wood pulps either cause environmental pollution (chemical) or require a large amount of electricity (mechanical) (Gottschling 1988; Slinn 1988). Evidence for the increasing concern to recycle wastepaper can be seen in the US where numerous states have, or are in the process of, passing legislation to tax publishers who use newsprint manufactured only from wood pulp (Gourlay 1989).

Environmental Regulations

The Canadian forest industry is facing increasing pressure from environmental groups, domestic regulations, and foreign importers to reduce the environmental damages caused through the production of forest products. The two sectors of the Canadian forest industry that may be affected by these regulations are the logging and pulping sectors. First, public concern regarding the over-cutting of Canada's forest and the preservation of ecosystems will likely lead to a reduction in the forest land base and regional annual allowable cuts (AAC's). As regional AAC's limit harvest levels, delivered wood costs will increase which will negatively affect the logging sector. Delivered wood costs are also expected to rise as lower quality, second growth timber is logged. Second, stricter pollution regulations regarding pulp mill effluent (specifically on the levels of dioxins, furans, and other chlorinated compounds that can be released) will increase the production costs of the Canadian pulping sector. Different technological solutions are available, depending on the type, size, and age of mill, and

all of them are costly (Pulp and Paper Journal 1990). For example, it is projected that it will cost the BC pulping industry $800 million to eliminate the production of toxic chemicals such as dioxins by 1994 (Pulp and Paper 1990).

This research focuses on the impact of stricter pollution regulations on the Canadian pulping sector. Methods for cleaning up and/or reducing the dioxin pollution from pulp mills include: 1) altering the production process by chemically cooking the pulp longer at earlier processing stages before chlorine is used; 2) installing oxygen delignification (bleaching) equipment which produces cleaner pulp, enables greater amounts of waste water to be captured by the recovery boiler, and reduces the volume of effluent; and 3) replacing elemental chlorine with chlorine dioxide as a substitute bleaching agent which is almost as effective but does not produce dioxins. Altering the production process (i.e chemically cooking the pulp longer in the early stages of production) increases the input costs associated with wood pulp production. That is, more energy and more labor will be used to produce the same amount of wood pulp. Thus, the costs for implementing this solution are a decrease in technological efficiency, and an increase in energy, chemicals, and labor expenditures. Costs for new capital equipment range from $100 million per mill for new oxygen bleaching equipment to $10 million per mill for new chlorine dioxide. Installation costs vary from $20 million to $70 million, depending on the age, size, and type of mill under consideration (Muller 1978; Pulp and Paper Journal 1988; Noble 1989). Alberta pulp mills presently under construction or expansion are required to install all three chlorine substitution systems recommended by the CPPA: bigger digestors for extended cooking, oxygen delignification systems, and chlorine dioxide generators and (Noble 1989; Simpson 1989). Published estimates report that average total production costs are increased by

3% to 9% for stricter pollution regulations facing the pulping sector (Muller 1978). Resource Information Systems Inc. (RISI) estimates that the average mill will have to spend $US 50 million to control dioxin discharges (Pulp and Paper 1990).

Foreign importers of wood pulp, such as West Germany, are beginning to tax pulp and paper companies according to the amount of chlorinated compounds in their effluent. In addition, European paper makers are calling for a complete ban on the import of North American wood pulp that is not produced under the same environmental standards which exist in Europe after 1992 (Noble 1989). Oxygen delignification equipment is the only equipment that will cut chlorinated compounds enough to be able to comply with such new European laws if they are implemented.

Public opposition to expansion in the forest industry also affects Canada. For example, the a proposed 400 000 tonne per year (tpy) bleached kraft pulp mill planned for Tasmania by the Australian Pulp and Paper Mills and Noranda Inc. was recently cancelled due to public opposition over its environmental impact. Public pressure also has forced delays in the construction of the Alberta Forest Industries Inc. bleached kraft pulp mill in Athabasca (Pulp and Paper 1990).

CHAPTER 3: MODEL DEVELOPMENT

Previous Modeling Efforts on the Canadian Forest Industry

Previous research has examined different aspects of the Canadian and North American forest industry as it relates to the trade of forest products. There are four major categories of interest which include: 1) assessing the market structure of individual forest industries; 2) developing demand and supply equations for specific forest products; 3) analyzing inter-regional and international trade of forest products; and 4) conducting forest policy analysis with respect to trade in forest products. Each category plays an important role in the analysis of trade in forest products.

Canadian Forest Industry Structure

i. Market Structure and Economies of Scale

Considerable controversy exists as to the market structure of the Canadian forest industry. Armstrong (1975) concluded that the pulp and paper sector in North America approximates the structure of an oligopoly. A number of other authors also supported this conclusion, specifically that the newsprint sector was an oligopoly with some form of price leadership (Eastman and Styholt 1967; Moore 1970; Guthrie 1972; Irland 1976). Recent work on the Canadian pulp and paper sector concluded that the sector was not perfectly competitive (Muller 1978; Klein 1985; Schembri and Robicheau 1986; Uhler and Townsend 1986). Muller found the Canadian pulp and paper sector to be oligopolistic in nature, while Schembri and Robicheau conclude that the sector as a whole operates as a price discriminating monopolist. All of these studies examine the

pulp and paper sector within their domestic market. Other studies which examine the pulp and paper sector in the context of the global market conclude that the global industry is perfectly competitive (Slatin 1975; Buongiorno et al. 1983; Gilless 1983).

The most recent and comprehensive study of the Canadian pulp and paper sector (Bernstein, 1989) also supports this conclusion that the sector is perfectly competitive. Bernstein's research indicated that the pricing of pulp and paper products occurred at marginal costs (i.e. there was no evidence of mark-ups). Klein (1985) looked specifically at Canada's pulp and paper sector and found that the structure of the sector varied considerably between geographical region and between product. Schembri and Robicheau (1986) recognized that the Canadian pulp and paper sector is competitive in international markets. In addition to this research, economic theory dealing with contestable markets suggests that the threat of entry to the Canadian pulp and paper sector would cause the existing firms to operate in a perfectly competitive manner. In conclusion, the literature suggests that the Canadian pulp and paper sector is oligopolistic in nature with respect to its domestic market, but is perfectly competitive with respect to its global market.

A number of studies have looked at economies of scale and technological change in the forest industry. The studies which examined the pulp and paper industry found some degree of economies of scale (Buongiorno and Gilless 1980; Singh and Nautiyal 1984; Martinello 1985; Stier 1985). Most of these studies also found positive technological change in the Canadian pulp and paper industry although Singh and Nautiyal (1984) and Martinello (1985) found negative technological change.

Demand and Supply of Forest Products

Early projections of the demand for forest products were simple econometric equations with population and economic activity as the sole explanatory variables (FAO 1960, 1963, 1972). McKillop (1967) undertook a more extensive study, estimating demand and supply functions for the major forest outputs in the end product and primary product (roundwood and stumpage) sectors of the US forest industry. More recent studies have focused on the price responsiveness of demand for forest products (Buongiorno 1978, 1979; Buongiorno and Kang 1981; Chou and Buongiorno 1984). Within the development of the Global Trade Model (GTM) (Kallio et al. 1987), a comprehensive review of the demand and supply of forest products was done. McKillop and Wibe (1987) provide a comprehensive review of recent studies on the demand for sawnwood and panel products. Similarly, Uutela (1987) provides a review of recent studies on the demand for pulp and paper products. Most of the studies reviewed analyzed the demand and supply of forest products in a partial equilibrium framework. Inherently, the studies which analyzed the structure of the forest industry (see previous section), also examined the production and supply of forest products. Most notable for Canadian pulp and paper products are the studies by Muller (1978), Klein (1985), Schembri and Robicheau (1986), and Bernstein (1989).

Trade in Forest Products

Adams et al. (1980) discuss the evolution of trade modeling with respect to forest products. Models examining the trade in forest products have developed from simple materials balance models to more sophisticated spatial equilibrium and dynamic market models. The simple materials balance models developed projections of demand and

supply from exogenous forecasts of various economic indicators. These projections were then compared in order to identify materials shortages (or excesses). Omission of prices in these models was considered a serious weakness and led to the development of a large number of partial equilibrium market and industry models. These models were largely based on a series of econometrically estimated derived demand and supply functions which were solved in each time period to obtain a time series of prices and quantities. However, many of these models employed ad-hoc specifications of demand and supply equations, loosely tied to economic theory. Recent research has given a great deal of attention to spatial equilibrium models, of which the Global Trade Model (GTM) (Kallio et al. 1987) for forest products, developed by the International Institute For Applied Systems Analysis (IIASA), is the most comprehensive. The GTM is a spatial equilibrium model which recognizes 18 regions and 16 forest products. It is a partial market equilibrium economic model following the framework developed by Hotelling (1932) and Samuelson (1952). The mathematical formulation is similar to that used in a model of the North American pulp and paper sector (Buongiorno 1981; Buongiorno and Gilless 1983, 1985) and is related to the structure of the Timber Assessment Market Model (TAMM) developed by Adams and Haynes (1980). Adams and Haynes (1987) also provide a review of recent studies and models used to examine the trade of forest products. Most of these trade models are in a partial equilibrium framework and look at predicting future trade flows.

Percy et al. (1989) discuss the deficiencies associated with the above generation of forest sector models, and provide an alternative direction for modelling the forest sector. The primary deficiencies with the previous set of forest sector models are that they ignore inter-sectoral linkages and that they assume that the macroeconomic variables

and indices of aggregate economic activity are not affected by changes in the forest sector. The alternative approach put forward by Percy et al. (1989) is to model the forest sector in a computable general equilibrium (CGE) framework which introduces inter-sectoral linkages and endogenizes some of the macroeconomic variables. However, this framework ignores inter-regional and inter-temporal linkages. Thus, it is more useful for the economic analysis of trade policy shocks than for the long range predictions of trade flows.

Forest Trade Policy Analysis

A number of issues are analyzed in the literature relating to the impact of domestic and foreign policy changes on the Canadian forest industry. Muller (1978) developed a partial equilibrium econometric model of the Canadian pulp and paper sector, formulated specifically to simulate the effects of increased production costs which result from mandatory pollution controls. Muller also looked at the effects of exchange rate changes. Less than unitary elasticities were found for the major variables (prices and quantities) with respect to changes in real income, unit factor requirements, and exchange rates. Muller concluded that overall industry output would not decline by more than 2% for a 6% increase in production costs associated with pollution control.

Schembri and Robicheau (1986) developed a model of the Canadian pulp and paper sector to examine the impact of exchange rate changes on the industry. They conclude that industry profits are more sensitive to exchange rate changes than to changes in the levels of output or employment. A 1% devaluation in the US/Canada exchange rate decreased profits by 2%, output by 1%, and employment by 0.5%.

Using a computable general equilibrium (CGE) model, Percy and Constantino (1987) examined the effects of the softwood lumber dispute between Canada and the US on the BC economy. They conclude that Canada is absolutely better off as a result of the 15% export tax imposed by Canada on all lumber exported to the US. Constantino and Percy (1988) reiterated these results and looked at the implications that this agreement will have on the future trade of natural resource commodities between the two countries. Using a spatial equilibrium model, Boyd and Krutilla (1987) analyzed the same issue and came up with similar conclusions (i.e. that a voluntary restraint on exports would increase profits in the Canadian sawmilling sector).

Uhler et al. (1987) examined the trade of pulp and paper products between Canada and the US over the last 70 years in light of the tariff schedules imposed by both countries. As mentioned earlier, they conclude that the present product mix of the Canadian pulp and paper sector has resulted from provincial legislation prohibiting the export of unprocessed roundwood cut on Crown land as well as from the US import tariff structure that emerged during the late 1920's. Furthermore, they predict that removal of the tariffs on other paper products would afford opportunities for US market penetration by the Canadian producers of other paper products.

Model Selection and Outline

The model selected to analyze the impacts of domestic and foreign policy shocks on the Canadian forest industry is a short run, inter-sectoral, inter-regional model specified in the form of proportional rates of change. This type of model was originally introduced by Johansen (1960). It specifies economic relationships at the level of economic agents and aggregates to the macroeconomic level. Relative prices, factor endowments, and production technologies are used to describe the economy. The

proportional rate of change format is used because it requires relatively little data, produces results easily interpreted in terms of elasticity relationships, uses a simple solution algorithm (i.e. matrix manipulations), and because it is well suited for the economic analysis of a wide range of policy shocks.

This model develops a production structure of the Canadian forest industry similar to that used Dixon et al. (1982). The Canadian forest industry is divided into five regions (BC coast (BC), BC interior (BI), Prairies (PR), Central (CE), and Atlantic (AT)) and into five sectors (logging (LO), sawmilling (SM), pulping (PU), newsprint (NP), and other paper (OP)). In international markets, Canada is treated as an excess supplier of lumber, wood pulp, newsprint, and other paper products. Regional production of forest products is destined for the US, Japanese, European Community (EC), and domestic Canadian markets. The US, Japan, and the EC are treated as excess demand regions with the European Free Trade Association (EFTA), Latin America (LA), and Other Asia-Pacific (OA) providing alternative supplies of forest products to the US, Japanese, and EC markets. Final demand is modeled using the Armington assumption that products differing only in the place of origin are imperfect substitutes (Armington 1969). Primary input demands are modeled using Constant Returns to scale, constant Elasticity of Substitution, Homothetic (CRESH) functions. Intermediate commodity input demands are modeled using Constant Elasticity of Substitution (CES) functions. Multiple output supplies are modeled using Constant Elasticity of Transformation (CET) functions. These three functional forms were selected because they allow flexibility in describing the production structure of each forest sector. Individual outputs are also modeled using a simple output supply function where output is a function of output and input prices. The model developed is not a full CGE model because it does

not explicitly recognize other sectors of the economy. However, the model can be easily expanded into a full CGE model. This is a short run model assuming that capital stocks are fixed and that there is no inter-temporal activity. However, it explicitly recognizes the interactions between regions and between sectors within a region.

The proportional rate of change format in which the variables are specified produces a system of linear equations (i.e. the model is linear with respect to the variables). Although the linearization of the equations allows for flexibility in terms of model size, modification, application, and implementation, it also introduces approximation errors (Dixon et al. 1982, pages 44-47). Approximation errors result from the inability of the model to cope with large changes in the exogenous variables. For example, the input and output shares used to build the model are treated as exogenous parameters when solving the model, even though the resulting changes in the prices and quantities of forest products change these input and output shares. Therefore, the results from this model are only valid for small changes in the exogenous variables which do not induce significant changes in the commodity composition of outputs, the industrial composition of factor employments, or the industry composition of input costs (i.e. no significant changes in the value shares used to build the model) (Dixon et al. 1982, page 44).

The model is currently set up on a LOTUS 1-2-3 spreadsheet and is solved by matrix manipulations. These matrix operations are performed using a FORTRAN program.

Modeling the Canadian Forest Industry Structure

Regional Industry Structure

The Canadian forest industry is divided into five regions and five sectors (See Table 3.1). BC is divided into the coastal and interior regions. The Prairies include Alberta, Saskatchewan, and Manitoba, while Central Canada includes Ontario and Quebec. The remaining Maritime provinces make up the Atlantic region. The Yukon and Northwest Territories are excluded in this model since they have very small forest industries. This regional division of Canada's forest industry is based on differences in the makeup of each regions' forest industry, differences between regional input costs, and on data availability. Many of the differences which exist between the makeup of each regions' forest industry and regional input costs can be attributed to the differences that exist between each the forests of each region.

Table 3.1: Canadian Regional Industry Makeup.

Region				
BC Coast	BC Interior	Prairies	Central	Atlantic
Logging Sawmilling Pulping Newsprint Other Paper	Logging Sawmilling Pulping	Logging Pulping Newsprint Other Paper	Logging Sawmilling Pulping Newsprint Other Paper	Logging Pulping Newsprint Other Paper

Forest Industry Structure

Because Canada operates primarily in the global market for forest products, all regional forest sectors and input/output markets are assumed to be perfectly

competitive (i.e both the producers and consumers of forest products are small and numerous such that each one treats the prices of forest products as exogenously fixed). This assumption is supported by the recent research done by Bernstein (1989).

Input and output mixes for each forest sector vary between regions depending on which other forest sectors are present in a given region (See Table 3.2). Labor, capital, and energy are the primary inputs used by all the regional forest sectors. These three primary inputs are modeled as imperfect substitutes and aggregated together to form an aggregate primary input using a CRESH function. Labor and energy are assumed to be mobile across forest sectors in a given region, while capital is assumed to be sector specific (i.e. capital is not mobile between different sectors of the forest industry). Timber is used as an input in the logging sector to produce sawlogs and/or pulp wood. Sawlogs are used in the sawmilling sector to produce lumber and pulp chips (providing the region has a sawmilling sector). The pulping sector uses pulp chips and/or pulp wood to produce wood pulp. Regional wood pulp is either exported or used in combination with wastepaper to produce newsprint and other paper products in that regions' newsprint and other paper sectors respectively.

This model attempts to capture the major commodity flows between sectors and regions, while ignoring minor commodity flows. This simplifies the model, but does not significantly detract from the results obtained. One of these simplifications is the assumption that intermediate commodity inputs (timber, sawlogs, pulp wood, pulp chips) are not mobile across regions. A second simplification is that Canada's domestic consumption of lumber, newsprint, and other paper products is not broken down by region. That is, Canada is treated as a single market for lumber, newsprint, and other paper products, rather than as five regional markets for each product.

Table 3.2: Canadian Forest Industries Input/Output Structure.

Industry		Structure
Logging	Inputs:	Timber, Labor, Capital, and Energy.
	Outputs:	Sawlogs and Pulp wood in the BC, BI, and CE regions. Pulp wood in the PR and AT regions.
Sawmilling	Inputs:	Sawlogs, Labor, Capital, and Energy.
	Outputs:	Lumber and Pulp chips.
Pulping	Inputs:	Pulp wood, Pulp chips, Labor, Capital, and Energy in the BC, BI, and CE regions. Pulp wood, Labor, Capital, and Energy in the PR and AT regions.
	Output:	Wood pulp.
Newsprint	Inputs:	Wood pulp, Wastepaper, Labor, Capital, and Energy.
	Output:	Newsprint.
Other Paper	Inputs:	Wood pulp, Wastepaper, Labor, Capital, and Energy.
	Output:	Other Paper Products.

Table 3.3: Canadian Regional Shipments of Forest Products by Destination.

REGION	PRODUCT	DESTINATION
BC Coast and Central	Lumber, Newsprint, and Other Papers	Canada, US, Japan, EC
	Wood pulp	Regional Newsprint and Other Paper Industries, US, Japan, EC
BC Interior	Lumber	Canada, US, Japan, EC
	Wood pulp	US, Japan, EC
Prairies and Atlantic	Wood pulp	Regional Newsprint and Other Paper Industries, US, Japan, EC
	Newsprint and Other Papers	Canada, US, Japan, EC

Modeling Trade Flows

International trade in four forest products is recognized in the model. These four forest products include: lumber (LU), wood pulp (PU), newsprint (NP), and other paper products (OP). Eight regions produce (supply) these forest products including: the BC coast (BC), BC interior (BI), Prairies (PR), Central (CE), and Atlantic (AT) regions of Canada, the European Free Trade Association (EFTA), Latin America (LA), and Other Asia-Pacific (OA) countries. Four regions consume (demand) Canadian forest products including: Canada, the US, Japan, and the EC. As mentioned earlier, the Canadian demand for each of these four forest products is not regionally disaggregated. The US, Japan and the EC are modeled as excess demand regions. Thus, the production and export of forest products by these regions are not explicitly recognized in the model. However, net domestic production (production minus exports) is used to calculate the market shares for the sources of domestic consumption in the US, Japan, and the EC. Table 3.3 summarizes the trade flows represented in the model.

The prices of forest products in countries other than Canada are assumed to be exogenous. Given that Canada plays a major role in the global marketplace for forest products, changes in the price of Canadian forest products will probably have an impact on the international prices of forest products. Therefore, the assumption that foreign prices are independent of Canadian prices may not be accurate. Subsequent versions of the model will relax this assumption regarding the price taking behavior of the Canadian forest industry.

Functional Form and Equations

Final Demand

The US, Japan, and the EC demand equations for lumber, wood pulp, newsprint, and other paper products are developed from the Armington assumption that products distinguished only by place of origin are imperfect substitutes (Armington 1969). Canadian final demand equations are developed in the same fashion for lumber, newsprint, and other paper products, while domestic wood pulp demand is treated as an intermediate input into the production of newsprint and other paper products.

The Armington assumption is used to represent two characteristics of trade. First, forest products originating from different regions are not exactly the same. Differences in the characteristics of the timber used in the production of forest products will result in differences in the quality and characteristics of those forest products. For example, wood pulp originating from the BC region will be primarily softwood bleached kraft wood pulp, while wood pulp originating from another Canadian region may contain more hardwood or mechanical pulps. Second, established trade patterns for forest products are sometimes resistant to changes in the prices of forest products. This trade inertia is a result of the fact that fewer problems are encountered when established trade patterns are followed (since, for example, the requirements for trade, paperwork, language, etc. are well understood). Establishing new trade flows has an added cost in the uncertainty and problems encountered in dealing with a new situation. Thus, it is appropriate to model forest products originating from different regions as imperfect substitutes.

Product demand functions assume a constant elasticity of substitution in each market for each product. These functions were formulated by Armington (1969) and have the following rate of change form (See Appendix 1: Glossary for a description of the terminology and subscripts used):

$$(1) \qquad (P_{ij} \cdot Q_{cij}) = \epsilon_{ci} \cdot \dot{D}_c - (\eta_{ci} - 1) \cdot \dot{P}_i + \sum_{k \neq i} \left(\left(\eta_{c\frac{i}{k}} \right) \cdot \dot{P}_k \right) - (\sigma_{ci} - 1) \cdot (\dot{P}_{ij} - \dot{P}_i)$$

where: $(P_{ij} \cdot Q_{cij}) = \dot{P}_{ij} + \dot{Q}_{cij}$

$\dot{P}_{ij}$ = percent change in price of good 'i' originating from region/country 'j'.

$\dot{Q}_{cij}$ = percent change in quantity of good 'i' originating from region/country 'j' demanded by country 'c'.

ϵ_{ci} = income elasticity for good 'i' in country 'c'.

$\dot{D}_c$ = percent change in income of country 'c'.

η_{ci} = direct price elasticity of demand for good 'i' in country 'c'.

$\eta_{c\frac{i}{k}}$ = cross price elasticity of demand for good 'i' with respect to price of good 'k' in country 'c'.

σ_{ci} = elasticity of substitution for good 'i' demanded by country 'c'.

$$\dot{P}_i = \sum_j (S_{cij} \cdot \dot{P}_{ij})$$

$$S_{cij} = \frac{P_{ij} \cdot Q_{cij}}{\sum_j P_{ij} \cdot Q_{cij}}$$

c = Canada, US, Japan, EC.

i = lumber (LU), wood pulp (PU), newsprint (NP), other paper products (OP).

j = BC, BI, PR, CE, AT, US, Japan, EC, EFTA, LA, OA.

Two further assumptions were introduced by Armington (1969) to simplify the equations and increase the ease of computation. First, it was assumed that the direct price elasticity of demand for good 'i' in all countries 'c' (η_{ci}) equaled unity. This assumption implies that the expenditures on a given forest product are independent of any changes in the overall level of prices for that forest product (i.e attention is focused on the effects of changes in the relative regional prices for a forest product, abstracting from any presumably small effects in the changes in the general level of prices for that forest product). Second, it was assumed that the third term in equation 1 is small enough to be ignored. This is not unreasonable with small price changes in other markets (Armington 1969).

After rearranging and including exchange rate variables, equation 1 simplifies to (See Appendix 1 for a description of the terminology and subscripts used):

$$(2) \qquad \dot{Q}_{ci,j} = \epsilon_{ci} \cdot \dot{D}_c - \sigma_{ci} \cdot \dot{P}_{i,j} + (\sigma_{ci} - 1) \cdot \sum_j (S_{ci,j} \cdot (\dot{P}_{i,j} - \dot{e}_{CA,j}))$$

where: $\dot{e}_{CA,j}$ = % change in exchange rate between Canada and region/country 'j'. All prices in $ Canadian.

The final demand equations for the regional production of lumber, newsprint, and other paper products are obtained by aggregating the final demand equations for each forest product over the four consuming countries 'c', weighting each of these demands by the appropriate regional export value share.

$$(3) \qquad \dot{Q}_{ij} = \sum_{c} (B_{cij} \cdot \dot{Q}_{cij})$$

where:

$\dot{Q}_{ij}$ = percent change in total quantity of good 'i' from region 'j'.

$\dot{B}_{cij}$ = export value share of product 'i' from region 'j' to country 'c'.

j = BC, BI, PR, CE, AT only.

In the case of the demand for the regional production of wood pulp, the final demand equations for wood pulp from the US, Japan, and the EEC are aggregated with the intermediate input demand equations for wood pulp from that regions' newsprint and other paper sectors. In total, 16 final demand equations are obtained; three for lumber; four for newsprint; and four for other papers. Five demand equations are obtained for wood pulp.

Input Demands

The Canadian forest industry structure is modeled under two general assumptions. First, as in Dixon et al. (1982, pages 68-74), it assumed that all inputs used by each regional forest industry are substitutes. Nested CES and CRESH functions are used to model this assumption. CES functions are used to model the substitution possibilities between primary and commodity inputs, and the substitution possibilities between

alternative intermediate commodity inputs. CRESH functions are used to model substitution possibilities between primary inputs. Although the model assumes that all inputs are substitutes, the structure of the model will allow inputs to be modeled as complements if desired.

CES functions assume that the elasticity of substitution between any two given inputs is constant regardless of the quantity of either input consumed. CES functions also assume that the elasticity of substitution is the same for all pair-wise input substitution possibilities. CRESH functions are a generalization of CES functions, and are used instead of CES functions to model primary input demands. The advantage of using CRESH functions is that they allow the elasticity of substitution to vary between different pairs of primary inputs. For example, the elasticity of substitution between labor and energy can be different from that between labor and capital. In turn, both of these elasticities can differ from the elasticity of substitution between energy and capital. CRESH functions imply constant returns to scale, positive marginal products, and diminishing marginal rates of substitution (Dixon et al. 1982, pages 71-72).

The second general assumption used is that dual output sectors have concave production possibility frontiers, and that these can be modeled using CET functions. CET functions are identical to the CES functions apart from their parameter restrictions. CET functions assume that the elasticities of transformation between alternative outputs are constant regardless of the quantities of either output produced (Dixon et al. 1982, pages 74-75).

i. Production Technology.

In levels form, the basic production function for all sectors and regions of the Canadian forest industry is a CES function which has commodity and primary inputs as substitutes for each other:

$$(4) \qquad Q_{rsp} = \frac{CES[f_{rsz}; \rho_{rs}, b_{rsz}]}{A_{rs}}$$

where:

Q_{rsp} = activity or output level of product 'p' produced by sector 's' in region 'r'.

Q_{rsz} = quantity of input 'z' demanded by sector 's' in region 'r'.

A_{rsz} = technological coefficient for input 'z' for sector 's' in region 'r'.

$f_{rsz} = \frac{Q_{rsz}}{A_{rsz}}$

ρ_{rs} = substitution parameter for sector 's' in region 'r'. $\rho > -1$ and $\neq 0$.

b_{rsz} = distribution parameter for input 'z' in sector 's' in region 'r'. $b > 0$.

A_{rs} = input neutral technological coefficient for sector 's' in region 'r'.

r = BC, BI, PR, CE, AT.

s = logging (LO), sawmilling (SM), pulping (PU), newsprint (NP), other paper products (OP).

p = logging aggregate output (LOAO), sawmilling aggregate output (SMAO), pulp wood (PW), PU, NP, OP.

z = aggregate commodity input (AC), aggregate primary input (AP), timber (TI), sawlogs (SA), PW.

Equations are also necessary to describe the aggregate primary (AP) and commodity (AC) inputs for the sectors in which they are present. The AP input function has the following form:

(5) $Q_{rsap} = CRESH[f_{rsx}; h_{rsx}, O_{rsx}, k_{rs}]$

where Q_{rsap} = quantity of aggregate primary input demanded by sector 's' in region 'r'.

h_{rsx} = substitution parameter for input 'x' in sector 's' in region 'r'. $h < 1$ and $\neq 0$.

O_{rsx} = distribution parameter for input 'x' in sector 's' in region 'r'. $O > 0$ and $\sum_x O_{rsx} = 1$.

k_{rs} = constant.

x = labor (LA), capital (KA), energy (EN).

The AC input function has the following form:

(6) $Q_{rsac} = CES[f_{rsx}; \theta_{rs}, b_{rsx}]$

where Q_{rsac} = quantity of aggregate commodity input demanded by sector 's' in region 'r'.

θ_{rs} = substitution parameter between commodity inputs for sector 's' in region 'r'. $\theta < 1$ and $\neq 0$.

b_{rsx} = distribution parameter for input 'x' in sector 's' in region 'r'. $b > 0$.

x = PW, PC for the PU sector.
PU, WA for the NP and OP sectors.

ii. Primary Inputs.

Cost minimization subject to the basic production function (4) and converting the variables to percentage change format yields the following input demand functions (Dixon et al. 1982, pages 76 - 90):

$$(7) \quad \dot{Q}_{rsz} = \dot{Q}_{rsp} - \sigma_{rs} \cdot \left(\dot{P}_{rsz} - \sum_{z} (\dot{P}_{rsz} \cdot S_{rsz}) \right) + \dot{A}_{rs} + \dot{A}_{rsz} - \sigma_{rs} \cdot \left(\dot{A}_{rsz} - \sum_{z} (\dot{A}_{rsz} \cdot S_{rsz}) \right)$$

where

$\dot{Q}$ = percent change in Q.

$\dot{P}$ = percent change in P.

$\dot{A}$ = percent change in A.

S_{rsz} = value share of input 'z' $= \frac{P_{rsz} \cdot Q_{rsz}}{\sum_{z} (P_{rsz} \cdot Q_{rsz})}$

σ_{rs} = elasticity of substitution between primary and commodity inputs in sector 's' in region 'r'. $= \left(\frac{1}{1 + \rho_{rs}} \right)$

Note: $\dot{P}_{rsz} = \sum_{x} (\dot{P}_{rsx} \cdot S_{rsx}) + \sum_{x} (\dot{A}_{rsx} \cdot S_{rsx})$

if z = AP, x = LA, KA, EN.

if z = AC, x = either PW and PC or PU and WA.

Primary input demand functions are obtained in a three step procedure. First, cost minimization subject to the aggregate primary input function (5) yields the following equation in percentage change form:

$$(8)\quad \dot{Q}_{rsx} = \dot{Q}_{rsap} - \sigma_{rsx} \cdot \left(\dot{P}_{rsx} - \sum_{x} (\dot{P}_{rsx} \cdot \hat{S}_{rsx}) \right) + \dot{A}_{rsx} - \sigma_{rsx} \cdot \left(\dot{A}_{rsx} - \sum_{x} (\dot{P}_{rsx} \cdot \hat{S}_{rsx}) \right)$$

where: x = LA, KA, EN.

$$\hat{S}_{rsx} = \frac{\sigma_{rsx} \cdot S_{rsx}}{\sum_{x} (\sigma_{rsx} \cdot S_{rsx})}$$

σ_{rsx} = primary input 'x' elasticity of substitution in sector 's' in region 'r'. $= \left(\frac{1}{1 - h_{rsx}} \right)$

Second, substitution of equation 7 into equation 8 yields the following primary input demand functions:

$$(9)\quad \dot{Q}_{rsx} = \dot{Q}_{rsp} - \sigma_{rs} \cdot \left(\dot{P}_{rsap} - \sum_{z} (\dot{P}_{rsz} \cdot S_{rsz}) \right) + \dot{A}_{rs} + \dot{A}_{rsz} - \sigma_{rs} \cdot \left(\dot{A}_{rsap} - \sum_{z} (\dot{A}_{rsz} \cdot S_{rsz}) \right)$$
$$- \sigma_{rsx} \cdot \left(\dot{P}_{rsx} - \sum_{x} (\dot{P}_{rsx} \cdot \hat{S}_{rsx}) \right) + \dot{A}_{rsx} - \sigma_{rsx} \cdot \left(\dot{A}_{rsx} - \sum_{x} (\dot{A}_{rsx} \cdot \hat{S}_{rsx}) \right)$$

where: x = LA, KA, EN.

Twenty one capital input demand functions are obtained which have the form of equation 9. Lastly, the labor and energy input demand functions for all the forest sectors in a given region are aggregated together, weighted by input value shares. This yields five regional labor and five regional energy input demand equations which have the following form:

$$(10) \qquad \dot{Q}_{rx} = \sum_{s} (B_{rsx} \cdot Q_{rsx})$$

where:

$\dot{Q}_{rx}$ = percent change in quantity of primary input 'x' demanded in region 'r'.

B_{rsx} = input value share for primary input 'x' used by sector 's' in region 'r'.

s = LO, SM, PU, NP, OP.

x = LA, EN.

In this short run model of the Canadian forest industry, it is assumed that the prices of labor and energy are exogenous. In the case of labor, this assumes that labor contracts set the price of labor (wage rate) over the short run, and any adjustment with respect to labor will occur in the employment level. In the case of energy, this assumes that the regional forest industry is a relatively small consumer of energy (with respect to total regional energy consumption) and that it does not affect the regional prices of energy. In the long run, wage rates will be flexible as new labor contracts are negotiated. In contrast, the price of energy is likely to remain exogenous to the forest industry.

In the case of capital, it is assumed that the capital stock is fixed in the short run such that any adjustment with respect to capital will occur in the price or return to capital (i.e. profits). In the long run, these profits will determine the allocation of new investment in the forest industry (i.e. a higher return to capital indicates a more

profitable sector which will have more new capital invested). Profits provide an incentive for the investment of new capital. Over time as new capital is invested in a sector, profits would be driven to zero (i.e the long run equilibrium).

iii. Intermediate Input Demands.

Intermediate input demands are obtained in the same way as primary input demands are obtained. Single commodity input sectors obtain input demand equations directly from equation 7. For multiple commodity input sectors, cost minimization subject to the aggregate commodity input function (6) yields:

$$(11)\quad \dot{Q}_{rsx} = \dot{Q}_{rsac} - \phi_{rs}\cdot\left(\dot{P}_{rsx} - \sum_{x}(\dot{P}_{rsx}\cdot\hat{S}_{rsx})\right) + \dot{A}_{rsx} - \phi_{rs}\cdot\left(\dot{A}_{rsx} - \sum_{x}(\dot{P}_{rsx}\cdot\hat{S}_{rsx})\right)$$

where: x = PW and PC or PU and WA.

ϕ_{rs} = elasticity of substitution between commodity inputs in sector 's' in region 'r'. $= \left(\frac{1}{1-\theta_{rsx}}\right)$

Substituting equation 7 into equation 11 and rearranging the variables yields individual commodity input demand equations by region and sector of the following form:

$$(12)\quad \dot{Q}_{rsx} = \dot{Q}_{rsp} - \sigma_{rs}\cdot\left(\dot{P}_{rsac} - \sum_{z}(\dot{P}_{rsz}\cdot S_{rsz})\right) + \dot{A}_{rs} + \dot{A}_{rsz} - \sigma_{rs}\cdot\left(\dot{A}_{rsac} - \sum_{z}(\dot{A}_{rsz}\cdot S_{rsz})\right)$$
$$-\sigma_{rsx}\cdot\left(\dot{P}_{rsx} - \sum_{x}(\dot{P}_{rsx}\cdot\hat{S}_{rsx})\right) + \dot{A}_{rsx} - \sigma_{rsx}\cdot\left(\dot{A}_{rsx} - \sum_{x}(\dot{A}_{rsx}\cdot\hat{S}_{rsx})\right)$$

where: x = PW, PC for BC, BI, and CE regions only.
PU, WA for all regions.

In the case of wood pulp, regional input demands from the newsprint and other paper sectors are aggregated with the final export demands for that regions' wood pulp,

all weighted by value shares. Twenty five intermediate input demand functions are obtained: five for timber, three for sawlogs, five for pulp wood, three for pulp chips, five for wood pulp, and four for wastepaper.

Prices and quantities are endogenous for all intermediate inputs except timber. The quantity of available timber is specified exogenously through annual allowable cuts (AAC's). Thus, in the short run, all adjustment will occur in the delivered wood cost (i.e the price of timber). As prices and profits increase over the long run, the regional annual allowable cuts (AAC's) will increase (i.e. as the extensive margin of timber increases) as will the regional silvicultural efforts (i.e. as the intensive margin increases).

Supply

Two functional forms are used to describe output supply. First, a CET function is used to describe transformation possibilities between alternative outputs. It has the following levels form:

$$(13) \qquad Q_{rsao} = [CET[g_{rsp}; \psi_{rs}, c_{rsp}]] \cdot B_{rs}$$

where:

Q_{rsao} = activity level of aggregate output produced by sector 's' in region 'r'.

$g_{rsp} = Q_{rsp} \cdot A_{rsp}$

A_{rsp} = technological coefficient for output 'p' produced by sector 's' in region 'r'.

ψ_{rs} = output transformation coefficient for sector 's' in region 'r'. $\psi < -1$.

c_{rsp} = distribution parameter for output 'p' produced by sector 's' in region 'r'. $c > 0$.

B_{rs} = output neutral technological coefficient for sector 's' in region 'r'.

p = SA and PW for logging in BC, BI, CE.
LU and PC for sawmilling in BC, BI, CE.

Output transformation functions are obtained by revenue maximization subject to equation 13 have the following form:

$$(14) \quad \dot{Q}_{rsp} = \dot{Q}_{rsao} + \omega_{rs} \cdot \left(\dot{P}_{rsp} - \sum_{p} (\dot{P}_{rsp} \cdot S_{rsp}) \right) - \dot{B}_{rs} - \dot{A}_{rsp} - \omega_{rs} \cdot \left(\dot{A}_{rsp} - \sum_{p} (\dot{A}_{rsp} \cdot S_{rsp}) \right)$$

where: ω_{rs} = elasticity of transformation between outputs in sector 's' in region 'r'. $= \left(\frac{1}{\psi_{rs} - 1} \right)$

The second functional form used is a simple output supply function in terms of input and output prices which is implied from the CES production function used (Dixon et al. 1986):

$$(15) \quad \dot{Q}_{rsp} = \tau_{rsp} \cdot (\dot{P}_{rsp} - \dot{P}_{rsx})$$

where: τ_{rsp} = direct price elasticity of supply for product 'p' in sector 's' in region 'r'.

$\dot{P}_{rsx}$ = percent change in average price of all inputs used to produce 'p'.

For each multiple output sector an aggregate output supply function is obtained by aggregating the individual output supply functions from that sector, weighted by value shares.

$$(16) \quad \dot{Q}_{rsao} = \sum_{p} (S_{rsp} \cdot \dot{Q}_{rsp})$$

where: $\dot{Q}_{rsp}$ = output supply function having the form of equation 3.12.

p = SA and PW for logging.
LU and PC for sawmilling.

A total of 12 output transformation functions, six aggregate output supply functions, and 19 individual output supply functions are obtained such that 37 equations describe the supply side of the Canadian forest industry. All output prices and quantities are endogenous.

Model Variables

Table 3.4: Listing of Endogenous and Exogenous Variables.

Endogenous Variables	% change	in P of timber	5
	"	in P and Q of pulpwood	10
	"	in P and Q of sawlogs	6
	"	in Q of logging aggregate output	3
	"	in P and Q of lumber	6
	"	in P and Q of pulp chips	6
	"	in Q of sawmilling aggregate output	3
	"	in P and Q of pulp	10
	"	in P and Q of wastepaper	8
	"	in P and Q of newsprint	8
	"	in P and Q of other paper	8
	"	in Q of labor	5
	"	in Q of energy	5
	"	in P of capital	21
		TOTAL:	104
Exogenous Variables	% change	in Q of timber BC,BI,PR,CE,AT	
	"	in P of energy BC,BI,PR,CE,AT	
	"	in P of labor BC,BI,PR,CE,AT	
	"	in Q of all capital stocks	
	"	in P of all foreign forest products	
	"	in foreign exchange rates	
	"	in technological coefficients	

A total of 104 equations in proportional rate of change form are obtained which makes up the model structure. For each equation, all the endogenous variables are

transferred to the left hand side of the equation while all the exogenous variables are transferred to the right hand side. 104 endogenous variables are recognized in the model (See Table 3.4).

Parameter values for the endogenous and exogenous variables are obtained from the appropriate shares and elasticities. Appendix 2 describes the data sources and estimation procedures used to determine these shares and elasticities. The base year used is 1986.

Solution Procedures

The model structure of 104 linear equations can be represented in a square matrix format:

$$(17) \qquad A \cdot x = B$$

where:
- A = square matrix of variable coefficients (104 x 104).
- x = vector of endogenous variables (104 x 1).
- B = vector of exogenous variables and coefficients (104 x 1).

Rearranging equation 17 such that the endogenous variable vector (x) can be calculated from A and B yields:

$$(18) \qquad x = A^{-1} \cdot B$$

Policies are simulated via changes in the exogenous variables vector. Multiplying the inverse coefficient matrix A^{-1} by the policy shocks (the exogenous matrix (B)) yields

the impact of the shock on the endogenous variables. The inverse coefficient matrix provides short run impact multipliers, which when multiplied by the exogenous matrix of policy shocks, produces a matrix of percentage changes in the endogenous variables. The results are in percentage change form but can easily be applied to the initial price and quantity levels to obtain changes in the actual prices and quantities.

CHAPTER 4: POLICY SIMULATIONS: RESULTS AND DISCUSSION

Introduction

Policy shocks are simulated in one of three ways. First, some policy shocks, such as trade barriers, are simulated by an increase or decrease in the relative price of Canadian forest products. Second, other policy shocks, such as stricter environmental regulations, are simulated by a negative technical change in the existing capital stock of the industry affected. Last, exchange rate policy shocks are simulated using the exchange rate variables specified in the model.

The structure of this model of the Canadian forest industry produces results that are linear (i.e. the impact of a 2% increase in the price of US other paper products will be twice as large as the impact of a 1% increase in the price of US other paper products). Therefore, all policy shocks are simulated by unit changes (1% change) in the appropriate exogenous variable(s). Unit change simulations are also used to minimize the approximation errors which are associated with Johansen's procedure of model linearization (See Chapter 3, Model Selection and Outline; or Dixon et al. 1982, pages 44-49). The results of the unit change simulations are used to discuss the most likely impact that each policy shock has on the Canadian forest industry. For example, the Canada/US FTA calls for the eventual elimination of all US import tariffs on Canadian forest products within five years. This will lead to a 4.2% increase in the price of US other paper products relative to the price of Canadian other paper products (i.e. the 4.2% US import tariff on Canadian other paper products is eliminated; see Chapter 2, Trade Barriers). The maximum impact that the FTA could have on the Canadian forest industry would be 4.2 times larger than the results obtained for the corresponding unit change simulation (i.e a 1% increase in the price of US other paper products). This

maximum impact scenario assumes that Canadian producers bear all of the effects of the Canada/US FTA (i.e the US excess demand for Canadian other paper products is perfectly inelastic). However, it is more likely that US consumers also bear some of the effects of the Canada/US FTA and that the actual impact on the Canadian forest industry will be less than that of the maximum possible scenario. Who actually bears the effects of the FTA depends on the elasticities of Canadian excess supply and of US excess demand for other paper products. This issue of incidence is discussed below.

The results from this model are produced by changes in the relative prices of inputs and/or outputs. For example, increasing the delivered wood cost (price of sawlogs) has two direct effects on the sawmilling sector. First, the sawmilling sector substitutes relatively cheaper labor and energy for sawlogs (i.e. an increase in the demands for labor and energy). Second, as input prices increase, the sawmilling sector decreases its supplies of lumber and pulp chips. This leads to an increase in the prices and a decrease in the quantities of lumber and pulp chips supplied. Decreasing the delivered wood cost has the opposite effect. Indirectly, through changes in the relative prices of inputs and outputs, the other sectors of the forest industry are affected.

Increasing the price of the lumber also has two direct effects on the sawmilling sector. First, the sawmilling sector produces more lumber at the expense of relatively cheaper pulp chips (i.e. an increase in the quantity of lumber supplied and a decrease in the supply of pulp chips). The aggregate output of lumber and pulp chips produced by the sawmilling sector increases. Second, as the aggregate production of lumber and pulp chips increases, the sawmilling sector increases its demands for all primary and commodity inputs. This leads to an increase in the prices of sawlogs and capital, as well

as to an increase in the quantities of sawlogs, labor, and energy demanded. Decreasing the price of lumber has the opposite effect. Again, these changes in relative prices indirectly affect other sectors of the forest industry.

In this model, an increase in the demand for an input will lead to an increase in the price and quantity of that input. A decrease in demand will have the opposite effect. An increase in the supply of an output will lead to a decrease in the price of that output, but will lead to an increase in the quantity of that output that is supplied. A decrease in supply will have the opposite effect. Through changes in the relative prices of inputs and outputs, these impacts are transmitted to other sectors of the forest industry, and to the rest of the economy.

Sensitivity Tests

Sensitivity tests examine the impacts that alternative parameter values have on the results generated by the model. These tests are done for those model parameters which show a wide range of values from previous research, or for those model parameters on which little previous research has been done. For this model, sensitivity tests are done for the Armington substitution elasticities, the output transformation elasticities, and the output supply elasticities for solid wood products. The sensitivity tests are done using four test simulations which include: 1) the impact of a 1% increase in the annual allowable cut (AAC) for the BC coast region; 2) the impact of a 1% decrease in the price of Japanese softwood lumber; 3) the impact of a 1% increase in the price of EEC wood pulp; and 4) the impact of a 1% decrease in the price of US newsprint. In general, the sensitivity tests indicate that alternative parameter values have only minor impacts on the results of the model. Prices are affected slightly more than quantities. (See Appendix 3 for a discussion of the results obtained from the sensitivity tests).

Policy Simulations

A. Introduction

F ir .ferent global issues are analyzed with respect to their impacts on the Canadian forest industry. For each issue, a number of alternative scenarios are analyzed. First, the impacts that the removal and/or implementation of trade barriers have on the Canadian forest industry are examined. Included in this section is an analysis of the Canada/US FTA. Second, the impacts that devaluations in the Canadian dollar against individual foreign currencies have on the Canadian forest industry are examined. Third, the impacts that increased supplies of alternative fibre sources have on the Canadian forest industry are examined. This section examines both an increased supply of recycled wastepaper for Canadian paper producers and an increased supply of Latin American wood pulp for foreign paper producers. Fourth, the impacts that more stringent pollution regulations on the pulping industry have on the Canadian forest industry are examined.

B. Trade Barriers

Trade barriers, including the elimination of import tariffs and implementation of NTB's, are modeled by decreases or increases in the relative prices of forest products. For example, the elimination of the EC import tariff on other paper products is simulated by a increase in the relative price of EC other paper products. This is modeled by an unit increase in the price of EC other paper products. Similarly, the implementation of nontariff barriers by the EC against imported other paper products would be simulated by a decrease in the relative price of EC other paper products. Thus, this would be modeled by an unit decrease in the price of EC other paper products.

The actual impact that policy shocks have on the Canadian forest industry will depend critically on the assumption regarding incidence. As noted earlier, incidence depends on the elasticities of excess demand or excess supply of the product in question (See Table 4.1). These excess demand and excess supply elasticities are calculated from the following formulas (See Constantino and Percy (1988) for derivation of formulas; See Appendix 2 for elasticities used):

$$(19) \qquad e_{ED} = (D/I) \cdot e_D - (S/I) \cdot e_S$$

and

$$(20) \qquad e_{ES} = (S/E) \cdot e_s - (D/E) \cdot e_d$$

where:

e_{ED} = elasticity of excess demand.

e_{ES} = elasticity of excess supply.

e_D = elasticity of demand.

e_S = elasticity of supply.

D = total annual demand

S = total annual supply

I = total annual imports

E = total annual exports

Table 4.1: Elasticities of Excess Demand (ED) and Excess Supply (ES) for Forest Products.

	Excess Elasticity by Forest Product			
Country	Lumber	Wood Pulp	Newsprint	Other Paper
US (ED)	-1.95	-8.57	-0.73	-7.26
Japan (ED)	-4.13	-2.10	-4.73	-10.90
EC (ED)	-0.87	-0.84	-0.63	-0.67
Canada (ES)	0.72	1.62	0.46	0.82

These elasticities are then used to calculate shares for the incidence of impacts (See Table 4.2) according to the following formulas:

$$(21) \qquad S_D = \frac{e_{ED}}{e_{ED} - e_{ES}}$$

and

$$(22) \qquad S_S = \frac{e_{ES}}{e_{ES} - e_{ED}}$$

where: S_D = share of impacts of increased foreign excess demand borne by Canada.

S_S = share of impacts of increased domestic excess supply borne by Canada.

Table 4.2: Incidence Impact Shares for Canada for Shifts in Foreign Excess Demands of Forest Products.

	Incidence Share by Forest Product			
Country	Lumber	Wood Pulp	Newsprint	Other Paper
US (ED)	*0.73	0.84	0.61	0.90
Japan (ED)	0.85	0.56	0.91	0.93
EC (ED)	0.55	0.34	0.58	0.45

*NOTE: These incidence impact shares S_D are calculated for increases in foreign excess demand by selected country and forest product. Incidence impact shares for increases in domestic excess supply S_S are equal to 1 - S_D.

In the example of the removal of the 3.0% EEC import tariff levied on other paper products, the Canadian producers bear only 45% (See Table 4.2) of the impacts. Thus, the actual impact that the removal of this import tariff will have on the Canadian forest industry will be 1.35 times larger times than the results obtained for the unit change simulation (i.e. 3.0 times 0.45 equals 1.35).

i. Import Tariffs

Import tariffs are simply taxes levied on the importation of foreign goods. In essence, import tariffs decrease the relative price of domestic goods with respect to the prices of all corresponding foreign goods. Therefore, the elimination of import tariffs can be simulated by an increase in the relative price of domestic good with respect to the prices of all corresponding foreign goods. This is modeled by an unit increase in the price of that domestic good, and is assumed to be achieved by an increase in the domestic excess demand . The results that these unit increase simulations have on the Canadian forest industry are used to discuss the likely impact of import tariff removals taking into account the excess demand and supply elasticities (i.e issue of incidence).

The existing import tariffs of importance that regulate the export of Canadian forest products include: 1) the US 4.2% import tariff on other paper products, 2) the Japanese 2.2%, 3.1%, and 5.1% import tariffs on wood pulp, newsprint, and other paper products respectively, and 3) the EC 5.4% and 3.0% import tariffs on newsprint and other paper products respectively. The elimination of each of these six import tariffs is examined individually. The elimination of a foreign import tariff has the following effects on the Canadian forest industry: 1) an increase in the demands for and export of those regional Canadian forest products whose corresponding foreign import tariff is eliminated; and 2) an increase in the regional Canadian demands for the primary and commodity inputs used to produce these forest products. Countries other than Canada are also positively affected by the elimination of US, Japanese, and EEC import tariffs levied on forest products (i.e. Canada does not bear all of the effects of the tariff removals). In general, the Canadian forest industry is not appreciably affected by the elimination of import tariffs levied on forest products (See Table 4.3).

An unit increase in the price of US other paper products is used to model an unit decrease in the US import tariff levied on other paper products. This increases the relative price of US other paper products and leads to an increase in the US demand for Canadian other paper products as US consumers switch consumption to relatively cheaper Canadian other paper products. Thus, there is an increase in the regional exports of other paper products to the US, and a subsequent increase in the Canadian prices of other paper products which ranges from 0.06% in the Prairies region to 0.15% in the Atlantic region (See Table 4.3). The increase in the regional price of other paper products leads to a reduction in the regional export of other paper products to Japan and to the EC. However, the increase in regional exports to the US dominates so that

regional production of other paper products increases by 0.01% to 0.02%. Given the increase in the demand for other paper products, returns to capital increase by 0.07% in the other paper sector. Regional energy consumption and labor employment increase by 0.01%. The remaining sectors of the Canadian forest industry are not affected by the removal of the US import tariff levied on other paper products. Given that Canada will bear 90% of the impacts of the removal of the 4.2% US import tariff levied on other paper products (See Table 4.2), the likely impact on the Canadian forest industry will be 3.78 times larger than is obtained for the unit change simulation.

Table 4.3: Summary of the Impacts of Unit (1%) Import Tariff Reductions on the Canadian Forest Industry (variables in % terms). (See Appendix 1 GLOSSARY for variable definitions).

	Import Tariff Reduced			
Variable	US Other Paper Products	Japanese Wood Pulp	Japanese Newsprint	EC Other Paper Products
QBCPU	0	0.02	0	0
QBCOP	0.02	-0.01	0	0.01
PBCPU	0.02	0.10	0.02	0.01
PBCNP	0	0.01	0.05	0
PBCOP	0.15	0	0.04	0.06
QBIPU	0	0.02	0	0
PBIPU	0	0.11	0	0
PPROP	0.06	0	0	0.01
QCEOP	0.02	-0	0	0
PCEOP	0.15	0	0	0.01
QATOP	0.02	-0	0	0.02
PATOP	0.16	0	0	0.14

A reduction in the Japanese import tariff levied on wood pulp is modeled by an unit increase in the price of Japanese wood pulp. The resulting increase in the relative price of Japanese wood pulp affects the prices of wood pulp in the two BC regions.

Since the remaining three Canadian regions do not export wood pulp to Japan, they are not directly affected by the removal of this Japanese import tariff. The price of wood pulp in the BC coast and BC interior increase by 0.10% and 0.11% respectively (See Table 4.3). Wood pulp production increases by 0.02% in both regions. The return to capital for the pulping sector increases by 0.08% and 0.09% for the coast and interior regions respectively. Regional exports of wood pulp from BC to Japan increase, while exports of wood pulp to the US and the EC decrease. Given that Canada will bear 56% of the effects of the removal of the 2.2% Japanese import tariff on wood pulp (See Table 4.2), the actual impact on the Canadian forest industry will be 1.23 times larger than is obtained for the corresponding unit change simulation.

Reducing the Japanese import tariff levied on newsprint has minor impacts on the Canadian forest industry except for the pulp and paper sector in the BC coast region. In this region, wood pulp, newsprint, and other paper product prices increase by 0.02%, 0.05%, and 0.04% respectively (See Table 4.3). Return rates to capital for each of these sectors increases by 0.02%, 0.05%, and 0.02% respectively. The remaining Canadian regions are not affected because they only export small quantities of newsprint to Japan. The actual impact that the removal of the 3.9% Japanese import tariff levied on newsprint will have on the Canadian forest industry will be 3.54 times larger than is obtained for the corresponding unit change simulation.

An unit decrease in the Japanese import tariff levied on other paper products has few impacts on the Canadian forest industry, except for a 0.04% increase in the price of BC coast other paper products. Similarly, an unit decrease in the EC import tariff levied on newsprint also has few impacts on the Canadian forest industry. Removal of these import tariffs have few impacts because Canada exports small quantities of other

paper products to Japan and small quantities of newsprint to the EC.

An unit decrease in the EEC import tariff levied on other paper products primarily affects the regional prices of other paper products in the BC coast and Atlantic regions of Canada. These prices increase by 0.06% and 0.14% respectively (See Table 4.3). These two regions are the only regions exporting large quantities of other paper products to the EC. As mentioned earlier, the actual impact that this import tariff removal will have on the Canadian forest industry will be 1.35 times larger than is obtained for the unit change simulation.

In summary, elimination of an import tariff levied by a given country on a given forest product primarily affects the regional Canadian prices of the forest product against which the import tariff was initially imposed. For example, removal of the US import tariff levied on other paper products affects the regional Canadian prices of other paper products. Regional exports of other paper products to the US are not affected. This corresponds with the findings of WRA (1988).

ii. Nontariff Barriers

Nontariff barriers (NTB's) are by definition all those barriers to trade other than tariffs. It is assumed in this model that NTB's examined can be converted to tariff equivalents. Thus, NTB's are modeled in the same manner as tariff barriers. For the implementation of a new NTB, the NTB is modeled by a unit decrease in the domestic price of the forest product against which the NTB is implemented. For the removal of an existing NTB, the NTB is modeled by an unit increase in the domestic price of the forest product for which the NTB is removed. The results that these unit change

simulations have on the Canadian forest industry are used to discuss the most likely impact of the implementation/removal of the NTB's given the excess demand and supply elasticities (i.e. issue of incidence).

Table 4.4: Summary of the Impacts of an Unit US Countervailing Duty or an Unit Canadian Export Tax on Lumber Exports on the Canadian Forest Industry (variables in % terms). (See Appendix 1 GLOSSARY for description of variables).

Variable	US duty/Canadian tax
QBCLU	-0.02
QBCPU	0.01
PBCLU	-0.16
PBCPU	-0.03
QBILU	-0.01
PBILU	-0.03
QCELU	-0.07
QCEPU	0.01
PCELU	-0.24
PCEPU	-0.03
PBCLOKA	-0.08
PBCSMKA	-0.15
PBILOKA	-0.01
PBISMKA	-0.03
PCELOKA	-0.07
PCESMKA	-0.22

Three NTB's are analyzed with respect to their impact on the Canadian forest industry. The first two NTB's simulated are the alternative outcomes of the 1986 softwood lumber dispute between Canada and the US. This dispute was settled by the Memorandum of Understanding (signed on December 30, 1986) under which the Canadian federal government imposed a 15% export tax on Canadian softwood lumber exported to the US. The alternative outcome to this export tax was the imposition of a 15% countervailing duty by the US federal government. The 15% export tax is

simulated by a decrease in the excess supply of Canadian lumber which leads to an increase in the relative price of Canadian lumber. That is, Canadian lumber producers view the export tax as an added cost to exporting lumber and simply respond by decreasing their export supplies. This is modeled by an unit decrease in the price of US lumber. The second NTB analyzed is 15% US countervailing duty. This NTB is simulated by a decrease in the US excess demand for lumber which leads to a decrease in the relative price of US lumber. That is, US consumers view the countervailing duty as an added cost to importing lumber and simply respond by decreasing their imports demands. This NTB is also modeled by an unit decrease in the price of US lumber. The third NTB analyzed is the impact of 'Integrated Europe 1992'. It is assumed that the Canadian forest products will face fewer problems and barriers in entering a unified EC market. This would result from the removal of internal trade barriers between western European countries and from the standardization of trade regulations. The result of the 'Integrated Europe 1992' agreement is assumed to be a decrease in the relative price of Canadian forest products in the EC market. This is modeled by an unit increase in the prices of EC forest products.

For the export tax/countervailing duty simulation, the unit decrease in the price of US lumber affects the regional Canadian prices of lumber. The decrease in the relative price of US lumber results in a decrease in the regional exports of lumber to the US and a subsequent decrease in the regional prices of lumber. The BC coast, BC interior, and Central prices of lumber decrease by 0.16%, 0.03%, and 0.24% respectively (See Table 4.4). Decreases in the regional prices of lumber are followed by an increase in the regional exports of lumber to Japan and the EC. Regional production of lumber decreases by 0.01% to 0.07%. Profits in the regional sawmilling sector decrease by

0.15% in the BC coast region and by 0.22% in the Central region. Regional labor employment declines by 0.04% in both of these regions. For the 15% US countervailing duty, which assumes US consumers decrease their excess demand for Canadian lumber, the Canadian industry bears 73% of the impacts of the duty imposition (See Table 4.2). Thus, the likely impact of the 15% countervailing duty on the Canadian forest industry will be 10.95 times larger than is obtained for the unit change simulation (See Table 4.4). In contrast, the Canadian forest industry only bears 27% of the impacts of Canada's 15% export tax (i.e. 3.05 times larger than is obtained for the unit change simulation).

Table 4.5: Summary of the Impacts of Reduced EC NTB's Against Forest Products on the Canadian Forest Industry (variables in % terms). (See Appendix 1 Glossary for a description of the variables).

	Forest Product		
Variable	Lumber	Wood Pulp	Other Paper
PBCLU	0.04	0	0
PBCOP	0	0	0.06
QBILU	0.02	-0	0
PBILU	0.14	0	0
PBIPU	0.01	0.06	0
PCELU	0.02	0	0
PCEPU	0	0.02	0
PATPU	0	0.08	0
PATOP	0	0	0.14

Reductions in the levels of EC NTB's against forest products have few impacts on the Canadian forest industry (See Table 4.5). For example, an unit increase in the price of EEC lumber primarily affects the sawmilling sector in the BC coast and BC interior regions. The prices of lumber in these regions increase by 0.04% and 0.14% respectively. The relatively large increase in the price of BC interior lumber causes sawmilling sector

profits to increase by 0.14%. The regional employment of labor increases by 0.05% (See Table 4.5). The Central region only exports a small amount of lumber to the EC so it is not affected by the increase in the relative price of EC lumber.

An increase in the relative price of EC wood pulp only affects the pulping sectors in the BC interior, Central, and Atlantic regions of Canada. The prices of wood pulp in these regions increase by 0.06%, 0.02%, and 0.08% respectively (See Table 4.5). Pulping sector profits increase by 0.05% in the BC interior and Atlantic regions, and by 0.04% in the Central region. Regional employment of labor in the Atlantic region, and regional consumption of energy in the BC interior region both increase by 0.01%. The BC coast and Prairie regions do not export wood pulp to the EC so they are not affected by an unit increase in the price of EC wood pulp.

Removing the EC NTB's on newsprint has little effect on the Canadian forest industry. This same result was found for the removal of the EC import tariff levied against newsprint. The only changes seen in the Canadian forest industry are a 0.01% increase in the price of newsprint from the Central region, and a 0.01% increase in the profits of the Central regions' newsprint sector. This occurs because the Central region is the only region that exports newsprint to the EC.

As for the removal of the EC import tariff on other paper products, the removal of EC NTB's on other paper products primarily affects the prices of other paper products in the BC coast and Atlantic regions. In general, the Canadian forest industry remains relatively stable with respect to the removal of EC NTB's on forest products. This occurs because the EC is a small export for most of the regional Canadian forest industries.

In summary, the impacts that a 15% countervailing duty/export tax levied on Canadian lumber exports to the US have on the Canadian forest industry, depend on the assumption regarding incidence. In the case of the countervailing duty, US consumers respond directly by decreasing their excess demands for lumber causing the Canadian producers of lumber to bear a greater share of the impacts. In the case of the export tax, the Canadian sawmilling sector responds directly by decreasing its excess supply of lumber causing US consumers of lumber to bear a greater share of the impacts. Boyd and Krutilla (1987) and Constantino and Percy (1988) report similar results although they suggest this occurs because the Canadian sector industry is allowed to exert its monopoly power over US consumers. Similarly, they suggest that when US consumers decrease their excess demand for lumber, they exert some of their monopsony power over the Canadian sawmilling sector. Removal of NTB's in the EC will primarily affect those regional forest sectors which export forest products to the EC.

iii. Canada/US FTA

The Canada/US FTA calls for the elimination of all trade barriers, both import tariffs and NTB's, levied on the trade of pulp and paper products between the two countries over a ten year period. When, the FTA was ratified (January 1, 1989), the existing US import tariffs levied on Canadian wood pulp, newsprint, and other paper products were 0%, 0%, and 4.2 % *ad valorem* respectively. The existing NTB (with respect to the US) of most importance to the Canadian forest industry is the 15% export tax on lumber exports to the US. Therefore, the effects on the Canadian forest industry

of the Canada/US FTA are a combination of the impacts resulting from the removal of the import tariff on other paper products and from the removal of the 15% export tax on lumber, both of which are discussed earlier.

C. Exchange Rates

Once and for all exchange rate devaluations are simulated directly through the exchange rate variables present in the equations of foreign demand for Canadian forest products (i.e Equation 2). The short run impact that an exchange rate devaluation has on the Canadian forest industry is to decrease the relative prices of all the Canadian forest products with respect to the prices of all the given foreign country's forest products. The three exchange rates most important to the Canadian forest industry, based on value of exports, are the Canada/US, the Canada/Japan, and the Canada/EC exchange rates. Thus, the impacts of a unit decrease (devaluation) in each of these exchange rates on the Canadian forest industry are examined individually.

The short run impacts that a once and for all devaluation in the Canadian dollar has on the Canadian forest industry include: 1) an increase in the foreign demands for regional Canadian forest products; and 2) an increase in the regional demands for the primary and commodity inputs used to produce these forest products. An increase in the foreign demands for Canadian forest products results in an increase in the prices, production and export of Canadian forest products. This leads to an increase in the demands for the primary and commodity inputs, as well as to an increase in the prices and/or quantities demanded of these inputs (See Table 4.6).

The unit devaluation in the Canada/US exchange rate positively affects all regional Canadian forest sectors except the other paper sector in the Prairies region (See Table 4.6). Regional production of lumber increases in the BC and CE regions (by 0.02%

and 0.04% respectively), while the regional prices of lumber increase by 0.03% to 0.26%. Both the price and production of lumber increase in response to an increase in exports to the US. The regional production of wood pulp and paper products increase by 0.01 to 0.03% and the corresponding regional prices of wood pulp and paper products increase by 0.08 to 0.42%, both in response to increased exports of wood pulp and paper products to the US. The large increase in the Prairies price of wood pulp (0.42%) leads to a decrease in the supply of other paper products which is larger than the increase in the demand for other paper products. This causes the quantity of other paper products supplied/demanded to decrease. As expected, the price of other paper products in the Prairies region increases. At most, regional employment of labor and regional consumption of energy increase by 0.01%. The returns to capital for the various forest sectors increases by 0.01% to 0.03%. The largest increases in the returns to capital occur in the Prairies logging and pulping sectors where rental rates increase by 0.03%.

The unit devaluation in the Canada/Japan exchange rate primarily affects the BC coast and BC interior regions of Canada (See Table 4.6). Both of these regions increase their exports of forest products to Japan in response to the exchange rate devaluation. The prices of wood pulp increase by 0.13% and 0.11% in these two regions respectively, while production only increases by 0.02%. These increases in wood pulp prices lead to increases in the price of newsprint and other paper products in BC, but leave newsprint and other paper production unaffected. The remaining Canadian regions are not affected by the devaluation in the Canada/Japan exchange rate because they only export small quantities of forest products to Japan.

Table 4.6: Summary of the Impacts of US, Japan, and EEC Exchange Rate Devaluations on the Canadian Forest Industry (variables in % terms). (See Appendix 1 Glossary for a description of the variables).

	Exchange Rate Devalued		
Variable	Canada/US	Canada/Japan	Canada/EEC
QBCLU	0.02	0.01	0.01
QBCPU	0.01	0.02	-0
QBCNP	0.03	-0	-0
QBCOP	0.01	-0	0.01
PBCLU	0.16	0.08	0.04
PBCPU	0.10	0.13	0.02
PBCNP	0.18	0.06	0
PBCOP	0.16	0.04	0.06
QBILU	0	-0	0.02
QBIPU	0.03	0.02	0
PBILU	0.03	0.01	0.14
PBIPU	0.15	0.11	0.07
QPRPU	0.04	0	0
QPRNP	0.02	0	0
QPROP	-0.02	0	0
PPRPU	0.42	0	0
PPRNP	0.24	0	0
PPROP	0.08	0	0.01
QCELU	0.04	0	0
QCEPU	0.03	-0	0
QCENP	0.02	0	0
QCEOP	0.01	0	0
PCELU	0.26	0.01	0.02
PCEPU	0.26	0	0.03
PCENP	0.21	0	0.02
PCEOP	0.17	0	0.02
QATPU	0.02	0	0.01
QATNP	0.04	0	-0.01
QATOP	0.01	0	0.01
PATPU	0.22	0	0.08
PATNP	0.22	0	0.01
PATOP	0.16	0	0.14

The unit devaluation in the Canada/EC exchange rate primarily affects the Atlantic and BC interior regions of Canada. In the Atlantic region, the price of wood pulp

increases by 0.08%, while the price of other paper products increases by 0.14%, both in response to increased exports to the EC. In the BC interior, the price of lumber increases by 0.11%, while the price of wood pulp increases by 0.07%. The remainder of the Canadian forest industry is not affected by the Canada/EC exchange rate devaluation. The regional employment of labor, consumption of energy, and sector profits are not affected by either the devaluation against the Japanese currency or the devaluation against the EC currency. In both simulations, the impacts on these variables are on the order of 0.01% or less.

In summary, a devaluation in the Canadian dollar against any foreign currency positively affects the Canadian forest industry. A devaluation in the Canadian dollar against the US dollar has a larger impact on the Canadian forest industry than does a devaluation in the Canadian dollar against either of the Japanese of EEC currencies. Although exchange rates have some significant effects on the Canadian forest industry in the short run, this may not necessarily be true in the long run as other sectors of the economy adjust. However, this model does not capture either the long run adjustments or the adjustment in other sectors of the economy which may reduce the impact that exchange rate devaluations have on the Canadian forest industry.

D. Alternative Fibre Sources

There are two major alternatives fibre sources with respect to the traditional bleached kraft pulps. First, recycled wastepaper can be used to replace some virgin wood pulp in the production of newsprint. This is an increasingly important source of fibre input as government and the public become more concerned with reducing

garbage filled landfills. Second, increasing amounts of fast growing plantation eucalyptus and pine are entering the international wood pulp markets. Most of the competition in volume and in markets will come from Latin American producers.

i. Recycled Wastepaper

An increase in the supply recycled wastepaper is simulated by directly increasing the supply of recycled wastepaper. This is modeled by a 1% increase in the supply of recycled wastepaper in each region.

Table 4.7: Summary of the Impacts of an Increased Supply of Recycled Wastepaper on the Central Regions' Forest Industry (variables in % terms). (See Appendix 1 Glossary for a description of the variables).

Variable	Central
QCEWA	0.58
QCEPU	-0.01
QCENP	0.02
QCEOP	0.03
PCEWA	-1.41
PCEPU	-0.08
PCENP	-0.01
PCEOP	-0.02

The impacts that an increase in the regional supply of recycled wastepaper has on regional forest industries include: 1) a decrease in the regional demands for wood pulp; and 2) an increase in the regional supplies of newsprint and other paper products. What happens in the Central region is representative of what happens in the other Canadian regions (excluding BC interior which does not have an other paper industry). The Central other paper sector accounts for 75% of Canada's other paper industry, thus it is the region of greatest concern. The 1% increase in the Central supply of recycled

wastepaper leads to a 0.58% increase in the consumption of recycled wastepaper, and a 1.40% decrease in the price of recycled wastepaper (See Table 4.6). Recycled wastepaper is substituted for wood pulp, which results in a decrease in the demand for wood pulp, and also to a decrease in the price and consumption of wood pulp. The supplies of newsprint and other paper products increase as the prices of recycled wastepaper and wood pulp decrease. The production of newsprint and other paper products increases by 0.2% to 0.3%, while the prices of these forest products decrease by 0.2%. The remaining sectors of the Central forest industry are not affected by an increase in the supply and use of recycled wastepaper. In summary, an increase in the regional use of recycled wastepaper positively affects the regional newsprint and other paper sectors, negatively affects the regional pulping sectors, and does not affect the regional solid wood products sectors.

ii. Plantation Fibre

An increase in the supply of plantation eucalyptus and pine from Latin America is simulated by an exogenous decrease in the relative price of Latin American wood pulp. This is modeled by a unit decrease in the price of Latin American wood pulp.

The direct effect that a decrease in the relative price of Latin American wood pulp has on the Canadian forest industry is to decrease the demand for wood pulp from those Canadian regions which export wood pulp to the same regions as Latin America. However, the decrease in the regional demands for wood pulp occur indirectly as foreign importers substitute relatively cheaper Latin American wood pulp for regional Canadian wood pulp. The Canadian pulping sector is slightly affected by the 1% decrease in the relative price of Latin American wood pulp (See Table 4.8). At most, the regional prices of wood pulp decrease by 0.01%. In large part, the stability of the

Canadian pulping sector results because of two factors. First, Latin America and Canada have relatively small market shares for wood pulp consumption within the US, Japanese, and EC markets, such that there is little substitution between Latin American and Canadian wood pulp. Second, much of the substitution of plantation wood pulp for Canadian softwood pulp has already occurred during the last decade, such that there is little room left for further substitution of plantation wood pulp for Canadian softwood pulp. Even large decreases in the relative price of Latin American wood pulp do not have much impact on the Canadian other paper sector. In summary, an increase in the supply of plantation fibre, specifically wood pulp, from Latin America has little impact on the Canadian forest industry.

Table 4.8: Summary of the Impacts of an Increased Supply of Latin American Wood Pulp on the Canadian Forest Industry (variables in % terms). (See Appendix 1 Glossary for a description of the variables).

Variable	Scenario 1	Variable	Scenario 1
PBIPW	-0	PATPW	-0.01
PBIPC	-0	PATPU	-0.01
PBIPU	-0.01	PBIPUKA	-0.01
PPRPU	-0	PATPUKA	-0.01

E. Environmental Regulations

The most pressing environmental concern facing the Canadian forest industry today is the disposal of chemical toxins (dioxins and other chlorinated organic compounds) by pulp mills in their waste effluent. Public concern and outcry has led to the development of more stringent regulations concerning the acceptable levels of these toxins in waste effluent. In order to meet these stricter environmental regulations (i.e

produce fewer toxins), existing pulp mills will have to alter their production processes, and/or invest in new capital. As noted before, altering the production process is not costless. Larger amounts of energy, labor, and chemicals are required to reduce the amount of toxins produced. In addition to altering the production process, old wood pulp mills will be required to install new capital equipment (oxygen bleaching equipment and chlorine dioxide generators). This is also not costless. In the past, market solutions to pollution abatement such as Pigovian taxes have been attempted. However, in the case of dioxins and other chlorinated compounds, public outcry has demanded standards be set for zero discharge levels. In order to meet this regulations, one or all of the aforementioned control measures will eventually have to be implemented by all existing pulp mills. Thus, these environmental regulations which require zero discharge of dioxins and other toxins are simulated by a non-biased negative technical change (with respect to the labor, capital, and energy) in conjunction with an increase in the capital stock for each region's pulping sector. The non-biased negative technical change accounts for alterations in the production process which will use more labor, energy, capital, and chemicals to produce the same amount of wood pulp (i.e. it is expected that all of the primary factors will be equally less productive as a result of altering the production process). An increase in the capital stock of the pulping sector accounts for the construction of new oxygen bleaching equipment and/or chlorine dioxide generators. For each region, this scenario is modeled by an unit decrease in the technical efficiency of each primary input used by the pulping sector combined with a unit increase in the capital stock of the pulping sector.

Table 4.9: Summary of the Impacts of Stricter Environmental Regulations on the Canadian Forest Industry (variables in % terms). (See Appendix 1 Glossary for a description of the variables).

	Region				
Regional Variable	BC	BI	PR	CE	AT
QPU	-0.06	-0.08	-0.07	-0.06	-0.08
PPU	0.15	0.05	0.05	0.12	0.08
PKA	-0.58	-0.69	-0.70	-0.60	-0.61
QLA	0.08	0.08	0.25	0.04	0.13
QEN	0.12	0.28	0.29	0.06	0.15

The effects of stricter environmental regulations regarding the release of toxic chemicals in pulp mill effluent include: 1) a decrease in the regional demands for primary inputs; 2) an increase in the regional supplies of capital for pulping; and 3) a decrease in the regional supplies of wood pulp. The decrease in technical efficiency of primary inputs in the regional pulping sectors results directly in the decrease in regional demands for primary inputs. That is, regional pulping sectors shift their demands for inputs away from relatively more expensive (i.e less efficient) primary inputs to commodity inputs. In conjunction, the regional supplies of capital for pulping are increased directly. The major result of this is a relatively large decrease in the profitability of the sector industry as seen by a decrease in the returns to capital for pulping in each region (See Table 4.9). Declines in the regional returns to capital for pulping range from 0.58% for the BC coast region to 0.70% for the Prairies region. As a result of the large fall in sector profits, wood pulp producers substitute labor and energy for capital. This labor and energy is also needed when altering the production process to reduce the amount of organic chlorinated compounds produced. This results in relatively small increases in

the regional quantities of labor employed and energy consumed. This happens despite the initial decrease in the regional demands for labor and energy. Increases in the regional employment level range from 0.04% to 0.25%, while increases in regional energy consumption range from 0.06% to 0.29%. The decline in the technological efficiency of the pulping sector causes a decrease in the regional supplies of wood pulp, witnessed by a decrease in the regional quantities of wood pulp and an increase in the regional prices of wood pulp. Regional wood pulp production declines by 0.06% to 0.08%, while the corresponding wood pulp prices increase by 0.05% to 0.15%. Impacts on the remaining sectors of each regions forest industry are not large.

Impact on Regional Economies

The percentage change in regional forest industry GDP is calculated using a weighted average of the percentage changes obtained for the returns to sector capital and for the regional employment level. The impact that each scenario has on its regional economy is calculated by multiplying the percentage change in regional forest industry GDP by the share of the regional GDP that the forest industry produces. For example, the BC, Prairies, Central, and Atlantic forest industries produce 8.4%, 0.5%, 1.9%, and 3.3% of their total regional GDP's respectively. The impact on the Canadian economy is obtained by a share weighted sum of the impacts on regional GDP's. However, these scenarios assume that the rest of the domestic economy (other than the forest industry) does not respond to any of the changes occurring in the forest industry.

Conclusion

The impacts that the different global issues discussed have on the Canadian forest industry vary significantly. For some issues, such as plantation fibre and tariff barriers, the Canadian forest industry is relatively stable. For other issues, such as stricter environmental regulations and nontariff barriers, the Canadian forest industry is very sensitive. For most of the issues examined, separate regional forest industries respond differently. These differential regional impacts result because of the differences in regional industry structure and in export markets.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

Introduction

The objectives of this research are to identify/select those global economic factors which may have a large impact on the Canadian forest industry and to quantify the actual impacts that these selected factors may have. Given the importance of Canada's forest industry to the domestic economy and to the global forest industry, a short run inter-sectoral, inter-regional model is developed to analyze the impacts that selected global factors have on the Canadian forest industry.

Summary of Canada's Forest Industry

Canada's forest industry is important. Forest product exports account for 10% of Canada's total exports, and for 2.5% of Canada's total GNP. Canada's forest industry is export oriented and plays a major role in the global marketplace for forest products. In the Canadian forest industry, the pulp and paper sector is the most important component, both in its' relative size to other sectors, and in its' importance in of derived demands for wood products produced by other sectors of the forest industry. Due to the importance of Canada's forest industry, both in the domestic and global economies, it is appropriate to model the Canadian forest industry in a general equilibrium framework. This framework is also suitable for the economic analysis of trade policies with respect to the variety of global economic factors impacting the Canadian forest industry. Since Canada's forest industry operates predominantly in the competitive global marketplace, the Canadian forest industry is assumed to be perfectly competitive. This assumption facilitates the development of a general equilibrium model of Canada's forest industry.

Lumber, wood pulp, newsprint, and other paper products account for 95% of Canada's forest product exports. Therefore, exports of these forest products are explicitly recognized. Similarly, the US, Japan, and the EEC import 90% of Canada's forest product exports. Therefore, exports to these regions are explicitly recognized. Regional differences in Canada's forest industry result from differences between each regions' forest resource base. These regional differences, both in industry structure (input/output mixes) and in export markets (destination), are also explicitly recognized.

Summary of the Model

The model selected to analyze the Canadian forest industry and trade in forest products is a inter-sectoral, inter-regional model specified in a proportional rate of change format. The Canadian forest industry is divided into five regions and five industries. Canada is an excess supplier of lumber, wood pulp, newsprint and other paper products. Regional production is destined for the US, Japan, and the EEC which are treated as excess demand regions. Alternative suppliers include the EFTA, Latin America and Other Asia-Pacific. Final demands for forest products are modeled using the Armington assumption that products distinguished only by place of origin can be treated as imperfect substitutes. Primary and intermediate input demands are modeled using CRESH and CES functions respectively. Multiple output industries are modeled using CET functions with individual output supply functions based on input and output prices. A system of linear equations is obtained and the model is solved using matrix inversion and multiplication. The model developed is not a full CGE model because it does not explicitly recognize other sectors of the economy. However, the model developed can be easily expanded into a full CGE model.

Summary of Results

Six different global issues are analyzed with respect to their impacts on the Canadian forest industry. First, the elimination of import tariffs on pulp and paper products by the US, Japan, and the EEC are examined. Eliminating all the tariffs on Canadian pulp and paper products imposed by an individual country generally produces few significant changes in the regional prices and quantities of Canadian forest products. Only the prices of the Canadian forest products against which the corresponding import tariffs are eliminated show any appreciable change. Second, the impacts of nontariff barriers against selected Canadian forest products are examined. Canada is better off having imposed a 15% export tax on lumber exports to the US than if the US had imposed a 15% countervailing duty. Removal of NTB's by the EEC primarily affect those regional forest sectors which export a significant amount of forest products to the EEC. However, in general these impacts are not that large as the EEC is a relatively small export market for most regions, especially relative to the US market. Third, exchange rate devaluations are examined. Devaluations in the Canadian dollar against foreign currencies, especially against the US dollar, have positive impacts throughout regional forest industries. Fourth, increased use of recycled wastepaper by the Canadian newsprint and other paper sector is examined. Increased use of recycled wastepaper has a significant impact on the regional prices and consumption of recycled wastepaper, and much smaller impacts on the prices and quantities of other pulp and paper products. In general, this occurs because recycled wastepaper is still a relatively minor input in the production of Canadian paper products. Fifth, an increase in the supply of Latin American wood pulp is examined. An increase in the supply of plantation wood pulp in the global forest products marketplace does not significantly affect the Canadian

forest industry. This occurs because Latin America and Canada do not compete against each other in global markets. Each country's wood pulp occupies its own niche for paper production. Sixth, stricter environmental regulations which require a reduction in effluent levels from the pulping sector are examined. In general, regional pulping sectors are negatively affected as they increase input expenditures, primarily on capital, to reduce pollution. This scenario produces the largest impacts on the Canadian forest industry relative to other scenarios. Given this set of results and the uncertainty surrounding stricter environmental regulations, further investigation is warranted.

Given the structure of the model, the results from each scenario can be viewed us upper bounds on the actual impact that will likely occur. This model does not explicitly identify linkages between the Canadian forest industry and the remainder of the domestic economy or the global forest industry. If these linkages were explicitly modeled, it would allow the forest industry to transmit some of the impacts to the domestic economy and/or global forest industry. This model focuses on the impacts that policy shocks have on regional forest industries and restricts the forest industry from transmitting shocks outside of itself (i.e. the forest industry bears all of the impacts of a given policy shock. For example, when labor is released from the forest industry due to a negative policy shock, some of the labor will migrate out of the forest industry and into other sectors of the economy. This model cannot account for this because it does not identify other domestic sectors. Thus, the results from this model are upper bound estimates of the actual impact that policy shocks have on the forest industry.

Policy Conclusions

Canadian forest trade policy should focus on two issues. First, Canadian policy should focus on analyzing the impact that stricter environmental regulations have on

the Canadian forest industry and domestic economy. Given the relatively large impacts that stricter pollution regulations have on regional pulping industries, the increasing public pressure with regards to the environment, and the method in which these regulations are modeled, more research is necessary. Research should focus on identifying which technique the pulping sector will use in response to the regulations. Second, Canadian trade policy should focus on eliminating existing trade barriers and preventing new trade barriers from being implemented. Priority should be given to those trade barriers which affect Canada/ US trade, though the EC and Japanese markets should also be examined, especially as they increase in importance. Canadian policy should also look at facilitating the expansion of trade in forest products to Japan and the EEC.

Model Alterations/Further Research

Three major areas of change to the model developed are recommended to expand the estimation capabilities of the model, and to expand the range of possible policy analyses. First, other sectors of the Canadian economy should be explicitly modeled in the GE framework. This would recognize the major role the forest industry plays in the Canadian economy. At present, only the Canadian forest industry is modeled in a GE framework with the rest of the domestic economy exogenous. Second, the model should be developed in a long run framework. This would involve endogenizing the delivered wood cost, the price of capital, and the quantity of labor employed. Then, changes in the AAC or economically accessible timber, in the capital stocks, or in wage rates would be explicitly recognized in the model. Third, the model should be expanded to endogenize the prices of foreign forest products. This would recognize the major role that the Canadian forest industry plays in the global forest industry. This would

involve the development of global demand and supply functions ensuring that world exports and imports balance. Any further expansion of this CGE model should not be done in the LOTUS spreadsheet framework as the present model nearly exceeds the capability of LOTUS.

One area of further research not related to the model structure is obtaining improved estimates for the elasticity parameters. Some of the elasticities used in this model show a considerable degree of variation in the literature. Very little research has been done on estimating other elasticities.

Conclusion

The Canadian forest industry is important to Canada. This research develops a quantitative model of the Canadian forest industry and does a preliminary analysis of the impact that selected global issues have on the Canadian forest industry. In light of the importance of Canada's forest industry, both to the domestic economy and global forest industry, a further, more detailed analysis is warranted.

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APPENDIX 1: GLOSSARY

Subscripts

c = country importing/consuming forest products.

CAN = Canada
US = United States
JAP = Japan
EC = European Economic Community

i = forest product exported/imported.

LU = softwood lumber
PU = wood pulp
NP = newsprint
OP = other paper products

j = country/region exporting forest products.

BC = BC coast
BI = BC interior
PR = Prairies
CE = Central
AT = Atlantic
EFTA = European Free Trade Association
LA = Latin America
OA = Other Asia-Pacific

p = output produced by regional Canadian forest industries.

LOAO = logging industry aggregate output (sawlogs and pulp wood)
SMAO = sawmilling industry aggregate output (lumber and pulp chips)
PW = pulp wood
PU = wood pulp
NP = newsprint
OP = other paper products

r = Canadian region producing forest products.

BC, BI, PR, CE, AT

s = Canadian forest industry sector.

LO = logging
SM = sawmilling
PU = pulping
NP = newsprint
OP = other paper

x = single inputs used by regional Canadian forest industries.

LA = labor
KA = capital
EN = energy
PW = pulp wood
PC = pulp chips
PU = wood pulp
WA = recycled wastepaper

z = single and aggregate inputs used by regional Canadian forest industries.

TI = timber
SA = sawlogs
PW = pulp wood
AC = aggregate commodity input
AP = aggregate primary input

Variable Acronyms

Table A1.1: Description of Endogenous Variable Acronyms.

Variable	Description
QSA	percent change in the quantity of sawlogs produced in a given region of Canada. (i.e QBCSA is the QSA for the BC coast region).
QPW	percent change in the quantity of pulp wood produced.
QLU	percent change in the quantity of lumber produced.
QPC	percent change in the quantity of pulp chips produced.
QPU	percent change in the quantity of wood pulp produced.
QWA	percent change in the quantity of recycled wastepaper consumed.
QNP	percent change in the quantity of newsprint produced.
QOP	percent change in the quantity of other paper products produced.
PTI	percent change in the price of timber (delivered wood cost).
PSA	percent change in the price of sawlogs.
PPW	percent change in the price of pulp wood.
PLU	percent change in the price of lumber.
PPC	percent change in the price of pulp chips.
PPU	percent change in the price of wood pulp.
PWA	percent change in the price of recycled wastepaper.
PNP	percent change in the price of newsprint.
POP	percent change in the price of other paper products.
QLA	percent change in the quantity of labor employed.
QEN	percent change in the quantity of energy consumed.
PLOKA	percent change in the rental return rate for capital used in the logging industry.
PSMKA	percent change in the rental return rate for capital used in the sawmilling industry.
PPUKA	percent change in the rental return rate for capital used in the pulping industry.
PNPKA	percent change in the rental return rate for capital used in the newsprint industry.
POPKA	percent change in the rental return rate for capital used in the other paper industry.

Other Acronyms

Table A1.2: Description of Other Acronyms.

Acronym	Description
AAC	Annual Allowable Cut
CC	Importing countries consumption
CE	Canadian exports
CES	Constant Elasticity of Substitution
CET	Constant Elasticity of Transformation
CGE	Computable General Equilibrium
CPPA	Canadian Pulp and Paper Association
CRESH	Constant Returns, Elasticity of Substitution, Homothetic
CTMP	Chemi-Thermo-Mechanical Pulp
EC	European Community
EFTA	European Free Trade Association
ES	Excess Supply
ED	Excess Demand
FAO	Food and Agriculture Organization
FTA	Free Trade Agreement
GATT	General Agreement on Trade and Tariffs
GNP	Gross National Product
GTM	Global Trade Model
IIASA	International Institute of Applied Systems Analysis
KNP	Royal Dutch Papermills
m3	cubic meters
MT	Metric Tonnes
NA	not applicable
NTB	Non-Tariff Barrier
TAMM	Timber Assessment Market Model
TVP	Total Value of Production
WRA	Woodbridge Reed and Associates

APPENDIX 2: PARAMETER VALUES

SHARES

All share data is annual and derived from the base year 1986. 1986 is a representative year for the Canadian forest industry. In 1986 there were no labor disruptions and the pulp and paper sector was operating at around 90 - 95% of full capacity. Also, the Canadian economy was recovering the effects of the 1982-1983 recession and was not suffering from high inflation or high interest rates.

Acronyms for Share Nomenclature

This provides a description of the nomenclature used for the share and elasticity data listing which follows.

Example name: 's-bc-lo-ap'

s or b=share, el=elasticity
bc=region/country (BC coast)
lo=industry (logging)
ap=input/output (aggregate primary input)

Regional Industry Input Expenditure Shares

Regional industry input expenditure shares are calculated for all the inputs used by a given sector and region (See Table A2.1). Input shares are first calculated for the aggregate primary and commodity inputs. Input shares are also calculated for the individual primary and commodity inputs. Input shares are calculated from the total expenditures by each regional forest sector. In all sectors, the cost of capital is assumed to be the residual from the total value of production minus the costs of all other inputs. The total cost of materials and supplies is assumed to be for the commodity inputs specified in the model. Data on industry expenditures are obtained from the appropriate Statistics Canada publications (Table 1: Principal Statistics of Manufacturing Activity). Data on commodity input shares for multiple commodity input industries are also obtained from the appropriate Statistics Canada publication (from Table 4: Material and Supplies Used by Commodity and by Industry).

Statistics Canada 25-201 for regional logging industries.

Statistics Canada 35-250 and -250B for regional sawmilling industries.

Statistics Canada 36-250 and -250B for regional pulping, newsprint, and other paper industries.

Table A2.1: Regional Industry Input Expenditure Shares For 1986.

sbcloap	0.47	sbiloap	0.35	sprloap	0.44	sceloap	0.49	satloap	0.36
sbcloti	0.53	sbiloti	0.65	sprloti	0.56	sceloti	0.51	satloti	0.64
sbclola	0.45	sbilola	0.49	sprlola	0.37	scelola	0.44	satlola	0.43
sbcloka	0.48	sbiloka	0.42	sprloka	0.54	sceloka	0.47	satloka	0.45
sbcloen	0.07	sbiloen	0.09	sprloen	0.09	sceloen	0.09	satloen	0.12
sbcsmap	0.43	sbismap	0.51			scesmap	0.43		
sbcsmsa	0.57	sbismsa	0.49			scesmsa	0.57		
sbcsmla	0.40	sbismla	0.37			scesmla	0.41		
sbcsmka	0.56	sbismka	0.56			scesmka	0.51		
sbcsmen	0.04	sbismen	0.07			scesmen	0.08		
sbcpuap	0.53	sbipuap	0.56	sprpuap	0.55	scepuap	0.49	satpuap	0.51
sbcpuac	0.47	sbipuac	0.44			scepuac	0.51		
sbcpupw	0.24	sbipupw	0.24	sprpupw	0.45	scepupw	0.56	satpupw	0.49
sbcpupc	0.76	sbipupc	0.76			scepupc	0.44		
sbcpula	0.27	sbipula	0.20	sprpula	0.23	scepula	0.26	satpula	0.29
sbcpuka	0.59	sbipuka	0.62	sprpuka	0.65	scepuka	0.58	satpuka	0.51
sbcpuen	0.14	sbipuen	0.18	sprpuen	0.12	scepuen	0.16	satpuen	0.20
sbcnpap	0.64	sbinpap	0.00	sprnpap	0.64	scenpap	0.64	satnpap	0.64
sbcnpac	0.36	sbinpac	0.00	sprnpac	0.36	scenpac	0.36	satnpac	0.36
sbcnppu	0.92	sbinppu	0.00	sprnppu	0.92	scenppu	0.92	satnppu	0.92
sbcnpwa	0.08	sbinpwa	0.00	sprnpwa	0.08	scenpwa	0.08	satnpwa	0.08
sbcnpla	0.21	sbinpla	0.00	sprnpla	0.24	scenpla	0.24	satnpla	0.24
sbcnpka	0.60	sbinpka	0.00	sprnpka	0.51	scenpka	0.57	satnpka	0.51
sbcnpen	0.19	sbinpen	0.00	sprnpen	0.25	scenpen	0.19	satnpen	0.25
sbcopap	0.53	sbiopap	0.00	spropap	0.53	sceopap	0.53	satopap	0.53
sbcopac	0.47	sbiopac	0.00	spropac	0.47	sceopac	0.47	satopac	0.47
sbcoppu	0.75	sbioppu	0.00	sproppu	0.75	sceoppu	0.75	satoppu	0.75
sbcopwa	0.25	sbiopwa	0.00	spropwa	0.25	sceopwa	0.25	satopwa	0.25
sbcopla	0.29	sbiopla	0.00	spropla	0.29	sceopla	0.29	satopla	0.29
sbcopka	0.52	sbiopka	0.00	spropka	0.52	sceopka	0.52	satopka	0.52
sbcopen	0.19	sbiopen	0.00	spropen	0.19	sceopen	0.19	satopen	0.19

Regional Industry Output Value Shares

Regional industry output value shares are calculated for those regions and sectors which produce multiple outputs (i.e the BC and Central logging and sawmilling sectors) (See Table A2.2). The output shares are calculated from the value of production of each output which is obtained from the same Statistics Canada publications as for regional industry input expenditure shares (from Table 2: Value of Shipments by Region).

Table A2.2: Regional Industry Output Value Shares For 1986.

sbclosa	0.95	sbilosa	0.93	scelosa	0.39
sbclopw	0.05	sbilopw	0.07	scelopw	0.61
sbcsmlu	0.92	sbismlu	0.91	scesmlu	0.75
sbcsmpc	0.08	sbismpc	0.09	scesmpc	0.25

Regional Forestry Labor and Energy Distribution

Regional forestry labor and energy distribution shares are calculated separately for each region (See Table A2.3). Distribution shares are calculated for the forest sectors present in each region. Labor distribution shares are calculated on the basis of the number of employees in each forest industry for a given region. Energy distribution shares are calculated on the basis of input expenditures for energy by each forest sector. Data for both of these distributive shares is obtained from the same source as for regional industry input value shares (from Table 1: Principal Statistics of Manufacturing Activity).

Table A2.3: Regional Forest Industry Labor and Energy Distribution Shares For 1986.

bbclola	0.36	bbilola	0.32	bprlola	0.35	bcelola	0.22	batlola	0.36
bbcsmla	0.28	bbismla	0.56			bcesmla	0.27		
bbcpula	0.11	bbipula	0.12	bprpula	0.39	bcepula	0.06	batpula	0.19
bbcnpla	0.15	bbinpla	0.00	bprnpla	0.10	bcenpla	0.28	batnpla	0.34
bbcopla	0.10	bbiopla	0.00	bpropla	0.16	bceopla	0.17	batopla	0.11
bbcloen	0.13	bbiloen	0.18	bprloen	0.14	bceloen	0.09	batloen	0.10
bbcsmen	0.08	bbismen	0.39			bcesmen	0.08		
bbcpuen	0.17	bbipuen	0.43	bprpuen	0.45	bcepuen	0.09	batpuen	0.22
bbcnpen	0.45	bbinpen	0.00	bprnpen	0.21	bcenpen	0.51	batnpen	0.57
bbcopen	0.17	bbiopen	0.00	bpropen	0.20	bceopen	0.23	batopen	0.11

Regional Forest Product Export/Import Market Shares

Regional forest product export/import market shares are calculated separately for each region (See Table A2.4). Five possible destinations are recognized for the exports of regional Canadian forest products including: Canada, the US, Japan, the EC, and the rest of the world (ROW). Nine possible sources of forest products are recognized for the import of forest products by the US, Japan and the EEC including: the five Canadian regions, the EFTA, Latin America, Other-Asia Pacific, and ROW. Data for these export/import market shares are obtained from 1) The FAO Yearbook of Trade in Forest Products, 2) selected Statistics Canada publications (35-002 and 35-003), and 3) Selected Forestry Statistics: 1987, published by Forestry Canada.

Table A2.4: Regional Forest Industry Export Market Shares For 1986.

bbccalu	0.29	bbicalu	0.32			bcecalu	0.27		
bbceclu	0.13	bbieclu	0.62			bceeclu	0.01		
bbcjalu	0.18	bbijalu	0.02			bcejalu	0.01		
bbcuslu	0.40	bbiuslu	0.03			bceuslu	0.69		
bbcnppu	0.54	bbinppu	0.00	bprnppu	0.20	bcenppu	0.49	batnppu	0.48
bbcoppu	0.39	bbioppu	0.00	bproppu	0.15	bceoppu	0.35	batoppu	0.09
bbcecpu	0.00	bbiecpu	0.26	bprecpu	0.00	bceecpu	0.03	batecpu	0.21
bbcjapu	0.07	bbijapu	0.23	bprjapu	0.00	bcejapu	0.00	batjapu	0.00
bbcuspu	0.00	bbiuspu	0.25	bpruspu	0.65	bceuspu	0.13	batuspu	0.22
bbccanp	0.13	bbicanp	0.00	bprcanp	0.00	bcecanp	0.08	batcanp	0.00
bbcecnp	0.00	bbiecnp	0.00	bprecnp	0.00	bceecnp	0.07	batecnp	0.00
bbcjanp	0.11	bbijanp	0.00	bprjanp	0.00	bcejanp	0.00	batjanp	0.00
bbcusnp	0.68	bbiusnp	0.00	bprusnp	1.00	bceusnp	0.80	batusnp	0.67
bbccaop	0.38	bbicaop	0.00	bprcaop	1.00	bcecaop	0.71	batcaop	0.29
bbcecop	0.14	bbiecop	0.00	bprecop	0.00	bceecop	0.02	batecop	0.40
bbcjaop	0.07	bbijaop	0.00	bprjaop	0.00	bcejaop	0.00	batjaop	0.00
bbcusop	0.24	bbiusop	0.00	bprusop	0.00	bceusop	0.24	batusop	0.31

Table A2.5: Country Import Market Shares for 1986.

scabclu	0.16	secbclu	0.03	sjabclu	0.05	susbclu	0.03
scabilu	0.44	secbilu	0.01	sjabilu	0.01	susbilu	0.13
scacelu	0.35	seccelu	0.01	sjacelu	0.01	suscelu	0.14
scabcnp	0.27	seceflu	0.27	sjaeflu	0.01	suseflu	0.00
scabinp	0.00	seclalu	0.01	sjalalu	0.01	suslalu	0.00
scaprnp	0.00	sececlu	0.45	sjajalu	0.85	sususlu	0.70
scacenp	0.73	secbcpu	0.00	sjabcpu	0.02	susbcpu	0.00
scaatnp	0.00	secbipu	0.05	sjabipu	0.07	susbipu	0.02
scabcop	0.10	secprpu	0.00	sjaprpu	0.00	susprpu	0.01
scabiop	0.00	seccepu	0.03	sjacepu	0.00	suscepu	0.03
scaprop	0.03	secatpu	0.04	sjaeipu	0.02	susatpu	0.01
scaceop	0.72	secefpu	0.24	sjaoapu	0.02	susefpu	0.01
scaatop	0.02	seclapu	0.05	sjalapu	0.02	suslapu	0.01
		sececpu	0.39	sjajapu	0.78	sususpu	0.91
		secbcnp	0.00	sjabcnp	0.06	susbcnp	0.08
		secbinp	0.00	sjabinp	0.00	susbinp	0.00
		secprnp	0.00	sjaprnp	0.00	susprnp	0.01
		seccenp	0.08	sjacenp	0.00	suscenp	0.38
		secatnp	0.00	sjaatnp	0.00	susatnp	0.09
		secefnp	0.51	sjaefnp	0.01	susefnp	0.01
		secoanp	0.04	sjalanp	0.01	suslanp	0.00
		sececnp	0.33	sjajanp	0.85	sususnp	0.38
		secbcop	0.01	sjabcop	0.01	susbcop	0.01
		secbiop	0.00	sjabiop	0.00	susbiop	0.00
		secprop	0.00	sjaprop	0.00	susprop	0.00
		secceop	0.01	sjaceop	0.00	susceop	0.02
		secatop	0.01	sjaatop	0.00	susatop	0.01
		secefop	0.18	sjaefop	0.01	susefop	0.01
		seclaop	0.01	sjalaop	0.00	suslaop	0.01
		sececop	0.72	sjajaop	0.96	sususop	0.93

ELASTICITIES

Regional Industry Primary/Commodity Input Substitution Elasticities

Aggregate input substitution elasticities for regional Canadian pulp and paper industries are obtained from work done on the Canadian pulp and paper sector by Klein (1985). It is assumed that these elasticities are the same for all regions and for all pulp and paper sectors. Substitution elasticities are obtained by averaging the fibre vs. energy or labor elasticities which are obtained for all pulp and paper sectors by Klein using his translog model. A value of 0.2 is used for the substitution elasticity between the aggregate primary and commodity inputs for all regional pulp and paper sectors. Aggregate input substitution elasticities for regional logging and sawmilling sectors are obtained in a similar manner as for the pulp and paper aggregate substitution elasticities. However, the fibre vs. labor or energy elasticities in the logging and sawmilling sectors are obtained from work done by Martinello (1985). Martinello also uses a translog model. A value of 0.15 is used for all regional logging substitution elasticities between the aggregate primary and commodity inputs. A value of 0.4 is used for the corresponding elasticity for all regional sawmilling sectors.

Regional Industry Primary/Commodity Input Substitution Elasticities

Regional industry primary input substitution elasticities for all industries are assumed to be 0.5. This is the value used by Dixon et al. (1982) in their ORANI model developed for the Australian economy. Dixon finds that there is little sensitivity in his results to changing these elasticity. They also indicate little work has been done on calculating substitution elasticities between primary inputs.

Regional Industry Output Transformation Elasticities

It is assumed that the transformation from pulpwood to sawlogs is inelastic (given that pulpwood is the major output of all regional logging industries except BC). A value of 0.75 is used for all regional logging output transformation elasticities. It is assumed that the transformation from lumber to pulp chips is elastic (given that lumber is the major output of all regional sawmilling industries). A value of 2.0 is used for all regional sawmilling output transformation elasticities.

Regional Industry Output Supply Elasticities

Regional output supply elasticities are obtained from two sources. All regions were assumed to have the same output supply elasticities for a given output. The lumber output supply elasticity is assumed to be 0.5, obtained from the Timber Assesment Market Model (TAMM) developed by Adams and Haynes (1980). Since there is no literature concerning output supply elasticities for sawlogs, pulp wood, or pulp chips, a value of 0.5 was also used for these output supply elasticities. Output supply elasticities for the pulp and paper products are obtained from work done by Schembri and Robicheau (1987). Values of 0.3, 0.4, and 0.15 are used for the output supplies of wood pulp, newsprint, and other paper products respectively. A value of 0.3 is also used for the output supply elasticity of recycled wastepaper (i.e the same as for its substitute input, wood pulp).

Country Armington Demand Substitution Elasticities

Armington demand substitution elasticities are obtained from work done by Constantino (1988) on developing a CGE model for Indonesia. A value of 2.0 is used for the Armington substitution elasticities for all countries and all forest products.

Country Income Demand Substitution Elasticities

Country income demand elasticities for selected forest products are obtained from work done on the Global Trade Model (GTM) (Kallio et al., 1987). All four consuming countries are assumed to have the same income demand elasticities as eachother. Values of 1.5, 1.0, 0.6, and 1.2 are used for the lumber, wood pulp, newsprint, and other paper product income demand elasticities respectively.

APPENDIX 3: SENSITIVITY TESTS

For this model, sensitivity tests are done for the Armington substitution elasticities, the output transformation elasticities, and the output supply elasticities for solid wood products. The sensitivity tests are done using four test simulations which include: 1) the impact of a 1% increase in the annual allowable cut (AAC) for the BC coast region; 2) the impact of a 1% decrease in the price of Japanese softwood lumber; 3) the impact of a 1% increase in the price of EC wood pulp; and 4) the impact of a 1% decrease in the price of US newsprint.

Armington Elasticities

Armington substitution elasticities represent the degree of substitution by an importing/consuming region between the same commodity of different origins. It is expected *a priori* that as the price of a commodity exported by region 'C' declines, that the prices and quantities of the same commodity exported by all other regions will also decline. This results because importing/consuming regions substitute region 'C' s relatively cheaper commodity for the same commodity exported by other regions. In this model, changing the values of the Armington substitution elasticities affects the export demand for Canadian forest products (i.e. lumber, wood pulp, newsprint, and other paper products). Therefore, it is expected *a priori* that the prices and quantities of these forest products will be affected more than the prices and quantities of the intermediate input commodities by a change in the values of the Armington substitution elasticities. The test simulations uses an initial value of 2.0 for all of the Armington substitution elasticities. This value assumes that forest products are highly substitutable, although not perfectly so. This value was obtained from work done by Constantino in

developing a CGE model for Indonesia (report forthcoming). Sensitivity tests are done for these test simulations using values of 0.5, 1.0, and 10.0 for all of the Armington substitution elasticities.

A3.1: The Effects of Changing the Armington Elasticity of Substitution on Selected Variables for a 1% Increase in the BC Coast Annual Allowable Cut (AAC) (variables in % terms) (See Appendix 1 GLOSSARY for a description of the variable names).

	Armington Elasticity			
Variable	0.5	1.0	2.0	10.0
QBCSA	-0.57	-0.59	-0.60	-0.61
QBCPW	-0.59	-0.58	-0.57	-0.57
QBCLU	-0.31	-0.34	-0.37	-0.39
PBCTI	5.86	5.63	5.40	5.22
PBCSA	1.88	1.71	1.54	1.41
PBCPW	1.85	1.71	1.57	1.46
PBCLU	0.58	0.38	0.19	0.04
PBCPU	0.28	0.21	0.15	0.06
PBCLOKA	-0.35	-0.46	-0.56	-0.64

For the test simulation which increases the BC coast AAC by 1%, the impact of changing the Armington substitution elasticities to 0.5 or to 10.0 is negligible (See Table A3.1). If the Armington substitution elasticities are decreased from 2.0 to 0.5, the quantity of commodities supplied by the BC coast logging and sawmilling industries are changed by at most 0.06 percentage points. The delivered wood costs for sawlogs and pulp wood are increased by at most 0.34 percentage points, while the prices of lumber and wood pulp are increased by up to 0.39 percentage points. If the Armington substitution elasticities are increased from 2.0 to 10.0, the quantity of commodities supplied by the BC coast logging and sawmilling industries are changed by at most 0.02 percentage points. The delivered wood costs for sawlogs and pulp wood are decreased

by at most 0.13 percentage points, while the prices of lumber and wood pulp are decreased by up to 0.15 percentage points. Changing the values of the Armington substitution elasticities to 0.5 has a greater impact on the results than does changing the values to 10.0.

A3.2: The Effects of Changing the Armington Elasticity of Substitution on Selected Variables for a 1% Decrease in the Price of Japanese Lumber (variables in % terms) (See Appendix 1 GLOSSARY for a description of the variable names).

	Armington Elasticity			
Variable	0.5	1.0	2.0	10.0
QBCSA	0.01	0	-0.01	-0.01
QBCLU	0.02	0	-0.01	-0.03
QBCPC	-0.02	0	0.01	0.03
PBCSA	0.10	0	-0.07	-0.13
PBCLU	0.11	0	-0.08	-0.15
PBCPC	0.09	0	-0.06	-0.13
PBCSMKA	0.11	0	-0.07	-0.15
QBILU	0	0	-0	-0.01
PBILU	0.01	0	-0.01	-0.03
PBISMKA	0.01	0	-0.01	-0.03
QCELU	-0	0	-0	-0.01
PCELU	-0	0	-0.01	-0.03
PCESMKA	-0	0	-0.01	-0.03

Table A3.3: The Effects of Changing the Armington Elasticity of Substitution on Selected Variables for a 1% Increase in the Price of EC Wood Pulp (variables in % terms) (See Appendix 1 GLOSSARY for a description of the variable names).

	Armington Elasticity			
Variable	0.5	1.0	2.0	10.0
QCEPU	-0	0	0	0.01
PCEPU	-0.01	0	0.02	0.06
PCEPUKA	-0.01	0	0.01	0.05
QATPU	-0.01	0	0.01	0.02
PATPU	-0.09	0	0.08	0.17
PATPUKA	-0.06	0	0.05	0.12

Changing the values of the Armington substitution elasticities produces similar trends for the three test simulations which examine the impact of foreign price shocks on the Canadian forest industry (See Tables A3.2, A3.3, and A3.4). These trends are: 1) Armington substitution elasticities of 1.0 leave the Canadian forest industry unaffected by changes in the relative price of foreign commodities: 2) Armington substitution elasticities of 0.5 produce the wrong signs in both regional prices and quantities (i.e the reverse of what is *a priori* expected); and 3) Armington substitution elasticities of 10.0 leave the Canadian forest industry more responsive to changes in the relative prices of foreign commodities than for Armington substitution elasticities of 2.0. An Armington substitution elasticity of 1.0 cancels out any substitution of Canadian forest products for foreign forest products (or vice versa) such that the Canadian forest industry is unaffected by changes in the relative prices of foreign forest products (i.e Canadian forest products are not substitutable with foreign forest products at all). This is the Leontief scenario. Further reduction of the Armington substitution elasticities to 0.5 causes the signs on all of the regional prices and quantities such that the exports

of Canadian forest products increases as the relative prices of foreign forest products decrease (i.e. Canadian forest products are complements to foreign forest products). This is also an unrealistic scenario.

For the test simulation which decreases the relative price of Japanese lumber by 1%, an increase in the Armington substitution elasticities from 2.0 to 10.0 has the greatest impact on the regional prices of lumber and on the rental return rate for capital in the sawmilling industry (See Table A3.2). In relative terms, a fivefold increase in the Armington substitution elasticities (2.0 to 10.0) results in approximately a twofold increase in all the regional prices and quantities. Similarly, for the test simulation which decreases the price of EC wood pulp by 1%, increasing the Armington substitution elasticities from 2.0 to 10.0 has the greatest impact on the regional prices of wood pulp and results in approximately a two to threefold increase in all the regional prices and quantities (See Table A3.3). A threefold increase in all the regional prices and quantities results for the US newsprint simulation when the Armington substitution elasticities are increased from 2.0 to 10.0 (See Table A3.4).

Table A3.4: The Effects of Changing the Armington Elasticity of Substitution on Selected Variables for a 1% Decrease in the Price of US Newsprint (variables in % terms) (See Appendix 1 GLOSSARY for a description of the variable names).

	Armington Elasticity			
Variable	0.5	1.0	2.0	10.0
QBCPU	0.01	0	-0.01	-0.02
QBCNP	0.03	0	-0.04	-0.12
PBCPU	0.05	0	-0.05	-0.08
PBCNP	0.13	0	-0.17	-0.52
PBCNPKA	0.13	0	-0.17	-0.51
QPRNP	0.05	0	-0.06	-0.16
PPRNP	0.19	0	-0.21	-0.61
PPRNPKA	0.18	0	-0.21	-0.59
QCENP	0.03	0	-0.04	-0.14
PCENP	0.16	0	-0.19	-0.56
PCENPKA	0.15	0	-0.18	-0.54
QATNP	0.04	0	-0.05	-0.16
PATNP	0.17	0	-0.20	-0.60
PATNPKA	0.16	0	-0.19	-0.58

Output Transformation Elasticities

Output transformation elasticities represent the degree of transformation between alternative outputs along a production possibilities frontier for a given industry. In this model, output transformation elasticities are required for the logging and sawmilling industries in the BC and Central Canada regions. For the logging industry, alternative outputs are sawlogs and pulp wood. A value of 0.75 is used for all output transformation elasticities in each regions' logging industry. This assumes that sawlogs can be converted into pulp wood (which is very easy), as well as assuming that pulp wood can be converted into sawlogs (which is very difficult). Ideally, it would be best to only model sawlogs as a substitute for pulp wood, and not to have pulp wood as a substitute for sawlogs.

However, a compromise is struck by assuming that these outputs are only partial transformable into eachother. Lumber and pulp chips are the alternative outputs for the sawmilling industry. A value of 2.0 is used for all output transformation elasticities in each regions' sawmilling industry. A similar argument can be made for the transformability of these outputs as was made for the sawlogs and pulp wood output. Alternative values of 0.5 and 1.0 are used for the logging output transformation elasticities sensitivity tests. Alternative values of 1.0 and 5.0 are used for the sawmilling output transformation elasticities sensitivity tests. For both sensitivity tests, regional prices and quantities are not significantly altered in any one of the four test simulations. Any changes that do occur are less than 0.03 percentage points. Based on these sensitivity tests, it is decided that a value of 0.5 and 2.0 should be used for the logging and sawmilling output transformation elasticities respectively for the remaining policy simulations.

Output Supply Elasticities

A value of 0.5 is used for the output supply elasticities of all the solid wood products (sawlogs, pulp wood, pulp chips, and lumber) in each region of Canada. Alternative values of 0.3 and 0.75 are used for the output supply elasticities sensitivity tests. These sensitivity tests have minor impacts on the regional prices and quantities in the test simulations which examine the impact of changes in the relative prices of foreign forest products. For the test simulation which increases the AAC of the BC coast region by 1%, the sensitivity tests change regional quantities by at most 0.06 percentage points, and change regional commodity prices by at most 0.15 percentage points. Stumpage prices and rental return rates for industry capital are changed by nearly 1.90 percentage

points. However, since this research focuses on the pulp and paper sector, the solid wood products output supply elasticities of 0.5 are used for the remaining policy simulations.

APPENDIX 4: SHARE WEIGHTED TARIFF

This appendix describes the procedure used to calculate the Japanese import tariff levied on other paper products. The grouping of 'other paper products' includes a wide variety of products. In terms of the Harmonized Commodity Description and Coding System (HS), this grouping includes products under the classification code 4802.10 through 4823.90.

The procedure used to calculate the Japanese import tariff on other paper products was to weight the tariffs levied on individual products by the total value of that product that is exported to Japan from Canada. The import tariffs levied on individual paper products were obtained from the Department of External Affairs, Office of Multilateral Trade Negotiations. The value of exports of individual commodities to Japan from Canada were obtained from Statistics Canada Catalogue 65 - 202 (1989). In calculating this share weighted tariff rate, commodities whose export values were less than $1 million were ignored and not included in the calculation.

Table A4.1: Other Paper Products Used in the Calculation of the Share Weighted Average of the Japanese Import Tariff on Other Paper Products.

Classification Code (H.S.) (6 digits)	Product Name	Export Value to Japan ($ thousands)	Initial Bound Import Tariff (%ad valorem)
4802.52	Woodfree paper	1220	5.8
4802.60	Mechanical paper	76 515	5.8
4804.11	Kraftliner paper	15 600	3.0
4804.21	Kraft sack paper	9412	3.5
4818.40	Sanitary napkins	1193	2.0
TOTAL		103 940	5.1

APPENDIX 5 MATRIX LISTING

This appendix provides a listing of the matrix which describes the model structure. Each row represents an equation and each column represents an endogenous variable. Each cell corresponds to the parameter value for the given variable in the given equation.

	qbcloao	qbcsmao	pbcti	qbcsa	qbcpw	qbclu
bctiinde	-1.000	0.000	0.071	0.000	0.000	0.000
bcsaousu	-1.000	0.000	0.000	1.000	0.000	0.000
bcpwousu	-1.000	0.000	0.000	0.000	1.000	0.000
bcloaosu	1.000	0.000	0.265	0.000	0.000	0.000
bcsainde	0.000	-1.000	0.000	1.000	0.000	0.000
bcluousu	0.000	-1.000	0.000	0.000	0.000	1.000
bcpcousu	0.000	-1.000	0.000	0.000	0.000	0.000
bcsmaosu	0.000	1.000	0.000	0.000	0.000	0.000
bcludema	0.000	0.000	0.000	0.000	0.000	1.000
bcpwinde	0.000	0.000	0.000	0.000	1.000	0.000
bcpcinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpuousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpudema	0.000	0.000	0.000	0.000	0.000	0.000
bcwainde	0.000	0.000	0.000	0.000	0.000	0.000
bcwaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpdema	0.000	0.000	0.000	0.000	0.000	0.000
bcopousu	0.000	0.000	0.000	0.000	0.000	0.000
bcopdema	0.000	0.000	0.000	0.000	0.000	0.000
bitiinde	0.000	0.000	0.000	0.000	0.000	0.000
bisaousu	0.000	0.000	0.000	0.000	0.000	0.000
bipwousu	0.000	0.000	0.000	0.000	0.000	0.000
biloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bisainde	0.000	0.000	0.000	0.000	0.000	0.000
biluousu	0.000	0.000	0.000	0.000	0.000	0.000
bipcousu	0.000	0.000	0.000	0.000	0.000	0.000
bismaosu	0.000	0.000	0.000	0.000	0.000	0.000
biludema	0.000	0.000	0.000	0.000	0.000	0.000
bipwinde	0.000	0.000	0.000	0.000	0.000	0.000
bipcinde	0.000	0.000	0.000	0.000	0.000	0.000
bipuousu	0.000	0.000	0.000	0.000	0.000	0.000
bipudema	0.000	0.000	0.000	0.000	0.000	0.000
prtiinde	0.000	0.000	0.000	0.000	0.000	0.000
prpwousu	0.000	0.000	0.000	0.000	0.000	0.000
prpwinde	0.000	0.000	0.000	0.000	0.000	0.000
prpuousu	0.000	0.000	0.000	0.000	0.000	0.000
prpudema	0.000	0.000	0.000	0.000	0.000	0.000
prwainde	0.000	0.000	0.000	0.000	0.000	0.000
prwaousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpdema	0.000	0.000	0.000	0.000	0.000	0.000
propousu	0.000	0.000	0.000	0.000	0.000	0.000
propdema	0.000	0.000	0.000	0.000	0.000	0.000
cetiinde	0.000	0.000	0.000	0.000	0.000	0.000
cesaousu	0.000	0.000	0.000	0.000	0.000	0.000
cepwousu	0.000	0.000	0.000	0.000	0.000	0.000
celoaosu	0.000	0.000	0.000	0.000	0.000	0.000
cesainde	0.000	0.000	0.000	0.000	0.000	0.000
celuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepcousu	0.000	0.000	0.000	0.000	0.000	0.000
cesmaosu	0.000	0.000	0.000	0.000	0.000	0.000
celudema	0.000	0.000	0.000	0.000	0.000	0.000

	qbcloao	qbcsmao	pbcti	qbcsa	qbcpw	qbclu
cepwinde	0.000	0.000	0.000	0.000	0.000	0.000
cepcinde	0.000	0.000	0.000	0.000	0.000	0.000
cepuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepudema	0.000	0.000	0.000	0.000	0.000	0.000
cewainde	0.000	0.000	0.000	0.000	0.000	0.000
cewaousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpdema	0.000	0.000	0.000	0.000	0.000	0.000
ceopousu	0.000	0.000	0.000	0.000	0.000	0.000
ceopdema	0.000	0.000	0.000	0.000	0.000	0.000
attiinde	0.000	0.000	0.000	0.000	0.000	0.000
atpwousu	0.000	0.000	0.000	0.000	0.000	0.000
atpwinde	0.000	0.000	0.000	0.000	0.000	0.000
atpuousu	0.000	0.000	0.000	0.000	0.000	0.000
atpudema	0.000	0.000	0.000	0.000	0.000	0.000
atwainde	0.000	0.000	0.000	0.000	0.000	0.000
atwaousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpdema	0.000	0.000	0.000	0.000	0.000	0.000
atopousu	0.000	0.000	0.000	0.000	0.000	0.000
atopdema	0.000	0.000	0.000	0.000	0.000	0.000
bclainde	-0.360	-0.280	-0.029	0.000	0.000	0.000
bilainde	0.000	0.000	0.000	0.000	0.000	0.000
prlainde	0.000	0.000	0.000	0.000	0.000	0.000
celainde	0.000	0.000	0.000	0.000	0.000	0.000
atlainde	0.000	0.000	0.000	0.000	0.000	0.000
bceninde	-0.130	-0.080	-0.010	0.000	0.000	0.000
bieninde	0.000	0.000	0.000	0.000	0.000	0.000
preninde	0.000	0.000	0.000	0.000	0.000	0.000
ceeninde	0.000	0.000	0.000	0.000	0.000	0.000
ateninde	0.000	0.000	0.000	0.000	0.000	0.000
bclokain	-1.000	0.000	-0.080	0.000	0.000	0.000
bcsmkain	0.000	-1.000	0.000	0.000	0.000	0.000
bcpukain	0.000	0.000	0.000	0.000	0.000	0.000
bcnpkain	0.000	0.000	0.000	0.000	0.000	0.000
bcopkain	0.000	0.000	0.000	0.000	0.000	0.000
bilokain	0.000	0.000	0.000	0.000	0.000	0.000
bismkain	0.000	0.000	0.000	0.000	0.000	0.000
bipukain	0.000	0.000	0.000	0.000	0.000	0.000
prlokain	0.000	0.000	0.000	0.000	0.000	0.000
prpukain	0.000	0.000	0.000	0.000	0.000	0.000
prnpkain	0.000	0.000	0.000	0.000	0.000	0.000
propkain	0.000	0.000	0.000	0.000	0.000	0.000
celokain	0.000	0.000	0.000	0.000	0.000	0.000
cesmkain	0.000	0.000	0.000	0.000	0.000	0.000
cepukain	0.000	0.000	0.000	0.000	0.000	0.000
cenpkain	0.000	0.000	0.000	0.000	0.000	0.000
ceopkain	0.000	0.000	0.000	0.000	0.000	0.000
atlokain	0.000	0.000	0.000	0.000	0.000	0.000
atpukain	0.000	0.000	0.000	0.000	0.000	0.000
atnpkain	0.000	0.000	0.000	0.000	0.000	0.000
atopkain	0.000	0.000	0.000	0.000	0.000	0.000

	qbcpc	qbcpu	qbcwa	qbcnp	qbcop	pbcsa
bctiinde	0.000	0.000	0.000	0.000	0.000	0.000
bcsaousu	0.000	0.000	0.000	0.000	0.000	-0.038
bcpwousu	0.000	0.000	0.000	0.000	0.000	0.713
bcloaosu	0.000	0.000	0.000	0.000	0.000	-0.475
bcsainde	0.000	0.000	0.000	0.000	0.000	0.172
bcluousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpcousu	1.000	0.000	0.000	0.000	0.000	0.000
bcsmaosu	0.000	0.000	0.000	0.000	0.000	0.285
bcludema	0.000	0.000	0.000	0.000	0.000	0.000
bcpwinde	0.000	-1.000	0.000	0.000	0.000	0.000
bcpcinde	1.000	-1.000	0.000	0.000	0.000	0.000
bcpuousu	0.000	1.000	0.000	0.000	0.000	0.000
bcpudema	0.000	1.000	0.000	-0.540	-0.390	0.000
bcwainde	0.000	0.000	1.000	-0.120	-0.880	0.000
bcwaousu	0.000	0.000	1.000	0.000	0.000	0.000
bcnpousu	0.000	0.000	0.000	1.000	0.000	0.000
bcnpdema	0.000	0.000	0.000	1.000	0.000	0.000
bcopousu	0.000	0.000	0.000	0.000	1.000	0.000
bcopdema	0.000	0.000	0.000	0.000	1.000	0.000
bitiinde	0.000	0.000	0.000	0.000	0.000	0.000
bisaousu	0.000	0.000	0.000	0.000	0.000	0.000
bipwousu	0.000	0.000	0.000	0.000	0.000	0.000
biloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bisainde	0.000	0.000	0.000	0.000	0.000	0.000
biluousu	0.000	0.000	0.000	0.000	0.000	0.000
bipcousu	0.000	0.000	0.000	0.000	0.000	0.000
bismaosu	0.000	0.000	0.000	0.000	0.000	0.000
biludema	0.000	0.000	0.000	0.000	0.000	0.000
bipwinde	0.000	0.000	0.000	0.000	0.000	0.000
bipcinde	0.000	0.000	0.000	0.000	0.000	0.000
bipuousu	0.000	0.000	0.000	0.000	0.000	0.000
bipudema	0.000	0.000	0.000	0.000	0.000	0.000
prtiinde	0.000	0.000	0.000	0.000	0.000	0.000
prpwousu	0.000	0.000	0.000	0.000	0.000	0.000
prpwinde	0.000	0.000	0.000	0.000	0.000	0.000
prpuousu	0.000	0.000	0.000	0.000	0.000	0.000
prpudema	0.000	0.000	0.000	0.000	0.000	0.000
prwainde	0.000	0.000	0.000	0.000	0.000	0.000
prwaousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpdema	0.000	0.000	0.000	0.000	0.000	0.000
propousu	0.000	0.000	0.000	0.000	0.000	0.000
propdema	0.000	0.000	0.000	0.000	0.000	0.000
cetiinde	0.000	0.000	0.000	0.000	0.000	0.000
cesaousu	0.000	0.000	0.000	0.000	0.000	0.000
cepwousu	0.000	0.000	0.000	0.000	0.000	0.000
celoaosu	0.000	0.000	0.000	0.000	0.000	0.000
cesainde	0.000	0.000	0.000	0.000	0.000	0.000
celuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepcousu	0.000	0.000	0.000	0.000	0.000	0.000
cesmaosu	0.000	0.000	0.000	0.000	0.000	0.000
celudema	0.000	0.000	0.000	0.000	0.000	0.000

	qbcpc	qbcpu	qbcwa	qbcnp	qbcop	pbcsa
cepwinde	0.000	0.000	0.000	0.000	0.000	0.000
cepcinde	0.000	0.000	0.000	0.000	0.000	0.000
cepuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepudema	0.000	0.000	0.000	0.000	0.000	0.000
cewainde	0.000	0.000	0.000	0.000	0.000	0.000
cewaousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpdema	0.000	0.000	0.000	0.000	0.000	0.000
ceopousu	0.000	0.000	0.000	0.000	0.000	0.000
ceopdema	0.000	0.000	0.000	0.000	0.000	0.000
attiinde	0.000	0.000	0.000	0.000	0.000	0.000
atpwousu	0.000	0.000	0.000	0.000	0.000	0.000
atpwinde	0.000	0.000	0.000	0.000	0.000	0.000
atpuousu	0.000	0.000	0.000	0.000	0.000	0.000
atpudema	0.000	0.000	0.000	0.000	0.000	0.000
atwainde	0.000	0.000	0.000	0.000	0.000	0.000
atwaousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpdema	0.000	0.000	0.000	0.000	0.000	0.000
atopousu	0.000	0.000	0.000	0.000	0.000	0.000
atopdema	0.000	0.000	0.000	0.000	0.000	0.000
bclainde	0.000	-0.110	0.000	-0.150	-0.100	-0.064
bilainde	0.000	0.000	0.000	0.000	0.000	0.000
prlainde	0.000	0.000	0.000	0.000	0.000	0.000
celainde	0.000	0.000	0.000	0.000	0.000	0.000
atlainde	0.000	0.000	0.000	0.000	0.000	0.000
bceninde	0.000	-0.170	0.000	-0.450	-0.170	-0.018
bieninde	0.000	0.000	0.000	0.000	0.000	0.000
preninde	0.000	0.000	0.000	0.000	0.000	0.000
ceeninde	0.000	0.000	0.000	0.000	0.000	0.000
ateninde	0.000	0.000	0.000	0.000	0.000	0.000
bclokain	0.000	0.000	0.000	0.000	0.000	0.000
bcsmkain	0.000	0.000	0.000	0.000	0.000	-0.228
bcpukain	0.000	-1.000	0.000	0.000	0.000	0.000
bcnpkain	0.000	0.000	0.000	-1.000	0.000	0.000
bcopkain	0.000	0.000	0.000	0.000	-1.000	0.000
bilokain	0.000	0.000	0.000	0.000	0.000	0.000
bismkain	0.000	0.000	0.000	0.000	0.000	0.000
bipukain	0.000	0.000	0.000	0.000	0.000	0.000
prlokain	0.000	0.000	0.000	0.000	0.000	0.000
prpukain	0.000	0.000	0.000	0.000	0.000	0.000
prnpkain	0.000	0.000	0.000	0.000	0.000	0.000
propkain	0.000	0.000	0.000	0.000	0.000	0.000
celokain	0.000	0.000	0.000	0.000	0.000	0.000
cesmkain	0.000	0.000	0.000	0.000	0.000	0.000
cepukain	0.000	0.000	0.000	0.000	0.000	0.000
cenpkain	0.000	0.000	0.000	0.000	0.000	0.000
ceopkain	0.000	0.000	0.000	0.000	0.000	0.000
atlokain	0.000	0.000	0.000	0.000	0.000	0.000
atpukain	0.000	0.000	0.000	0.000	0.000	0.000
atnpkain	0.000	0.000	0.000	0.000	0.000	0.000
atopkain	0.000	0.000	0.000	0.000	0.000	0.000

	pbcpw	pbclu	pbcpc	pbcpu	pbcwa	pbcnp
bctiinde	0.000	0.000	0.000	0.000	0.000	0.000
bcsaousu	0.038	0.000	0.000	0.000	0.000	0.000
bcpwousu	-0.713	0.000	0.000	0.000	0.000	0.000
bcloaosu	-0.025	0.000	0.000	0.000	0.000	0.000
bcsainde	0.000	0.000	0.000	0.000	0.000	0.000
bcluousu	0.000	-0.160	0.160	0.000	0.000	0.000
bcpcousu	0.000	1.840	-1.840	0.000	0.000	0.000
bcsmaosu	0.000	-0.460	-0.040	0.000	0.000	0.000
bcludema	0.000	1.929	0.000	0.000	0.000	0.000
bcpwinde	0.405	0.000	-0.299	0.000	0.000	0.000
bcpcinde	-0.095	0.000	0.201	0.000	0.000	0.000
bcpuousu	0.034	0.000	0.107	-0.300	0.000	0.000
bcpudema	0.000	0.000	0.000	0.304	-0.054	0.000
bcwainde	0.000	0.000	0.000	-0.301	0.410	0.000
bcwaousu	0.000	0.000	0.000	0.000	-0.300	0.000
bcnpousu	0.000	0.000	0.000	0.132	0.012	-0.400
bcnpdema	0.000	0.000	0.000	0.000	0.000	1.744
bcopousu	0.000	0.000	0.000	0.053	0.018	0.000
bcopdema	0.000	0.000	0.000	0.000	0.000	0.000
bitiinde	0.000	0.000	0.000	0.000	0.000	0.000
bisaousu	0.000	0.000	0.000	0.000	0.000	0.000
bipwousu	0.000	0.000	0.000	0.000	0.000	0.000
biloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bisainde	0.000	0.000	0.000	0.000	0.000	0.000
biluousu	0.000	0.000	0.000	0.000	0.000	0.000
bipcousu	0.000	0.000	0.000	0.000	0.000	0.000
bismaosu	0.000	0.000	0.000	0.000	0.000	0.000
biludema	0.000	-0.072	0.000	0.000	0.000	0.000
bipwinde	0.000	0.000	0.000	0.000	0.000	0.000
bipcinde	0.000	0.000	0.000	0.000	0.000	0.000
bipuousu	0.000	0.000	0.000	0.000	0.000	0.000
bipudema	0.000	0.000	0.000	-0.005	0.000	0.000
prtiinde	0.000	0.000	0.000	0.000	0.000	0.000
prpwousu	0.000	0.000	0.000	0.000	0.000	0.000
prpwinde	0.000	0.000	0.000	0.000	0.000	0.000
prpuousu	0.000	0.000	0.000	0.000	0.000	0.000
prpudema	0.000	0.000	0.000	0.000	0.000	0.000
prwainde	0.000	0.000	0.000	0.000	0.000	0.000
prwaousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpdema	0.000	0.000	0.000	0.000	0.000	-0.080
propousu	0.000	0.000	0.000	0.000	0.000	0.000
propdema	0.000	0.000	0.000	0.000	0.000	0.000
cetiinde	0.000	0.000	0.000	0.000	0.000	0.000
cesaousu	0.000	0.000	0.000	0.000	0.000	0.000
cepwousu	0.000	0.000	0.000	0.000	0.000	0.000
celoaosu	0.000	0.000	0.000	0.000	0.000	0.000
cesainde	0.000	0.000	0.000	0.000	0.000	0.000
celuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepcousu	0.000	0.000	0.000	0.000	0.000	0.000
cesmaosu	0.000	0.000	0.000	0.000	0.000	0.000
celudema	0.000	-0.065	0.000	0.000	0.000	0.000

	pbcpw	pbclu	pbcpc	pbcpu	pbcwa	pbcnp
cepwinde	0.000	0.000	0.000	0.000	0.000	0.000
cepcinde	0.000	0.000	0.000	0.000	0.000	0.000
cepuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepudema	0.000	0.000	0.000	0.000	0.000	0.000
cewainde	0.000	0.000	0.000	0.000	0.000	0.000
cewaousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpdema	0.000	0.000	0.000	0.000	0.000	-0.086
ceopousu	0.000	0.000	0.000	0.000	0.000	0.000
ceopdema	0.000	0.000	0.000	0.000	0.000	0.000
attiinde	0.000	0.000	0.000	0.000	0.000	0.000
atpwousu	0.000	0.000	0.000	0.000	0.000	0.000
atpwinde	0.000	0.000	0.000	0.000	0.000	0.000
atpuousu	0.000	0.000	0.000	0.000	0.000	0.000
atpudema	0.000	0.000	0.000	0.000	0.000	0.000
atwainde	0.000	0.000	0.000	0.000	0.000	0.000
atwaousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpdema	0.000	0.000	0.000	0.000	0.000	-0.054
atopousu	0.000	0.000	0.000	0.000	0.000	0.000
atopdema	0.000	0.000	0.000	0.000	0.000	0.000
bclainde	-0.002	0.000	-0.008	-0.017	-0.003	0.000
bilainde	0.000	0.000	0.000	0.000	0.000	0.000
prlainde	0.000	0.000	0.000	0.000	0.000	0.000
celainde	0.000	0.000	0.000	0.000	0.000	0.000
atlainde	0.000	0.000	0.000	0.000	0.000	0.000
bceninde	-0.004	0.000	-0.012	-0.042	-0.007	0.000
bieninde	0.000	0.000	0.000	0.000	0.000	0.000
preninde	0.000	0.000	0.000	0.000	0.000	0.000
ceeninde	0.000	0.000	0.000	0.000	0.000	0.000
ateninde	0.000	0.000	0.000	0.000	0.000	0.000
bclokain	0.000	0.000	0.000	0.000	0.000	0.000
bcsmkain	0.000	0.000	0.000	0.000	0.000	0.000
bcpukain	-0.023	0.000	-0.071	0.000	0.000	0.000
bcnpkain	0.000	0.000	0.000	-0.066	-0.006	0.000
bcopkain	0.000	0.000	0.000	-0.071	-0.024	0.000
bilokain	0.000	0.000	0.000	0.000	0.000	0.000
bismkain	0.000	0.000	0.000	0.000	0.000	0.000
bipukain	0.000	0.000	0.000	0.000	0.000	0.000
prlokain	0.000	0.000	0.000	0.000	0.000	0.000
prpukain	0.000	0.000	0.000	0.000	0.000	0.000
prnpkain	0.000	0.000	0.000	0.000	0.000	0.000
propkain	0.000	0.000	0.000	0.000	0.000	0.000
celokain	0.000	0.000	0.000	0.000	0.000	0.000
cesmkain	0.000	0.000	0.000	0.000	0.000	0.000
cepukain	0.000	0.000	0.000	0.000	0.000	0.000
cenpkain	0.000	0.000	0.000	0.000	0.000	0.000
ceopkain	0.000	0.000	0.000	0.000	0.000	0.000
atlokain	0.000	0.000	0.000	0.000	0.000	0.000
atpukain	0.000	0.000	0.000	0.000	0.000	0.000
atnpkain	0.000	0.000	0.000	0.000	0.000	0.000
atopkain	0.000	0.000	0.000	0.000	0.000	0.000

	pbcop	qbiloao	qbismao	pbiti	qbisa	qbipw
bctiinde	0.000	0.000	0.000	0.000	0.000	0.000
bcsaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpwousu	0.000	0.000	0.000	0.000	0.000	0.000
bcloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bcsainde	0.000	0.000	0.000	0.000	0.000	0.000
bcluousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpcousu	0.000	0.000	0.000	0.000	0.000	0.000
bcsmaosu	0.000	0.000	0.000	0.000	0.000	0.000
bcludema	0.000	0.000	0.000	0.000	0.000	0.000
bcpwinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpcinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpuousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpudema	0.000	0.000	0.000	0.000	0.000	0.000
bcwainde	0.000	0.000	0.000	0.000	0.000	0.000
bcwaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpdema	0.000	0.000	0.000	0.000	0.000	0.000
bcopousu	-0.150	0.000	0.000	0.000	0.000	0.000
bcopdema	1.618	0.000	0.000	0.000	0.000	0.000
bitiinde	0.000	-1.000	0.000	0.053	0.000	0.000
bisaousu	0.000	-1.000	0.000	0.000	1.000	0.000
bipwousu	0.000	-1.000	0.000	0.000	0.000	1.000
biloaosu	0.000	1.000	0.000	0.325	0.000	0.000
bisainde	0.000	0.000	-1.000	0.000	1.000	0.000
biluousu	0.000	0.000	-1.000	0.000	0.000	0.000
bipcousu	0.000	0.000	-1.000	0.000	0.000	0.000
bismaosu	0.000	0.000	1.000	0.000	0.000	0.000
biludema	0.000	0.000	0.000	0.000	0.000	0.000
bipwinde	0.000	0.000	0.000	0.000	0.000	1.000
bipcinde	0.000	0.000	0.000	0.000	0.000	0.000
bipuousu	0.000	0.000	0.000	0.000	0.000	0.000
bipudema	0.000	0.000	0.000	0.000	0.000	0.000
prtiinde	0.000	0.000	0.000	0.000	0.000	0.000
prpwousu	0.000	0.000	0.000	0.000	0.000	0.000
prpwinde	0.000	0.000	0.000	0.000	0.000	0.000
prpuousu	0.000	0.000	0.000	0.000	0.000	0.000
prpudema	0.000	0.000	0.000	0.000	0.000	0.000
prwainde	0.000	0.000	0.000	0.000	0.000	0.000
prwaousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpdema	0.000	0.000	0.000	0.000	0.000	0.000
propousu	0.000	0.000	0.000	0.000	0.000	0.000
propdema	-0.100	0.000	0.000	0.000	0.000	0.000
cetiinde	0.000	0.000	0.000	0.000	0.000	0.000
cesaousu	0.000	0.000	0.000	0.000	0.000	0.000
cepwousu	0.000	0.000	0.000	0.000	0.000	0.000
celoaosu	0.000	0.000	0.000	0.000	0.000	0.000
cesainde	0.000	0.000	0.000	0.000	0.000	0.000
celuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepcousu	0.000	0.000	0.000	0.000	0.000	0.000
cesmaosu	0.000	0.000	0.000	0.000	0.000	0.000
celudema	0.000	0.000	0.000	0.000	0.000	0.000

	pbcop	qbiloao	qbismao	pbiti	qbisa	qbipw
cepwinde	0.000	0.000	0.000	0.000	0.000	0.000
cepcinde	0.000	0.000	0.000	0.000	0.000	0.000
cepuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepudema	0.000	0.000	0.000	0.000	0.000	0.000
cewainde	0.000	0.000	0.000	0.000	0.000	0.000
cewaousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpdema	0.000	0.000	0.000	0.000	0.000	0.000
ceopousu	0.000	0.000	0.000	0.000	0.000	0.000
ceopdema	-0.074	0.000	0.000	0.000	0.000	0.000
attiinde	0.000	0.000	0.000	0.000	0.000	0.000
atpwousu	0.000	0.000	0.000	0.000	0.000	0.000
atpwinde	0.000	0.000	0.000	0.000	0.000	0.000
atpuousu	0.000	0.000	0.000	0.000	0.000	0.000
atpudema	0.000	0.000	0.000	0.000	0.000	0.000
atwainde	0.000	0.000	0.000	0.000	0.000	0.000
atwaousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpdema	0.000	0.000	0.000	0.000	0.000	0.000
atopousu	0.000	0.000	0.000	0.000	0.000	0.000
atopdema	-0.036	0.000	0.000	0.000	0.000	0.000
bclainde	0.000	0.000	0.000	0.000	0.000	0.000
bilainde	0.000	-0.320	-0.560	-0.031	0.000	0.000
prlainde	0.000	0.000	0.000	0.000	0.000	0.000
celainde	0.000	0.000	0.000	0.000	0.000	0.000
atlainde	0.000	0.000	0.000	0.000	0.000	0.000
bceninde	0.000	0.000	0.000	0.000	0.000	0.000
bieninde	0.000	-0.180	-0.390	-0.018	0.000	0.000
preninde	0.000	0.000	0.000	0.000	0.000	0.000
ceeninde	0.000	0.000	0.000	0.000	0.000	0.000
ateninde	0.000	0.000	0.000	0.000	0.000	0.000
bclokain	0.000	0.000	0.000	0.000	0.000	0.000
bcsmkain	0.000	0.000	0.000	0.000	0.000	0.000
bcpukain	0.000	0.000	0.000	0.000	0.000	0.000
bcnpkain	0.000	0.000	0.000	0.000	0.000	0.000
bcopkain	0.000	0.000	0.000	0.000	0.000	0.000
bilokain	0.000	-1.000	0.000	-0.098	0.000	0.000
bismkain	0.000	0.000	-1.000	0.000	0.000	0.000
bipukain	0.000	0.000	0.000	0.000	0.000	0.000
prlokain	0.000	0.000	0.000	0.000	0.000	0.000
prpukain	0.000	0.000	0.000	0.000	0.000	0.000
prnpkain	0.000	0.000	0.000	0.000	0.000	0.000
propkain	0.000	0.000	0.000	0.000	0.000	0.000
celokain	0.000	0.000	0.000	0.000	0.000	0.000
cesmkain	0.000	0.000	0.000	0.000	0.000	0.000
cepukain	0.000	0.000	0.000	0.000	0.000	0.000
cenpkain	0.000	0.000	0.000	0.000	0.000	0.000
ceopkain	0.000	0.000	0.000	0.000	0.000	0.000
atlokain	0.000	0.000	0.000	0.000	0.000	0.000
atpukain	0.000	0.000	0.000	0.000	0.000	0.000
atnpkain	0.000	0.000	0.000	0.000	0.000	0.000
atopkain	0.000	0.000	0.000	0.000	0.000	0.000

	qbilu	qbipc	qbipu	pbisa	pbipw	pbilu
bctiinde	0.000	0.000	0.000	0.000	0.000	0.000
bcsaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpwousu	0.000	0.000	0.000	0.000	0.000	0.000
bcloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bcsainde	0.000	0.000	0.000	0.000	0.000	0.000
bcluousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpcousu	0.000	0.000	0.000	0.000	0.000	0.000
bcsmaosu	0.000	0.000	0.000	0.000	0.000	0.000
bcludema	0.000	0.000	0.000	0.000	0.000	-0.183
bcpwinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpcinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpuousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpudema	0.000	0.000	0.000	0.000	0.000	0.000
bcwainde	0.000	0.000	0.000	0.000	0.000	0.000
bcwaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpdema	0.000	0.000	0.000	0.000	0.000	0.000
bcopousu	0.000	0.000	0.000	0.000	0.000	0.000
bcopdema	0.000	0.000	0.000	0.000	0.000	0.000
bitiinde	0.000	0.000	0.000	0.000	0.000	0.000
bisaousu	0.000	0.000	0.000	-0.052	0.053	0.000
bipwousu	0.000	0.000	0.000	0.698	-0.698	0.000
biloaosu	0.000	0.000	0.000	-0.465	-0.035	0.000
bisainde	0.000	0.000	0.000	0.204	0.000	0.000
biluousu	1.000	0.000	0.000	0.000	0.000	-0.180
bipcousu	0.000	1.000	0.000	0.000	0.000	1.820
bismaosu	0.000	0.000	0.000	0.245	0.000	-0.455
biludema	1.000	0.000	0.000	0.000	0.000	1.829
bipwinde	0.000	0.000	-1.000	0.000	0.407	0.000
bipcinde	0.000	1.000	-1.000	0.000	-0.093	0.000
bipuousu	0.000	0.000	1.000	0.000	0.032	0.000
bipudema	0.000	0.000	1.000	0.000	0.000	0.000
prtiinde	0.000	0.000	0.000	0.000	0.000	0.000
prpwousu	0.000	0.000	0.000	0.000	0.000	0.000
prpwinde	0.000	0.000	0.000	0.000	0.000	0.000
prpuousu	0.000	0.000	0.000	0.000	0.000	0.000
prpudema	0.000	0.000	0.000	0.000	0.000	0.000
prwainde	0.000	0.000	0.000	0.000	0.000	0.000
prwaousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpdema	0.000	0.000	0.000	0.000	0.000	0.000
propousu	0.000	0.000	0.000	0.000	0.000	0.000
propdema	0.000	0.000	0.000	0.000	0.000	0.000
cetiinde	0.000	0.000	0.000	0.000	0.000	0.000
cesaousu	0.000	0.000	0.000	0.000	0.000	0.000
cepwousu	0.000	0.000	0.000	0.000	0.000	0.000
celoaosu	0.000	0.000	0.000	0.000	0.000	0.000
cesainde	0.000	0.000	0.000	0.000	0.000	0.000
celuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepcousu	0.000	0.000	0.000	0.000	0.000	0.000
cesmaosu	0.000	0.000	0.000	0.000	0.000	0.000
celudema	0.000	0.000	0.000	0.000	0.000	-0.209

	qbilu	qbipc	qbipu	pbisa	pbipw	pbilu
cepwinde	0.000	0.000	0.000	0.000	0.000	0.000
cepcinde	0.000	0.000	0.000	0.000	0.000	0.000
cepuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepudema	0.000	0.000	0.000	0.000	0.000	0.000
cewainde	0.000	0.000	0.000	0.000	0.000	0.000
cewaousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpdema	0.000	0.000	0.000	0.000	0.000	0.000
ceopousu	0.000	0.000	0.000	0.000	0.000	0.000
ceopdema	0.000	0.000	0.000	0.000	0.000	0.000
attiinde	0.000	0.000	0.000	0.000	0.000	0.000
atpwousu	0.000	0.000	0.000	0.000	0.000	0.000
atpwinde	0.000	0.000	0.000	0.000	0.000	0.000
atpuousu	0.000	0.000	0.000	0.000	0.000	0.000
atpudema	0.000	0.000	0.000	0.000	0.000	0.000
atwainde	0.000	0.000	0.000	0.000	0.000	0.000
atwaousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpdema	0.000	0.000	0.000	0.000	0.000	0.000
atopousu	0.000	0.000	0.000	0.000	0.000	0.000
atopdema	0.000	0.000	0.000	0.000	0.000	0.000
bclainde	0.000	0.000	0.000	0.000	0.000	0.000
bilainde	0.000	0.000	-0.120	-0.110	-0.003	0.000
prlainde	0.000	0.000	0.000	0.000	0.000	0.000
celainde	0.000	0.000	0.000	0.000	0.000	0.000
atlainde	0.000	0.000	0.000	0.000	0.000	0.000
bceninde	0.000	0.000	0.000	0.000	0.000	0.000
bieninde	0.000	0.000	-0.430	-0.076	-0.009	0.000
preninde	0.000	0.000	0.000	0.000	0.000	0.000
ceeninde	0.000	0.000	0.000	0.000	0.000	0.000
ateninde	0.000	0.000	0.000	0.000	0.000	0.000
bclokain	0.000	0.000	0.000	0.000	0.000	0.000
bcsmkain	0.000	0.000	0.000	0.000	0.000	0.000
bcpukain	0.000	0.000	0.000	0.000	0.000	0.000
bcnpkain	0.000	0.000	0.000	0.000	0.000	0.000
bcopkain	0.000	0.000	0.000	0.000	0.000	0.000
bilokain	0.000	0.000	0.000	0.000	0.000	0.000
bismkain	0.000	0.000	0.000	-0.196	0.000	0.000
bipukain	0.000	0.000	-1.000	0.000	-0.021	0.000
prlokain	0.000	0.000	0.000	0.000	0.000	0.000
prpukain	0.000	0.000	0.000	0.000	0.000	0.000
prnpkain	0.000	0.000	0.000	0.000	0.000	0.000
propkain	0.000	0.000	0.000	0.000	0.000	0.000
celokain	0.000	0.000	0.000	0.000	0.000	0.000
cesmkain	0.000	0.000	0.000	0.000	0.000	0.000
cepukain	0.000	0.000	0.000	0.000	0.000	0.000
cenpkain	0.000	0.000	0.000	0.000	0.000	0.000
ceopkain	0.000	0.000	0.000	0.000	0.000	0.000
atlokain	0.000	0.000	0.000	0.000	0.000	0.000
atpukain	0.000	0.000	0.000	0.000	0.000	0.000
atnpkain	0.000	0.000	0.000	0.000	0.000	0.000
atopkain	0.000	0.000	0.000	0.000	0.000	0.000

	pbipc	pbipu	pprti	qprpw	qprpu	qprwa
bctiinde	0.000	0.000	0.000	0.000	0.000	0.000
bcsaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpwousu	0.000	0.000	0.000	0.000	0.000	0.000
bcloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bcsainde	0.000	0.000	0.000	0.000	0.000	0.000
bcluousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpcousu	0.000	0.000	0.000	0.000	0.000	0.000
bcsmaosu	0.000	0.000	0.000	0.000	0.000	0.000
bcludema	0.000	0.000	0.000	0.000	0.000	0.000
bcpwinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpcinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpuousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpudema	0.000	-0.005	0.000	0.000	0.000	0.000
bcwainde	0.000	0.000	0.000	0.000	0.000	0.000
bcwaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpdema	0.000	0.000	0.000	0.000	0.000	0.000
bcopousu	0.000	0.000	0.000	0.000	0.000	0.000
bcopdema	0.000	0.000	0.000	0.000	0.000	0.000
bitiinde	0.000	0.000	0.000	0.000	0.000	0.000
bisaousu	0.000	0.000	0.000	0.000	0.000	0.000
bipwousu	0.000	0.000	0.000	0.000	0.000	0.000
biloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bisainde	0.000	0.000	0.000	0.000	0.000	0.000
biluousu	0.180	0.000	0.000	0.000	0.000	0.000
bipcousu	-1.820	0.000	0.000	0.000	0.000	0.000
bismaosu	-0.045	0.000	0.000	0.000	0.000	0.000
biludema	0.000	0.000	0.000	0.000	0.000	0.000
bipwinde	-0.295	0.000	0.000	0.000	0.000	0.000
bipcinde	0.205	0.000	0.000	0.000	0.000	0.000
bipuousu	0.100	-0.300	0.000	0.000	0.000	0.000
bipudema	0.000	1.446	0.000	0.000	0.000	0.000
prtiinde	0.000	0.000	0.066	-1.000	0.000	0.000
prpwousu	0.000	0.000	0.280	1.000	0.000	0.000
prpwinde	0.000	0.000	0.000	1.000	-1.000	0.000
prpuousu	0.000	0.000	0.000	0.000	1.000	0.000
prpudema	0.000	-0.013	0.000	0.000	1.000	0.000
prwainde	0.000	0.000	0.000	0.000	0.000	1.000
prwaousu	0.000	0.000	0.000	0.000	0.000	1.000
prnpousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpdema	0.000	0.000	0.000	0.000	0.000	0.000
propousu	0.000	0.000	0.000	0.000	0.000	0.000
propdema	0.000	0.000	0.000	0.000	0.000	0.000
cetiinde	0.000	0.000	0.000	0.000	0.000	0.000
cesaousu	0.000	0.000	0.000	0.000	0.000	0.000
cepwousu	0.000	0.000	0.000	0.000	0.000	0.000
celoaosu	0.000	0.000	0.000	0.000	0.000	0.000
cesainde	0.000	0.000	0.000	0.000	0.000	0.000
celuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepcousu	0.000	0.000	0.000	0.000	0.000	0.000
cesmaosu	0.000	0.000	0.000	0.000	0.000	0.000
celudema	0.000	0.000	0.000	0.000	0.000	0.000

	pbipc	pbipu	pprti	qprpw	qprpu	qprwa
cepwinde	0.000	0.000	0.000	0.000	0.000	0.000
cepcinde	0.000	0.000	0.000	0.000	0.000	0.000
cepuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepudema	0.000	-0.004	0.000	0.000	0.000	0.000
cewainde	0.000	0.000	0.000	0.000	0.000	0.000
cewaousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpdema	0.000	0.000	0.000	0.000	0.000	0.000
ceopousu	0.000	0.000	0.000	0.000	0.000	0.000
ceopdema	0.000	0.000	0.000	0.000	0.000	0.000
attiinde	0.000	0.000	0.000	0.000	0.000	0.000
atpwousu	0.000	0.000	0.000	0.000	0.000	0.000
atpwinde	0.000	0.000	0.000	0.000	0.000	0.000
atpuousu	0.000	0.000	0.000	0.000	0.000	0.000
atpudema	0.000	-0.015	0.000	0.000	0.000	0.000
atwainde	0.000	0.000	0.000	0.000	0.000	0.000
atwaousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpdema	0.000	0.000	0.000	0.000	0.000	0.000
atopousu	0.000	0.000	0.000	0.000	0.000	0.000
atopdema	0.000	0.000	0.000	0.000	0.000	0.000
bclainde	0.000	0.000	0.000	0.000	0.000	0.000
bilainde	-0.008	0.000	0.000	0.000	0.000	0.000
prlainde	0.000	0.000	-0.029	-0.350	-0.390	0.000
celainde	0.000	0.000	0.000	0.000	0.000	0.000
atlainde	0.000	0.000	0.000	0.000	0.000	0.000
bceninde	0.000	0.000	0.000	0.000	0.000	0.000
bieninde	-0.029	0.000	0.000	0.000	0.000	0.000
preninde	0.000	0.000	-0.012	-0.140	-0.450	0.000
ceeninde	0.000	0.000	0.000	0.000	0.000	0.000
ateninde	0.000	0.000	0.000	0.000	0.000	0.000
bclokain	0.000	0.000	0.000	0.000	0.000	0.000
bcsmkain	0.000	0.000	0.000	0.000	0.000	0.000
bcpukain	0.000	0.000	0.000	0.000	0.000	0.000
bcnpkain	0.000	0.000	0.000	0.000	0.000	0.000
bcopkain	0.000	0.000	0.000	0.000	0.000	0.000
bilokain	0.000	0.000	0.000	0.000	0.000	0.000
bismkain	0.000	0.000	0.000	0.000	0.000	0.000
bipukain	-0.067	0.000	0.000	0.000	0.000	0.000
prlokain	0.000	0.000	-0.084	-1.000	0.000	0.000
prpukain	0.000	0.000	0.000	0.000	-1.000	0.000
prnpkain	0.000	0.000	0.000	0.000	0.000	0.000
propkain	0.000	0.000	0.000	0.000	0.000	0.000
celokain	0.000	0.000	0.000	0.000	0.000	0.000
cesmkain	0.000	0.000	0.000	0.000	0.000	0.000
cepukain	0.000	0.000	0.000	0.000	0.000	0.000
cenpkain	0.000	0.000	0.000	0.000	0.000	0.000
ceopkain	0.000	0.000	0.000	0.000	0.000	0.000
atlokain	0.000	0.000	0.000	0.000	0.000	0.000
atpukain	0.000	0.000	0.000	0.000	0.000	0.000
atnpkain	0.000	0.000	0.000	0.000	0.000	0.000
atopkain	0.000	0.000	0.000	0.000	0.000	0.000

	qprnp	qprop	pprpw	pprpu	pprwa	pprnp
bctiinde	0.000	0.000	0.000	0.000	0.000	0.000
bcsaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpwousu	0.000	0.000	0.000	0.000	0.000	0.000
bcloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bcsainde	0.000	0.000	0.000	0.000	0.000	0.000
bcluousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpcousu	0.000	0.000	0.000	0.000	0.000	0.000
bcsmaosu	0.000	0.000	0.000	0.000	0.000	0.000
bcludema	0.000	0.000	0.000	0.000	0.000	0.000
bcpwinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpcinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpuousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpudema	0.000	0.000	0.000	0.000	0.000	0.000
bcwainde	0.000	0.000	0.000	0.000	0.000	0.000
bcwaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpdema	0.000	0.000	0.000	0.000	0.000	-0.007
bcopousu	0.000	0.000	0.000	0.000	0.000	0.000
bcopdema	0.000	0.000	0.000	0.000	0.000	0.000
bitiinde	0.000	0.000	0.000	0.000	0.000	0.000
bisaousu	0.000	0.000	0.000	0.000	0.000	0.000
bipwousu	0.000	0.000	0.000	0.000	0.000	0.000
biloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bisainde	0.000	0.000	0.000	0.000	0.000	0.000
biluousu	0.000	0.000	0.000	0.000	0.000	0.000
bipcousu	0.000	0.000	0.000	0.000	0.000	0.000
bismaosu	0.000	0.000	0.000	0.000	0.000	0.000
biludema	0.000	0.000	0.000	0.000	0.000	0.000
bipwinde	0.000	0.000	0.000	0.000	0.000	0.000
bipcinde	0.000	0.000	0.000	0.000	0.000	0.000
bipuousu	0.000	0.000	0.000	0.000	0.000	0.000
bipudema	0.000	0.000	0.000	-0.003	0.000	0.000
prtiinde	0.000	0.000	0.000	0.000	0.000	0.000
prpwousu	0.000	0.000	-0.500	0.000	0.000	0.000
prpwinde	0.000	0.000	0.110	0.000	0.000	0.000
prpuousu	0.000	0.000	0.135	-0.300	0.000	0.000
prpudema	-0.200	-0.150	0.000	1.356	-0.021	0.000
prwainde	-0.120	-0.880	0.000	-0.301	0.410	0.000
prwaousu	0.000	0.000	0.000	0.000	-0.300	0.000
prnpousu	1.000	0.000	0.000	0.132	0.012	-0.400
prnpdema	1.000	0.000	0.000	0.000	0.000	1.990
propousu	0.000	1.000	0.000	0.053	0.018	0.000
propdema	0.000	1.000	0.000	0.000	0.000	0.000
cetiinde	0.000	0.000	0.000	0.000	0.000	0.000
cesaousu	0.000	0.000	0.000	0.000	0.000	0.000
cepwousu	0.000	0.000	0.000	0.000	0.000	0.000
celoaosu	0.000	0.000	0.000	0.000	0.000	0.000
cesainde	0.000	0.000	0.000	0.000	0.000	0.000
celuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepcousu	0.000	0.000	0.000	0.000	0.000	0.000
cesmaosu	0.000	0.000	0.000	0.000	0.000	0.000
celudema	0.000	0.000	0.000	0.000	0.000	0.000

	qprnp	qprop	pprpw	pprpu	pprwa	pprnp
cepwinde	0.000	0.000	0.000	0.000	0.000	0.000
cepcinde	0.000	0.000	0.000	0.000	0.000	0.000
cepuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepudema	0.000	0.000	0.000	-0.001	0.000	0.000
cewainde	0.000	0.000	0.000	0.000	0.000	0.000
cewaousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpdema	0.000	0.000	0.000	0.000	0.000	-0.008
ceopousu	0.000	0.000	0.000	0.000	0.000	0.000
ceopdema	0.000	0.000	0.000	0.000	0.000	0.000
attiinde	0.000	0.000	0.000	0.000	0.000	0.000
atpwousu	0.000	0.000	0.000	0.000	0.000	0.000
atpwinde	0.000	0.000	0.000	0.000	0.000	0.000
atpuousu	0.000	0.000	0.000	0.000	0.000	0.000
atpudema	0.000	0.000	0.000	-0.002	0.000	0.000
atwainde	0.000	0.000	0.000	0.000	0.000	0.000
atwaousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpdema	0.000	0.000	0.000	0.000	0.000	-0.007
atopousu	0.000	0.000	0.000	0.000	0.000	0.000
atopdema	0.000	0.000	0.000	0.000	0.000	0.000
bclainde	0.000	0.000	0.000	0.000	0.000	0.000
bilainde	0.000	0.000	0.000	0.000	0.000	0.000
prlainde	-0.100	-0.160	-0.035	-0.018	-0.004	0.000
celainde	0.000	0.000	0.000	0.000	0.000	0.000
atlainde	0.000	0.000	0.000	0.000	0.000	0.000
bceninde	0.000	0.000	0.000	0.000	0.000	0.000
bieninde	0.000	0.000	0.000	0.000	0.000	0.000
preninde	-0.210	-0.200	-0.041	-0.028	-0.006	0.000
ceeninde	0.000	0.000	0.000	0.000	0.000	0.000
ateninde	0.000	0.000	0.000	0.000	0.000	0.000
bclokain	0.000	0.000	0.000	0.000	0.000	0.000
bcsmkain	0.000	0.000	0.000	0.000	0.000	0.000
bcpukain	0.000	0.000	0.000	0.000	0.000	0.000
bcnpkain	0.000	0.000	0.000	0.000	0.000	0.000
bcopkain	0.000	0.000	0.000	0.000	0.000	0.000
bilokain	0.000	0.000	0.000	0.000	0.000	0.000
bismkain	0.000	0.000	0.000	0.000	0.000	0.000
bipukain	0.000	0.000	0.000	0.000	0.000	0.000
prlokain	0.000	0.000	0.000	0.000	0.000	0.000
prpukain	0.000	0.000	-0.090	0.000	0.000	0.000
prnpkain	-1.000	0.000	0.000	-0.066	-0.006	0.000
propkain	0.000	-1.000	0.000	-0.071	-0.024	0.000
celokain	0.000	0.000	0.000	0.000	0.000	0.000
cesmkain	0.000	0.000	0.000	0.000	0.000	0.000
cepukain	0.000	0.000	0.000	0.000	0.000	0.000
cenpkain	0.000	0.000	0.000	0.000	0.000	0.000
ceopkain	0.000	0.000	0.000	0.000	0.000	0.000
atlokain	0.000	0.000	0.000	0.000	0.000	0.000
atpukain	0.000	0.000	0.000	0.000	0.000	0.000
atnpkain	0.000	0.000	0.000	0.000	0.000	0.000
atopkain	0.000	0.000	0.000	0.000	0.000	0.000

	pprop	qceloao	qcesmao	pceti	qcesa	qcepw
bctiinde	0.000	0.000	0.000	0.000	0.000	0.000
bcsaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpwousu	0.000	0.000	0.000	0.000	0.000	0.000
bcloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bcsainde	0.000	0.000	0.000	0.000	0.000	0.000
bcluousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpcousu	0.000	0.000	0.000	0.000	0.000	0.000
bcsmaosu	0.000	0.000	0.000	0.000	0.000	0.000
bcludema	0.000	0.000	0.000	0.000	0.000	0.000
bcpwinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpcinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpuousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpudema	0.000	0.000	0.000	0.000	0.000	0.000
bcwainde	0.000	0.000	0.000	0.000	0.000	0.000
bcwaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpdema	0.000	0.000	0.000	0.000	0.000	0.000
bcopousu	0.000	0.000	0.000	0.000	0.000	0.000
bcopdema	-0.011	0.000	0.000	0.000	0.000	0.000
bitiinde	0.000	0.000	0.000	0.000	0.000	0.000
bisaousu	0.000	0.000	0.000	0.000	0.000	0.000
bipwousu	0.000	0.000	0.000	0.000	0.000	0.000
biloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bisainde	0.000	0.000	0.000	0.000	0.000	0.000
biluousu	0.000	0.000	0.000	0.000	0.000	0.000
bipcousu	0.000	0.000	0.000	0.000	0.000	0.000
bismaosu	0.000	0.000	0.000	0.000	0.000	0.000
biludema	0.000	0.000	0.000	0.000	0.000	0.000
bipwinde	0.000	0.000	0.000	0.000	0.000	0.000
bipcinde	0.000	0.000	0.000	0.000	0.000	0.000
bipuousu	0.000	0.000	0.000	0.000	0.000	0.000
bipudema	0.000	0.000	0.000	0.000	0.000	0.000
prtiinde	0.000	0.000	0.000	0.000	0.000	0.000
prpwousu	0.000	0.000	0.000	0.000	0.000	0.000
prpwinde	0.000	0.000	0.000	0.000	0.000	0.000
prpuousu	0.000	0.000	0.000	0.000	0.000	0.000
prpudema	0.000	0.000	0.000	0.000	0.000	0.000
prwainde	0.000	0.000	0.000	0.000	0.000	0.000
prwaousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpdema	0.000	0.000	0.000	0.000	0.000	0.000
propousu	-0.150	0.000	0.000	0.000	0.000	0.000
propdema	1.970	0.000	0.000	0.000	0.000	0.000
cetiinde	0.000	-1.000	0.000	0.074	0.000	0.000
cesaousu	0.000	-1.000	0.000	0.000	1.000	0.000
cepwousu	0.000	-1.000	0.000	0.000	0.000	1.000
celoaosu	0.000	1.000	0.000	0.255	0.000	0.000
cesainde	0.000	0.000	-1.000	0.000	1.000	0.000
celuousu	0.000	0.000	-1.000	0.000	0.000	0.000
cepcousu	0.000	0.000	-1.000	0.000	0.000	0.000
cesmaosu	0.000	0.000	1.000	0.000	0.000	0.000
celudema	0.000	0.000	0.000	0.000	0.000	0.000

	pprop	qceloao	qcesmao	pceti	qcesa	qcepw
cepwinde	0.000	0.000	0.000	0.000	0.000	1.000
cepcinde	0.000	0.000	0.000	0.000	0.000	0.000
cepuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepudema	0.000	0.000	0.000	0.000	0.000	0.000
cewainde	0.000	0.000	0.000	0.000	0.000	0.000
cewaousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpdema	0.000	0.000	0.000	0.000	0.000	0.000
ceopousu	0.000	0.000	0.000	0.000	0.000	0.000
ceopdema	-0.021	0.000	0.000	0.000	0.000	0.000
attiinde	0.000	0.000	0.000	0.000	0.000	0.000
atpwousu	0.000	0.000	0.000	0.000	0.000	0.000
atpwinde	0.000	0.000	0.000	0.000	0.000	0.000
atpuousu	0.000	0.000	0.000	0.000	0.000	0.000
atpudema	0.000	0.000	0.000	0.000	0.000	0.000
atwainde	0.000	0.000	0.000	0.000	0.000	0.000
atwaousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpdema	0.000	0.000	0.000	0.000	0.000	0.000
atopousu	0.000	0.000	0.000	0.000	0.000	0.000
atopdema	-0.009	0.000	0.000	0.000	0.000	0.000
bclainde	0.000	0.000	0.000	0.000	0.000	0.000
bilainde	0.000	0.000	0.000	0.000	0.000	0.000
prlainde	0.000	0.000	0.000	0.000	0.000	0.000
celainde	0.000	-0.220	-0.270	-0.017	0.000	0.000
atlainde	0.000	0.000	0.000	0.000	0.000	0.000
bceninde	0.000	0.000	0.000	0.000	0.000	0.000
bieninde	0.000	0.000	0.000	0.000	0.000	0.000
preninde	0.000	0.000	0.000	0.000	0.000	0.000
ceeninde	0.000	-0.090	-0.080	-0.007	0.000	0.000
ateninde	0.000	0.000	0.000	0.000	0.000	0.000
bclokain	0.000	0.000	0.000	0.000	0.000	0.000
bcsmkain	0.000	0.000	0.000	0.000	0.000	0.000
bcpukain	0.000	0.000	0.000	0.000	0.000	0.000
bcnpkain	0.000	0.000	0.000	0.000	0.000	0.000
bcopkain	0.000	0.000	0.000	0.000	0.000	0.000
bilokain	0.000	0.000	0.000	0.000	0.000	0.000
bismkain	0.000	0.000	0.000	0.000	0.000	0.000
bipukain	0.000	0.000	0.000	0.000	0.000	0.000
prlokain	0.000	0.000	0.000	0.000	0.000	0.000
prpukain	0.000	0.000	0.000	0.000	0.000	0.000
prnpkain	0.000	0.000	0.000	0.000	0.000	0.000
propkain	0.000	0.000	0.000	0.000	0.000	0.000
celokain	0.000	-1.000	0.000	-0.077	0.000	0.000
cesmkain	0.000	0.000	-1.000	0.000	0.000	0.000
cepukain	0.000	0.000	0.000	0.000	0.000	0.000
cenpkain	0.000	0.000	0.000	0.000	0.000	0.000
ceopkain	0.000	0.000	0.000	0.000	0.000	0.000
atlokain	0.000	0.000	0.000	0.000	0.000	0.000
atpukain	0.000	0.000	0.000	0.000	0.000	0.000
atnpkain	0.000	0.000	0.000	0.000	0.000	0.000
atopkain	0.000	0.000	0.000	0.000	0.000	0.000

	qcelu	qcepc	qcepu	qcewa	qcenp	qceop
bctiinde	0.000	0.000	0.000	0.000	0.000	0.000
bcsaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpwousu	0.000	0.000	0.000	0.000	0.000	0.000
bcloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bcsainde	0.000	0.000	0.000	0.000	0.000	0.000
bcluousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpcousu	0.000	0.000	0.000	0.000	0.000	0.000
bcsmaosu	0.000	0.000	0.000	0.000	0.000	0.000
bcludema	0.000	0.000	0.000	0.000	0.000	0.000
bcpwinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpcinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpuousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpudema	0.000	0.000	0.000	0.000	0.000	0.000
bcwainde	0.000	0.000	0.000	0.000	0.000	0.000
bcwaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpdema	0.000	0.000	0.000	0.000	0.000	0.000
bcopousu	0.000	0.000	0.000	0.000	0.000	0.000
bcopdema	0.000	0.000	0.000	0.000	0.000	0.000
bitiinde	0.000	0.000	0.000	0.000	0.000	0.000
bisaousu	0.000	0.000	0.000	0.000	0.000	0.000
bipwousu	0.000	0.000	0.000	0.000	0.000	0.000
biloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bisainde	0.000	0.000	0.000	0.000	0.000	0.000
biluousu	0.000	0.000	0.000	0.000	0.000	0.000
bipcousu	0.000	0.000	0.000	0.000	0.000	0.000
bismaosu	0.000	0.000	0.000	0.000	0.000	0.000
biludema	0.000	0.000	0.000	0.000	0.000	0.000
bipwinde	0.000	0.000	0.000	0.000	0.000	0.000
bipcinde	0.000	0.000	0.000	0.000	0.000	0.000
bipuousu	0.000	0.000	0.000	0.000	0.000	0.000
bipudema	0.000	0.000	0.000	0.000	0.000	0.000
prtiinde	0.000	0.000	0.000	0.000	0.000	0.000
prpwousu	0.000	0.000	0.000	0.000	0.000	0.000
prpwinde	0.000	0.000	0.000	0.000	0.000	0.000
prpuousu	0.000	0.000	0.000	0.000	0.000	0.000
prpudema	0.000	0.000	0.000	0.000	0.000	0.000
prwainde	0.000	0.000	0.000	0.000	0.000	0.000
prwaousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpdema	0.000	0.000	0.000	0.000	0.000	0.000
propousu	0.000	0.000	0.000	0.000	0.000	0.000
propdema	0.000	0.000	0.000	0.000	0.000	0.000
cetiinde	0.000	0.000	0.000	0.000	0.000	0.000
cesaousu	0.000	0.000	0.000	0.000	0.000	0.000
cepwousu	0.000	0.000	0.000	0.000	0.000	0.000
celoaosu	0.000	0.000	0.000	0.000	0.000	0.000
cesainde	0.000	0.000	0.000	0.000	0.000	0.000
celuousu	1.000	0.000	0.000	0.000	0.000	0.000
cepcousu	0.000	1.000	0.000	0.000	0.000	0.000
cesmaosu	0.000	0.000	0.000	0.000	0.000	0.000
celudema	1.000	0.000	0.000	0.000	0.000	0.000

	qcelu	qcepc	qcepu	qcewa	qcenp	qceop
cepwinde	0.000	0.000	-1.000	0.000	0.000	0.000
cepcinde	0.000	1.000	-1.000	0.000	0.000	0.000
cepuousu	0.000	0.000	1.000	0.000	0.000	0.000
cepudema	0.000	0.000	1.000	0.000	-0.490	-0.350
cewainde	0.000	0.000	0.000	1.000	-0.120	-0.880
cewaousu	0.000	0.000	0.000	1.000	0.000	0.000
cenpousu	0.000	0.000	0.000	0.000	1.000	0.000
cenpdema	0.000	0.000	0.000	0.000	1.000	0.000
ceopousu	0.000	0.000	0.000	0.000	0.000	1.000
ceopdema	0.000	0.000	0.000	0.000	0.000	1.000
attiinde	0.000	0.000	0.000	0.000	0.000	0.000
atpwousu	0.000	0.000	0.000	0.000	0.000	0.000
atpwinde	0.000	0.000	0.000	0.000	0.000	0.000
atpuousu	0.000	0.000	0.000	0.000	0.000	0.000
atpudema	0.000	0.000	0.000	0.000	0.000	0.000
atwainde	0.000	0.000	0.000	0.000	0.000	0.000
atwaousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpdema	0.000	0.000	0.000	0.000	0.000	0.000
atopousu	0.000	0.000	0.000	0.000	0.000	0.000
atopdema	0.000	0.000	0.000	0.000	0.000	0.000
bclainde	0.000	0.000	0.000	0.000	0.000	0.000
bilainde	0.000	0.000	0.000	0.000	0.000	0.000
prlainde	0.000	0.000	0.000	0.000	0.000	0.000
celainde	0.000	0.000	-0.060	0.000	-0.280	-0.170
atlainde	0.000	0.000	0.000	0.000	0.000	0.000
bceninde	0.000	0.000	0.000	0.000	0.000	0.000
bieninde	0.000	0.000	0.000	0.000	0.000	0.000
preninde	0.000	0.000	0.000	0.000	0.000	0.000
ceeninde	0.000	0.000	-0.090	0.000	-0.510	-0.230
ateninde	0.000	0.000	0.000	0.000	0.000	0.000
bclokain	0.000	0.000	0.000	0.000	0.000	0.000
bcsmkain	0.000	0.000	0.000	0.000	0.000	0.000
bcpukain	0.000	0.000	0.000	0.000	0.000	0.000
bcnpkain	0.000	0.000	0.000	0.000	0.000	0.000
bcopkain	0.000	0.000	0.000	0.000	0.000	0.000
bilokain	0.000	0.000	0.000	0.000	0.000	0.000
bismkain	0.000	0.000	0.000	0.000	0.000	0.000
bipukain	0.000	0.000	0.000	0.000	0.000	0.000
prlokain	0.000	0.000	0.000	0.000	0.000	0.000
prpukain	0.000	0.000	0.000	0.000	0.000	0.000
prnpkain	0.000	0.000	0.000	0.000	0.000	0.000
propkain	0.000	0.000	0.000	0.000	0.000	0.000
celokain	0.000	0.000	0.000	0.000	0.000	0.000
cesmkain	0.000	0.000	0.000	0.000	0.000	0.000
cepukain	0.000	0.000	-1.000	0.000	0.000	0.000
cenpkain	0.000	0.000	0.000	0.000	-1.000	0.000
ceopkain	0.000	0.000	0.000	0.000	0.000	-1.000
atlokain	0.000	0.000	0.000	0.000	0.000	0.000
atpukain	0.000	0.000	0.000	0.000	0.000	0.000
atnpkain	0.000	0.000	0.000	0.000	0.000	0.000
atopkain	0.000	0.000	0.000	0.000	0.000	0.000

	pcesa	pcepw	pcelu	pcepc	pcepu	pcewa
bctiinde	0.000	0.000	0.000	0.000	0.000	0.000
bcsaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpwousu	0.000	0.000	0.000	0.000	0.000	0.000
bcloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bcsainde	0.000	0.000	0.000	0.000	0.000	0.000
bcluousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpcousu	0.000	0.000	0.000	0.000	0.000	0.000
bcsmaosu	0.000	0.000	0.000	0.000	0.000	0.000
bcludema	0.000	0.000	-0.161	0.000	0.000	0.000
bcpwinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpcinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpuousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpudema	0.000	0.000	0.000	0.000	0.000	0.000
bcwainde	0.000	0.000	0.000	0.000	0.000	0.000
bcwaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpdema	0.000	0.000	0.000	0.000	0.000	0.000
bcopousu	0.000	0.000	0.000	0.000	0.000	0.000
bcopdema	0.000	0.000	0.000	0.000	0.000	0.000
bitiinde	0.000	0.000	0.000	0.000	0.000	0.000
bisaousu	0.000	0.000	0.000	0.000	0.000	0.000
bipwousu	0.000	0.000	0.000	0.000	0.000	0.000
biloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bisainde	0.000	0.000	0.000	0.000	0.000	0.000
biluousu	0.000	0.000	0.000	0.000	0.000	0.000
bipcousu	0.000	0.000	0.000	0.000	0.000	0.000
bismaosu	0.000	0.000	0.000	0.000	0.000	0.000
biludema	0.000	0.000	-0.123	0.000	0.000	0.000
bipwinde	0.000	0.000	0.000	0.000	0.000	0.000
bipcinde	0.000	0.000	0.000	0.000	0.000	0.000
bipuousu	0.000	0.000	0.000	0.000	0.000	0.000
bipudema	0.000	0.000	0.000	0.000	-0.015	0.000
prtiinde	0.000	0.000	0.000	0.000	0.000	0.000
prpwousu	0.000	0.000	0.000	0.000	0.000	0.000
prpwinde	0.000	0.000	0.000	0.000	0.000	0.000
prpuousu	0.000	0.000	0.000	0.000	0.000	0.000
prpudema	0.000	0.000	0.000	0.000	-0.020	0.000
prwainde	0.000	0.000	0.000	0.000	0.000	0.000
prwaousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpdema	0.000	0.000	0.000	0.000	0.000	0.000
propousu	0.000	0.000	0.000	0.000	0.000	0.000
propdema	0.000	0.000	0.000	0.000	0.000	0.000
cetiinde	0.000	0.000	0.000	0.000	0.000	0.000
cesaousu	-0.458	0.458	0.000	0.000	0.000	0.000
cepwousu	0.293	-0.293	0.000	0.000	0.000	0.000
celoaosu	-0.195	-0.305	0.000	0.000	0.000	0.000
cesainde	0.172	0.000	0.000	0.000	0.000	0.000
celuousu	0.000	0.000	-0.500	0.500	0.000	0.000
cepcousu	0.000	0.000	1.500	-1.500	0.000	0.000
cesmaosu	0.285	0.000	-0.375	-0.125	0.000	0.000
celudema	0.000	0.000	1.769	0.000	0.000	0.000

	pcesa	pcepw	pcelu	pcepc	pcepu	pcewa
cepwinde	0.000	0.275	0.000	-0.177	0.000	0.000
cepcinde	0.000	-0.225	0.000	0.323	0.000	0.000
cepuousu	0.000	0.086	0.000	0.067	-0.300	0.000
cepudema	0.000	0.000	0.000	0.000	0.464	-0.049
cewainde	0.000	0.000	0.000	0.000	-0.301	0.410
cewaousu	0.000	0.000	0.000	0.000	0.000	-0.300
cenpousu	0.000	0.000	0.000	0.000	0.132	0.012
cenpdema	0.000	0.000	0.000	0.000	0.000	0.000
ceopousu	0.000	0.000	0.000	0.000	0.053	0.018
ceopdema	0.000	0.000	0.000	0.000	0.000	0.000
attiinde	0.000	0.000	0.000	0.000	0.000	0.000
atpwousu	0.000	0.000	0.000	0.000	0.000	0.000
atpwinde	0.000	0.000	0.000	0.000	0.000	0.000
atpuousu	0.000	0.000	0.000	0.000	0.000	0.000
atpudema	0.000	0.000	0.000	0.000	-0.013	0.000
atwainde	0.000	0.000	0.000	0.000	0.000	0.000
atwaousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpdema	0.000	0.000	0.000	0.000	0.000	0.000
atopousu	0.000	0.000	0.000	0.000	0.000	0.000
atopdema	0.000	0.000	0.000	0.000	0.000	0.000
bclainde	0.000	0.000	0.000	0.000	0.000	0.000
bilainde	0.000	0.000	0.000	0.000	0.000	0.000
prlainde	0.000	0.000	0.000	0.000	0.000	0.000
celainde	-0.062	-0.003	0.000	-0.003	-0.031	-0.006
atlainde	0.000	0.000	0.000	0.000	0.000	0.000
bceninde	0.000	0.000	0.000	0.000	0.000	0.000
bieninde	0.000	0.000	0.000	0.000	0.000	0.000
preninde	0.000	0.000	0.000	0.000	0.000	0.000
ceeninde	-0.018	-0.005	0.000	-0.004	-0.050	-0.008
ateninde	0.000	0.000	0.000	0.000	0.000	0.000
bclokain	0.000	0.000	0.000	0.000	0.000	0.000
bcsmkain	0.000	0.000	0.000	0.000	0.000	0.000
bcpukain	0.000	0.000	0.000	0.000	0.000	0.000
bcnpkain	0.000	0.000	0.000	0.000	0.000	0.000
bcopkain	0.000	0.000	0.000	0.000	0.000	0.000
bilokain	0.000	0.000	0.000	0.000	0.000	0.000
bismkain	0.000	0.000	0.000	0.000	0.000	0.000
bipukain	0.000	0.000	0.000	0.000	0.000	0.000
prlokain	0.000	0.000	0.000	0.000	0.000	0.000
prpukain	0.000	0.000	0.000	0.000	0.000	0.000
prnpkain	0.000	0.000	0.000	0.000	0.000	0.000
propkain	0.000	0.000	0.000	0.000	0.000	0.000
celokain	0.000	0.000	0.000	0.000	0.000	0.000
cesmkain	-0.228	0.000	0.000	0.000	0.000	0.000
cepukain	0.000	-0.057	0.000	-0.045	0.000	0.000
cenpkain	0.000	0.000	0.000	0.000	-0.066	-0.006
ceopkain	0.000	0.000	0.000	0.000	-0.071	-0.024
atlokain	0.000	0.000	0.000	0.000	0.000	0.000
atpukain	0.000	0.000	0.000	0.000	0.000	0.000
atnpkain	0.000	0.000	0.000	0.000	0.000	0.000
atopkain	0.000	0.000	0.000	0.000	0.000	0.000

	pcenp	pceop	patti	qatpw	qatpu	qatwa
bctiinde	0.000	0.000	0.000	0.000	0.000	0.000
bcsaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpwousu	0.000	0.000	0.000	0.000	0.000	0.000
bcloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bcsainde	0.000	0.000	0.000	0.000	0.000	0.000
bcluousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpcousu	0.000	0.000	0.000	0.000	0.000	0.000
bcsmaosu	0.000	0.000	0.000	0.000	0.000	0.000
bcludema	0.000	0.000	0.000	0.000	0.000	0.000
bcpwinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpcinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpuousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpudema	0.000	0.000	0.000	0.000	0.000	0.000
bcwainde	0.000	0.000	0.000	0.000	0.000	0.000
bcwaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpdema	-0.353	0.000	0.000	0.000	0.000	0.000
bcopousu	0.000	0.000	0.000	0.000	0.000	0.000
bcopdema	0.000	-0.280	0.000	0.000	0.000	0.000
bitiinde	0.000	0.000	0.000	0.000	0.000	0.000
bisaousu	0.000	0.000	0.000	0.000	0.000	0.000
bipwousu	0.000	0.000	0.000	0.000	0.000	0.000
biloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bisainde	0.000	0.000	0.000	0.000	0.000	0.000
biluousu	0.000	0.000	0.000	0.000	0.000	0.000
bipcousu	0.000	0.000	0.000	0.000	0.000	0.000
bismaosu	0.000	0.000	0.000	0.000	0.000	0.000
biludema	0.000	0.000	0.000	0.000	0.000	0.000
bipwinde	0.000	0.000	0.000	0.000	0.000	0.000
bipcinde	0.000	0.000	0.000	0.000	0.000	0.000
bipuousu	0.000	0.000	0.000	0.000	0.000	0.000
bipudema	0.000	0.000	0.000	0.000	0.000	0.000
prtiinde	0.000	0.000	0.000	0.000	0.000	0.000
prpwousu	0.000	0.000	0.000	0.000	0.000	0.000
prpwinde	0.000	0.000	0.000	0.000	0.000	0.000
prpuousu	0.000	0.000	0.000	0.000	0.000	0.000
prpudema	0.000	0.000	0.000	0.000	0.000	0.000
prwainde	0.000	0.000	0.000	0.000	0.000	0.000
prwaousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpdema	-0.380	0.000	0.000	0.000	0.000	0.000
propousu	0.000	0.000	0.000	0.000	0.000	0.000
propdema	0.000	-0.720	0.000	0.000	0.000	0.000
cetiinde	0.000	0.000	0.000	0.000	0.000	0.000
cesaousu	0.000	0.000	0.000	0.000	0.000	0.000
cepwousu	0.000	0.000	0.000	0.000	0.000	0.000
celoaosu	0.000	0.000	0.000	0.000	0.000	0.000
cesainde	0.000	0.000	0.000	0.000	0.000	0.000
celuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepcousu	0.000	0.000	0.000	0.000	0.000	0.000
cesmaosu	0.000	0.000	0.000	0.000	0.000	0.000
celudema	0.000	0.000	0.000	0.000	0.000	0.000

	pcenp	pceop	patti	qatpw	qatpu	qatwa
cepwinde	0.000	0.000	0.000	0.000	0.000	0.000
cepcinde	0.000	0.000	0.000	0.000	0.000	0.000
cepuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepudema	0.000	0.000	0.000	0.000	0.000	0.000
cewainde	0.000	0.000	0.000	0.000	0.000	0.000
cewaousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpousu	-0.400	0.000	0.000	0.000	0.000	0.000
cenpdema	1.532	0.000	0.000	0.000	0.000	0.000
ceopousu	0.000	-0.150	0.000	0.000	0.000	0.000
ceopdema	0.000	1.424	0.000	0.000	0.000	0.000
attiinde	0.000	0.000	0.054	-1.000	0.000	0.000
atpwousu	0.000	0.000	0.320	1.000	0.000	0.000
atpwinde	0.000	0.000	0.000	1.000	-1.000	0.000
atpuousu	0.000	0.000	0.000	0.000	1.000	0.000
atpudema	0.000	0.000	0.000	0.000	1.000	0.000
atwainde	0.000	0.000	0.000	0.000	0.000	1.000
atwaousu	0.000	0.000	0.000	0.000	0.000	1.000
atnpousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpdema	-0.255	0.000	0.000	0.000	0.000	0.000
atopousu	0.000	0.000	0.000	0.000	0.000	0.000
atopdema	0.000	-0.219	0.000	0.000	0.000	0.000
bclainde	0.000	0.000	0.000	0.000	0.000	0.000
bilainde	0.000	0.000	0.000	0.000	0.000	0.000
prlainde	0.000	0.000	0.000	0.000	0.000	0.000
celainde	0.000	0.000	0.000	0.000	0.000	0.000
atlainde	0.000	0.000	-0.035	-0.360	-0.190	0.000
bceninde	0.000	0.000	0.000	0.000	0.000	0.000
bieninde	0.000	0.000	0.000	0.000	0.000	0.000
preninde	0.000	0.000	0.000	0.000	0.000	0.000
ceeninde	0.000	0.000	0.000	0.000	0.000	0.000
ateninde	0.000	0.000	-0.010	-0.100	-0.220	0.000
bclokain	0.000	0.000	0.000	0.000	0.000	0.000
bcsmkain	0.000	0.000	0.000	0.000	0.000	0.000
bcpukain	0.000	0.000	0.000	0.000	0.000	0.000
bcnpkain	0.000	0.000	0.000	0.000	0.000	0.000
bcopkain	0.000	0.000	0.000	0.000	0.000	0.000
bilokain	0.000	0.000	0.000	0.000	0.000	0.000
bismkain	0.000	0.000	0.000	0.000	0.000	0.000
bipukain	0.000	0.000	0.000	0.000	0.000	0.000
prlokain	0.000	0.000	0.000	0.000	0.000	0.000
prpukain	0.000	0.000	0.000	0.000	0.000	0.000
prnpkain	0.000	0.000	0.000	0.000	0.000	0.000
propkain	0.000	0.000	0.000	0.000	0.000	0.000
celokain	0.000	0.000	0.000	0.000	0.000	0.000
cesmkain	0.000	0.000	0.000	0.000	0.000	0.000
cepukain	0.000	0.000	0.000	0.000	0.000	0.000
cenpkain	0.000	0.000	0.000	0.000	0.000	0.000
ceopkain	0.000	0.000	0.000	0.000	0.000	0.000
atlokain	0.000	0.000	-0.096	-1.000	0.000	0.000
atpukain	0.000	0.000	0.000	0.000	-1.000	0.000
atnpkain	0.000	0.000	0.000	0.000	0.000	0.000
atopkain	0.000	0.000	0.000	0.000	0.000	0.000

	qatnp	qatop	patpw	patpu	patwa	patnp
bctiinde	0.000	0.000	0.000	0.000	0.000	0.000
bcsaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpwousu	0.000	0.000	0.000	0.000	0.000	0.000
bcloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bcsainde	0.000	0.000	0.000	0.000	0.000	0.000
bcluousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpcousu	0.000	0.000	0.000	0.000	0.000	0.000
bcsmaosu	0.000	0.000	0.000	0.000	0.000	0.000
bcludema	0.000	0.000	0.000	0.000	0.000	0.000
bcpwinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpcinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpuousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpudema	0.000	0.000	0.000	0.000	0.000	0.000
bcwainde	0.000	0.000	0.000	0.000	0.000	0.000
bcwaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpdema	0.000	0.000	0.000	0.000	0.000	-0.061
bcopousu	0.000	0.000	0.000	0.000	0.000	0.000
bcopdema	0.000	0.000	0.000	0.000	0.000	0.000
bitiinde	0.000	0.000	0.000	0.000	0.000	0.000
bisaousu	0.000	0.000	0.000	0.000	0.000	0.000
bipwousu	0.000	0.000	0.000	0.000	0.000	0.000
biloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bisainde	0.000	0.000	0.000	0.000	0.000	0.000
biluousu	0.000	0.000	0.000	0.000	0.000	0.000
bipcousu	0.000	0.000	0.000	0.000	0.000	0.000
bismaosu	0.000	0.000	0.000	0.000	0.000	0.000
biludema	0.000	0.000	0.000	0.000	0.000	0.000
bipwinde	0.000	0.000	0.000	0.000	0.000	0.000
bipcinde	0.000	0.000	0.000	0.000	0.000	0.000
bipuousu	0.000	0.000	0.000	0.000	0.000	0.000
bipudema	0.000	0.000	0.000	-0.013	0.000	0.000
prtiinde	0.000	0.000	0.000	0.000	0.000	0.000
prpwousu	0.000	0.000	0.000	0.000	0.000	0.000
prpwinde	0.000	0.000	0.000	0.000	0.000	0.000
prpuousu	0.000	0.000	0.000	0.000	0.000	0.000
prpudema	0.000	0.000	0.000	-0.007	0.000	0.000
prwainde	0.000	0.000	0.000	0.000	0.000	0.000
prwaousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpdema	0.000	0.000	0.000	0.000	0.000	-0.090
propousu	0.000	0.000	0.000	0.000	0.000	0.000
propdema	0.000	0.000	0.000	0.000	0.000	0.000
cetiinde	0.000	0.000	0.000	0.000	0.000	0.000
cesaousu	0.000	0.000	0.000	0.000	0.000	0.000
cepwousu	0.000	0.000	0.000	0.000	0.000	0.000
celoaosu	0.000	0.000	0.000	0.000	0.000	0.000
cesainde	0.000	0.000	0.000	0.000	0.000	0.000
celuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepcousu	0.000	0.000	0.000	0.000	0.000	0.000
cesmaosu	0.000	0.000	0.000	0.000	0.000	0.000
celudema	0.000	0.000	0.000	0.000	0.000	0.000

	qatnp	qatop	patpw	patpu	patwa	patnp
cepwinde	0.000	0.000	0.000	0.000	0.000	0.000
cepcinde	0.000	0.000	0.000	0.000	0.000	0.000
cepuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepudema	0.000	0.000	0.000	-0.003	0.000	0.000
cewainde	0.000	0.000	0.000	0.000	0.000	0.000
cewaousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpdema	0.000	0.000	0.000	0.000	0.000	-0.072
ceopousu	0.000	0.000	0.000	0.000	0.000	0.000
ceopdema	0.000	0.000	0.000	0.000	0.000	0.000
attiinde	0.000	0.000	0.000	0.000	0.000	0.000
atpwousu	0.000	0.000	-0.500	0.000	0.000	0.000
atpwinde	0.000	0.000	0.102	0.000	0.000	0.000
atpuousu	0.000	0.000	0.147	-0.300	0.000	0.000
atpudema	-0.480	-0.090	0.000	0.944	-0.023	0.000
atwainde	-0.120	-0.880	0.000	-0.301	0.410	0.000
atwaousu	0.000	0.000	0.000	0.000	-0.300	0.000
atnpousu	1.000	0.000	0.000	0.132	0.012	-0.400
atnpdema	1.000	0.000	0.000	0.000	0.000	1.280
atopousu	0.000	1.000	0.000	0.053	0.018	0.000
atopdema	0.000	1.000	0.000	0.000	0.000	0.000
bclainde	0.000	0.000	0.000	0.000	0.000	0.000
bilainde	0.000	0.000	0.000	0.000	0.000	0.000
prlainde	0.000	0.000	0.000	0.000	0.000	0.000
celainde	0.000	0.000	0.000	0.000	0.000	0.000
atlainde	-0.340	-0.110	-0.019	-0.030	-0.005	0.000
bceninde	0.000	0.000	0.000	0.000	0.000	0.000
bieninde	0.000	0.000	0.000	0.000	0.000	0.000
preninde	0.000	0.000	0.000	0.000	0.000	0.000
ceeninde	0.000	0.000	0.000	0.000	0.000	0.000
ateninde	-0.570	-0.110	-0.022	-0.046	-0.006	0.000
bclokain	0.000	0.000	0.000	0.000	0.000	0.000
bcsmkain	0.000	0.000	0.000	0.000	0.000	0.000
bcpukain	0.000	0.000	0.000	0.000	0.000	0.000
bcnpkain	0.000	0.000	0.000	0.000	0.000	0.000
bcopkain	0.000	0.000	0.000	0.000	0.000	0.000
bilokain	0.000	0.000	0.000	0.000	0.000	0.000
bismkain	0.000	0.000	0.000	0.000	0.000	0.000
bipukain	0.000	0.000	0.000	0.000	0.000	0.000
prlokain	0.000	0.000	0.000	0.000	0.000	0.000
prpukain	0.000	0.000	0.000	0.000	0.000	0.000
prnpkain	0.000	0.000	0.000	0.000	0.000	0.000
propkain	0.000	0.000	0.000	0.000	0.000	0.000
celokain	0.000	0.000	0.000	0.000	0.000	0.000
cesmkain	0.000	0.000	0.000	0.000	0.000	0.000
cepukain	0.000	0.000	0.000	0.000	0.000	0.000
cenpkain	0.000	0.000	0.000	0.000	0.000	0.000
ceopkain	0.000	0.000	0.000	0.000	0.000	0.000
atlokain	0.000	0.000	0.000	0.000	0.000	0.000
atpukain	0.000	0.000	-0.098	0.000	0.000	0.000
atnpkain	-1.000	0.000	0.000	-0.066	-0.006	0.000
atopkain	0.000	-1.000	0.000	-0.071	-0.024	0.000

	patop	qbcla	qbila	qprla	qcela	qatla
bctiinde	0.000	0.000	0.000	0.000	0.000	0.000
bcsaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpwousu	0.000	0.000	0.000	0.000	0.000	0.000
bcloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bcsainde	0.000	0.000	0.000	0.000	0.000	0.000
bcluousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpcousu	0.000	0.000	0.000	0.000	0.000	0.000
bcsmaosu	0.000	0.000	0.000	0.000	0.000	0.000
bcludema	0.000	0.000	0.000	0.000	0.000	0.000
bcpwinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpcinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpuousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpudema	0.000	0.000	0.000	0.000	0.000	0.000
bcwainde	0.000	0.000	0.000	0.000	0.000	0.000
bcwaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpdema	0.000	0.000	0.000	0.000	0.000	0.000
bcopousu	0.000	0.000	0.000	0.000	0.000	0.000
bcopdema	-0.011	0.000	0.000	0.000	0.000	0.000
bitiinde	0.000	0.000	0.000	0.000	0.000	0.000
bisaousu	0.000	0.000	0.000	0.000	0.000	0.000
bipwousu	0.000	0.000	0.000	0.000	0.000	0.000
biloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bisainde	0.000	0.000	0.000	0.000	0.000	0.000
biluousu	0.000	0.000	0.000	0.000	0.000	0.000
bipcousu	0.000	0.000	0.000	0.000	0.000	0.000
bismaosu	0.000	0.000	0.000	0.000	0.000	0.000
biludema	0.000	0.000	0.000	0.000	0.000	0.000
bipwinde	0.000	0.000	0.000	0.000	0.000	0.000
bipcinde	0.000	0.000	0.000	0.000	0.000	0.000
bipuousu	0.000	0.000	0.000	0.000	0.000	0.000
bipudema	0.000	0.000	0.000	0.000	0.000	0.000
prtiinde	0.000	0.000	0.000	0.000	0.000	0.000
prpwousu	0.000	0.000	0.000	0.000	0.000	0.000
prpwinde	0.000	0.000	0.000	0.000	0.000	0.000
prpuousu	0.000	0.000	0.000	0.000	0.000	0.000
prpudema	0.000	0.000	0.000	0.000	0.000	0.000
prwainde	0.000	0.000	0.000	0.000	0.000	0.000
prwaousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpdema	0.000	0.000	0.000	0.000	0.000	0.000
propousu	0.000	0.000	0.000	0.000	0.000	0.000
propdema	-0.020	0.000	0.000	0.000	0.000	0.000
cetiinde	0.000	0.000	0.000	0.000	0.000	0.000
cesaousu	0.000	0.000	0.000	0.000	0.000	0.000
cepwousu	0.000	0.000	0.000	0.000	0.000	0.000
celoaosu	0.000	0.000	0.000	0.000	0.000	0.000
cesainde	0.000	0.000	0.000	0.000	0.000	0.000
celuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepcousu	0.000	0.000	0.000	0.000	0.000	0.000
cesmaosu	0.000	0.000	0.000	0.000	0.000	0.000
celudema	0.000	0.000	0.000	0.000	0.000	0.000

	patop	qbcla	qbila	qprla	qcela	qatla
cepwinde	0.000	0.000	0.000	0.000	0.000	0.000
cepcinde	0.000	0.000	0.000	0.000	0.000	0.000
cepuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepudema	0.000	0.000	0.000	0.000	0.000	0.000
cewainde	0.000	0.000	0.000	0.000	0.000	0.000
cewaousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpdema	0.000	0.000	0.000	0.000	0.000	0.000
ceopousu	0.000	0.000	0.000	0.000	0.000	0.000
ceopdema	-0.017	0.000	0.000	0.000	0.000	0.000
attiinde	0.000	0.000	0.000	0.000	0.000	0.000
atpwousu	0.000	0.000	0.000	0.000	0.000	0.000
atpwinde	0.000	0.000	0.000	0.000	0.000	0.000
atpuousu	0.000	0.000	0.000	0.000	0.000	0.000
atpudema	0.000	0.000	0.000	0.000	0.000	0.000
atwainde	0.000	0.000	0.000	0.000	0.000	0.000
atwaousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpdema	0.000	0.000	0.000	0.000	0.000	0.000
atopousu	-0.150	0.000	0.000	0.000	0.000	0.000
atopdema	1.987	0.000	0.000	0.000	0.000	0.000
bclainde	0.000	1.000	0.000	0.000	0.000	0.000
bilainde	0.000	0.000	1.000	0.000	0.000	0.000
prlainde	0.000	0.000	0.000	1.000	0.000	0.000
celainde	0.000	0.000	0.000	0.000	1.000	0.000
atlainde	0.000	0.000	0.000	0.000	0.000	1.000
bceninde	0.000	0.000	0.000	0.000	0.000	0.000
bieninde	0.000	0.000	0.000	0.000	0.000	0.000
preninde	0.000	0.000	0.000	0.000	0.000	0.000
ceeninde	0.000	0.000	0.000	0.000	0.000	0.000
ateninde	0.000	0.000	0.000	0.000	0.000	0.000
bclokain	0.000	0.000	0.000	0.000	0.000	0.000
bcsmkain	0.000	0.000	0.000	0.000	0.000	0.000
bcpukain	0.000	0.000	0.000	0.000	0.000	0.000
bcnpkain	0.000	0.000	0.000	0.000	0.000	0.000
bcopkain	0.000	0.000	0.000	0.000	0.000	0.000
bilokain	0.000	0.000	0.000	0.000	0.000	0.000
bismkain	0.000	0.000	0.000	0.000	0.000	0.000
bipukain	0.000	0.000	0.000	0.000	0.000	0.000
prlokain	0.000	0.000	0.000	0.000	0.000	0.000
prpukain	0.000	0.000	0.000	0.000	0.000	0.000
prnpkain	0.000	0.000	0.000	0.000	0.000	0.000
propkain	0.000	0.000	0.000	0.000	0.000	0.000
celokain	0.000	0.000	0.000	0.000	0.000	0.000
cesmkain	0.000	0.000	0.000	0.000	0.000	0.000
cepukain	0.000	0.000	0.000	0.000	0.000	0.000
cenpkain	0.000	0.000	0.000	0.000	0.000	0.000
ceopkain	0.000	0.000	0.000	0.000	0.000	0.000
atlokain	0.000	0.000	0.000	0.000	0.000	0.000
atpukain	0.000	0.000	0.000	0.000	0.000	0.000
atnpkain	0.000	0.000	0.000	0.000	0.000	0.000
atopkain	0.000	0.000	0.000	0.000	0.000	0.000

	qbcen	qbien	qpren	qceen	qaten	pbcloka
bctiinde	0.000	0.000	0.000	0.000	0.000	-0.034
bcsaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpwous	0.000	0.000	0.000	0.000	0.000	0.000
bcloaosu	.000	0.000	0.000	0.000	0.000	0.113
bcsainde	0.000	0.000	0.000	0.000	0.000	0.000
bcluousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpcousu	0.000	0.000	0.000	0.000	0.000	0.000
bcsmaosu	0.000	0.000	0.000	0.000	0.000	0.000
bcludema	0.000	0.000	0.000	0.000	0.000	0.000
bcpwinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpcinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpuousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpudema	0.000	0.000	0.000	0.000	0.000	0.000
bcwainde	0.000	0.000	0.000	0.000	0.000	0.000
bcwaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpdema	0.000	0.000	0.000	0.000	0.000	0.000
bcopousu	0.000	0.000	0.000	0.000	0.000	0.000
bcopdema	0.000	0.000	0.000	0.000	0.000	0.000
bitiinde	0.000	0.000	0.000	0.000	0.000	0.000
bisaousu	0.000	0.000	0.000	0.000	0.000	0.000
bipwousu	0.000	0.000	0.000	0.000	0.000	0.000
biloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bisainde	0.000	0.000	0.000	0.000	0.000	0.000
biluousu	0.000	0.000	0.000	0.000	0.000	0.000
bipcousu	0.000	0.000	0.000	0.000	0.000	0.000
bismaosu	0.000	0.000	0.000	0.000	0.000	0.000
biludema	0.000	0.000	0.000	0.000	0.000	0.000
bipwinde	0.000	0.000	0.000	0.000	0.000	0.000
bipcinde	0.000	0.000	0.000	0.000	0.000	0.000
bipuousu	0.000	0.000	0.000	0.000	0.000	0.000
bipudema	0.000	0.000	0.000	0.000	0.000	0.000
prtiinde	0.000	0.000	0.000	0.000	0.000	0.000
prpwousu	0.000	0.000	0.000	0.000	0.000	0.000
prpwinde	0.000	0.000	0.000	0.000	0.000	0.000
prpuousu	0.000	0.000	0.000	0.000	0.000	0.000
prpudema	0.000	0.000	0.000	0.000	0.000	0.000
prwainde	0.000	0.000	0.000	0.000	0.000	0.000
prwaousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpdema	0.000	0.000	0.000	0.000	0.000	0.000
propousu	0.000	0.000	0.000	0.000	0.000	0.000
propdema	0.000	0.000	0.000	0.000	0.000	0.000
cetiinde	0.000	0.000	0.000	0.000	0.000	0.000
cesaousu	0.000	0.000	0.000	0.000	0.000	0.000
cepwousu	0.000	0.000	0.000	0.000	0.000	0.000
celoaosu	0.000	0.000	0.000	0.000	0.000	0.000
cesainde	0.000	0.000	0.000	0.000	0.000	0.000
celuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepcousu	0.000	0.000	0.000	0.000	0.000	0.000
cesmaosu	0.000	0.000	0.000	0.000	0.000	0.000
celudema	0.000	0.000	0.000	0.000	0.000	0.000

	qbcen	qbien	qpren	qceen	qaten	pbcloka
cepwinde	0.000	0.000	0.000	0.000	0.000	0.000
cepcinde	0.000	0.000	0.000	0.000	0.000	0.000
cepuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepudema	0.000	0.000	0.000	0.000	0.000	0.000
cewainde	0.000	0.000	0.000	0.000	0.000	0.000
cewaousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpdema	0.000	0.000	0.000	0.000	0.000	0.000
ceopousu	0.000	0.000	0.000	0.000	0.000	0.000
ceopdema	0.000	0.000	0.000	0.000	0.000	0.000
attiinde	0.000	0.000	0.000	0.000	0.000	0.000
atpwousu	0.000	0.000	0.000	0.000	0.000	0.000
atpwinde	0.000	0.000	0.000	0.000	0.000	0.000
atpuousu	0.000	0.000	0.000	0.000	0.000	0.000
atpudema	0.000	0.000	0.000	0.000	0.000	0.000
atwainde	0.000	0.000	0.000	0.000	0.000	0.000
atwaousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpdema	0.000	0.000	0.000	0.000	0.000	0.000
atopousu	0.000	0.000	0.000	0.000	0.000	0.000
atopdema	0.000	0.000	0.000	0.000	0.000	0.000
bclainde	0.000	0.000	0.000	0.000	0.000	-0.073
bilainde	0.000	0.000	0.000	0.000	0.000	0.000
prlainde	0.000	0.000	0.000	0.000	0.000	0.000
celainde	0.000	0.000	0.000	0.000	0.000	0.000
atlainde	0.000	0.000	0.000	0.000	0.000	0.000
bceninde	1.000	0.000	0.000	0.000	0.000	-0.026
bieninde	0.000	1.000	0.000	0.000	0.000	0.000
preninde	0.000	0.000	1.000	0.000	0.000	0.000
ceeninde	0.000	0.000	0.000	1.000	0.000	0.000
ateninde	0.000	0.000	0.000	0.000	1.000	0.000
bclokain	0.000	0.000	0.000	0.000	0.000	0.298
bcsmkain	0.000	0.000	0.000	0.000	0.000	0.000
bcpukain	0.000	0.000	0.000	0.000	0.000	0.000
bcnpkain	0.000	0.000	0.000	0.000	0.000	0.000
bcopkain	0.000	0.000	0.000	0.000	0.000	0.000
bilokain	0.000	0.000	0.000	0.000	0.000	0.000
bismkain	0.000	0.000	0.000	0.000	0.000	0.000
bipukain	0.000	0.000	0.000	0.000	0.000	0.000
prlokain	0.000	0.000	0.000	0.000	0.000	0.000
prpukain	0.000	0.000	0.000	0.000	0.000	0.000
prnpkain	0.000	0.000	0.000	0.000	0.000	0.000
propkain	0.000	0.000	0.000	0.000	0.000	0.000
celokain	0.000	0.000	0.000	0.000	0.000	0.000
cesmkain	0.000	0.000	0.000	0.000	0.000	0.000
cepukain	0.000	0.000	0.000	0.000	0.000	0.000
cenpkain	0.000	0.000	0.000	0.000	0.000	0.000
ceopkain	0.000	0.000	0.000	0.000	0.000	0.000
atlokain	0.000	0.000	0.000	0.000	0.000	0.000
atpukain	0.000	0.000	0.000	0.000	0.000	0.000
atnpkain	0.000	0.000	0.000	0.000	0.000	0.000
atopkain	0.000	0.000	0.000	0.000	0.000	0.000

	pbcsmka	pbcpuka	pbcnpka	pbcopka	pbiloka	pbismka
bctiinde	0.000	0.000	0.000	0.000	0.000	0.000
bcsaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpwousu	0.000	0.000	0.000	0.000	0.000	0.000
bcloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bcsainde	-0.096	0.000	0.000	0.000	0.000	0.000
bcluousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpcousu	0.000	0.000	0.000	0.000	0.000	0.000
bcsmaosu	0.120	0.000	0.000	0.000	0.000	0.000
bcludema	0.000	0.000	0.000	0.000	0.000	0.000
bcpwinde	0.000	-0.063	0.000	0.000	0.000	0.000
bcpcinde	0.000	-0.063	0.000	0.000	0.000	0.000
bcpuousu	0.000	0.094	0.000	0.000	0.000	0.000
bcpudema	0.000	0.000	-0.041	-0.021	0.000	0.000
bcwainde	0.000	0.000	-0.009	-0.049	0.000	0.000
bcwaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpousu	0.000	0.000	0.154	0.000	0.000	0.000
bcnpdema	0.000	0.000	0.000	0.000	0.000	0.000
bcopousu	0.000	0.000	0.000	0.041	0.000	0.000
bcopdema	0.000	0.000	0.000	0.000	0.000	0.000
bitiinde	0.000	0.000	0.000	0.000	-0.022	0.000
bisaousu	0.000	0.000	0.000	0.000	0.000	0.000
bipwousu	0.000	0.000	0.000	0.000	0.000	0.000
biloaosu	0.000	0.000	0.000	0.000	0.074	0.000
bisainde	0.000	0.000	0.000	0.000	0.000	-0.114
biluousu	0.000	0.000	0.000	0.000	0.000	0.000
bipcousu	0.000	0.000	0.000	0.000	0.000	0.000
bismaosu	0.000	0.000	0.000	0.000	0.000	0.143
biludema	0.000	0.000	0.000	0.000	0.000	0.000
bipwinde	0.000	0.000	0.000	0.000	0.000	0.000
bipcinde	0.000	0.000	0.000	0.000	0.000	0.000
bipuousu	0.000	0.000	0.000	0.000	0.000	0.000
bipudema	0.000	0.000	0.000	0.000	0.000	0.000
prtiinde	0.000	0.000	0.000	0.000	0.000	0.000
prpwousu	0.000	0.000	0.000	0.000	0.000	0.000
prpwinde	0.000	0.000	0.000	0.000	0.000	0.000
prpuousu	0.000	0.000	0.000	0.000	0.000	0.000
prpudema	0.000	0.000	0.000	0.000	0.000	0.000
prwainde	0.000	0.000	0.000	0.000	0.000	0.000
prwaousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpdema	0.000	0.000	0.000	0.000	0.000	0.000
propousu	0.000	0.000	0.000	0.000	0.000	0.000
propdema	0.000	0.000	0.000	0.000	0.000	0.000
cetiinde	0.000	0.000	0.000	0.000	0.000	0.000
cesaousu	0.000	0.000	0.000	0.000	0.000	0.000
cepwousu	0.000	0.000	0.000	0.000	0.000	0.000
celoaosu	0.000	0.000	0.000	0.000	0.000	0.000
cesainde	0.000	0.000	0.000	0.000	0.000	0.000
celuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepcousu	0.000	0.000	0.000	0.000	0.000	0.000
cesmaosu	0.000	0.000	0.000	0.000	0.000	0.000
celudema	0.000	0.000	0.000	0.000	0.000	0.000

	pbcsmka	pbcpuka	pbcnpka	pbcopka	pbiloka	pbismka
cepwinde	0.000	0.000	0.000	0.000	0.000	0.000
cepcinde	0.000	0.000	0.000	0.000	0.000	0.000
cepuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepudema	0.000	0.000	0.000	0.000	0.000	0.000
cewainde	0.000	0.000	0.000	0.000	0.000	0.000
cewaousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpdema	0.000	0.000	0.000	0.000	0.000	0.000
ceopousu	0.000	0.000	0.000	0.000	0.000	0.000
ceopdema	0.000	0.000	0.000	0.000	0.000	0.000
attiinde	0.000	0.000	0.000	0.000	0.000	0.000
atpwousu	0.000	0.000	0.000	0.000	0.000	0.000
atpwinde	0.000	0.000	0.000	0.000	0.000	0.000
atpuousu	0.000	0.000	0.000	0.000	0.000	0.000
atpudema	0.000	0.000	0.000	0.000	0.000	0.000
atwainde	0.000	0.000	0.000	0.000	0.000	0.000
atwaousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpdema	0.000	0.000	0.000	0.000	0.000	0.000
atopousu	0.000	0.000	0.000	0.000	0.000	0.000
atopdema	0.000	0.000	0.000	0.000	0.000	0.000
bclainde	-0.043	-0.026	-0.039	-0.021	0.000	0.000
bilainde	0.000	0.000	0.000	0.000	-0.054	-0.095
prlainde	0.000	0.000	0.000	0.000	0.000	0.000
celainde	0.000	0.000	0.000	0.000	0.000	0.000
atlainde	0.000	0.000	0.000	0.000	0.000	0.000
bceninde	-0.012	-0.041	-0.116	-0.036	0.000	0.000
bieninde	0.000	0.000	0.000	0.000	-0.030	-0.066
preninde	0.000	0.000	0.000	0.000	0.000	0.000
ceeninde	0.000	0.000	0.000	0.000	0.000	0.000
ateninde	0.000	0.000	0.000	0.000	0.000	0.000
bclokain	0.000	0.000	0.000	0.000	0.000	0.000
bcsmkain	0.348	0.000	0.000	0.000	0.000	0.000
bcpukain	0.000	0.260	0.000	0.000	0.000	0.000
bcnpkain	0.000	0.000	0.243	0.000	0.000	0.000
bcopkain	0.000	0.000	0.000	0.289	0.000	0.000
bilokain	0.000	0.000	0.000	0.000	0.331	0.000
bismkain	0.000	0.000	0.000	0.000	0.000	0.330
bipukain	0.000	0.000	0.000	0.000	0.000	0.000
prlokain	0.000	0.000	0.000	0.000	0.000	0.000
prpukain	0.000	0.000	0.000	0.000	0.000	0.000
prnpkain	0.000	0.000	0.000	0.000	0.000	0.000
propkain	0.000	0.000	0.000	0.000	0.000	0.000
celokain	0.000	0.000	0.000	0.000	0.000	0.000
cesmkain	0.000	0.000	0.000	0.000	0.000	0.000
cepukain	0.000	0.000	0.000	0.000	0.000	0.000
cenpkain	0.000	0.000	0.000	0.000	0.000	0.000
ceopkain	0.000	0.000	0.000	0.000	0.000	0.000
atlokain	0.000	0.000	0.000	0.000	0.000	0.000
atpukain	0.000	0.000	0.000	0.000	0.000	0.000
atnpkain	0.000	0.000	0.000	0.000	0.000	0.000
atopkain	0.000	0.000	0.000	0.000	0.000	0.000

	pbipuka	pprloka	pprpuka	pprnpka	ppropka	pceloka
bctiinde	0.000	0.000	0.000	0.000	0.000	0.000
bcsaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpwousu	0.000	0.000	0.000	0.000	0.000	0.000
bcloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bcsainde	0.000	0.000	0.000	0.000	0.000	0.000
bcluousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpcousu	0.000	0.000	0.000	0.000	0.000	0.000
bcsmaosu	0.000	0.000	0.000	0.000	0.000	0.000
bcludema	0.000	0.000	0.000	0.000	0.000	0.000
bcpwinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpcinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpuousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpudema	0.000	0.000	0.000	0.000	0.000	0.000
bcwainde	0.000	0.000	0.000	0.000	0.000	0.000
bcwaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpdema	0.000	0.000	0.000	0.000	0.000	0.000
bcopousu	0.000	0.000	0.000	0.000	0.000	0.000
bcopdema	0.000	0.000	0.000	0.000	0.000	0.000
bitiinde	0.000	0.000	0.000	0.000	0.000	0.000
bisaousu	0.000	0.000	0.000	0.000	0.000	0.000
bipwousu	0.000	0.000	0.000	0.000	0.000	0.000
biloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bisainde	0.000	0.000	0.000	0.000	0.000	0.000
biluousu	0.000	0.000	0.000	0.000	0.000	0.000
bipcousu	0.000	0.000	0.000	0.000	0.000	0.000
bismaosu	0.000	0.000	0.000	0.000	0.000	0.000
biludema	0.000	0.000	0.000	0.000	0.000	0.000
bipwinde	-0.069	0.000	0.000	0.000	0.000	0.000
bipcinde	-0.069	0.000	0.000	0.000	0.000	0.000
bipuousu	0.104	0.000	0.000	0.000	0.000	0.000
bipudema	0.000	0.000	0.000	0.000	0.000	0.000
prtiinde	0.000	-0.036	0.000	0.000	0.000	0.000
prpwousu	0.000	0.119	0.000	0.000	0.000	0.000
prpwinde	0.000	0.000	-0.072	0.000	0.000	0.000
prpuousu	0.000	0.000	0.107	0.000	0.000	0.000
prpudema	0.000	0.000	0.000	-0.013	-0.008	0.000
prwainde	0.000	0.000	0.000	-0.008	-0.049	0.000
prwaousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpousu	0.000	0.000	0.000	0.131	0.000	0.000
prnpdema	0.000	0.000	0.000	0.000	0.000	0.000
propousu	0.000	0.000	0.000	0.000	0.041	0.000
propdema	0.000	0.000	0.000	0.000	0.000	0.000
cetiinde	0.000	0.000	0.000	0.000	0.000	-0.035
cesaousu	0.000	0.000	0.000	0.000	0.000	0.000
cepwousu	0.000	0.000	0.000	0.000	0.000	0.000
celoaosu	0.000	0.000	0.000	0.000	0.000	0.115
cesainde	0.000	0.000	0.000	0.000	0.000	0.000
celuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepcousu	0.000	0.000	0.000	0.000	0.000	0.000
cesmaosu	0.000	0.000	0.000	0.000	0.000	0.000
celudema	0.000	0.000	0.000	0.000	0.000	0.000

	pbipuka	pprloka	pprpuka	pprnpka	ppropka	pceloka
cepwinde	0.000	0.000	0.000	0.000	0.000	0.000
cepcinde	0.000	0.000	0.000	0.000	0.000	0.000
cepuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepudema	0.000	0.000	0.000	0.000	0.000	0.000
cewainde	0.000	0.000	0.000	0.000	0.000	0.000
cewaousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpdema	0.000	0.000	0.000	0.000	0.000	0.000
ceopousu	0.000	0.000	0.000	0.000	0.000	0.000
ceopdema	0.000	0.000	0.000	0.000	0.000	0.000
attiinde	0.000	0.000	0.000	0.000	0.000	0.000
atpwousu	0.000	0.000	0.000	0.000	0.000	0.000
atpwinde	0.000	0.000	0.000	0.000	0.000	0.000
atpuousu	0.000	0.000	0.000	0.000	0.000	0.000
atpudema	0.000	0.000	0.000	0.000	0.000	0.000
atwainde	0.000	0.000	0.000	0.000	0.000	0.000
atwaousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpdema	0.000	0.000	0.000	0.000	0.000	0.000
atopousu	0.000	0.000	0.000	0.000	0.000	0.000
atopdema	0.000	0.000	0.000	0.000	0.000	0.000
bclainde	0.000	0.000	0.000	0.000	0.000	0.000
bilainde	-0.031	0.000	0.000	0.000	0.000	0.000
prlainde	0.000	-0.079	-0.104	-0.022	-0.034	0.000
celainde	0.000	0.000	0.000	0.000	0.000	-0.044
atlainde	0.000	0.000	0.000	0.000	0.000	0.000
bceninde	0.000	0.000	0.000	0.000	0.000	0.000
bieninde	-0.110	0.000	0.000	0.000	0.000	0.000
preninde	0.000	-0.031	-0.120	-0.046	-0.042	0.000
ceeninde	0.000	0.000	0.000	0.000	0.000	-0.018
ateninde	0.000	0.000	0.000	0.000	0.000	0.000
bclokain	0.000	0.000	0.000	0.000	0.000	0.000
bcsmkain	0.000	0.000	0.000	0.000	0.000	0.000
bcpukain	0.000	0.000	0.000	0.000	0.000	0.000
bcnpkain	0.000	0.000	0.000	0.000	0.000	0.000
bcopkain	0.000	0.000	0.000	0.000	0.000	0.000
bilokain	0.000	0.000	0.000	0.000	0.000	0.000
bismkain	0.000	0.000	0.000	0.000	0.000	0.000
bipukain	0.245	0.000	0.000	0.000	0.000	0.000
prlokain	0.000	0.275	0.000	0.000	0.000	0.000
prpukain	0.000	0.000	0.233	0.000	0.000	0.000
prnpkain	0.000	0.000	0.000	0.282	0.000	0.000
propkain	0.000	0.000	0.000	0.000	0.289	0.000
celokain	0.000	0.000	0.000	0.000	0.000	0.301
cesmkain	0.000	0.000	0.000	0.000	0.000	0.000
cepukain	0.000	0.000	0.000	0.000	0.000	0.000
cenpkain	0.000	0.000	0.000	0.000	0.000	0.000
ceopkain	0.000	0.000	0.000	0.000	0.000	0.000
atlokain	0.000	0.000	0.000	0.000	0.000	0.000
atpukain	0.000	0.000	0.000	0.000	0.000	0.000
atnpkain	0.000	0.000	0.000	0.000	0.000	0.000
atopkain	0.000	0.000	0.000	0.000	0.000	0.000

	pcesmka	pcepuka	pcenpka	pceopka	patloka	patpuka
bctiinde	0.000	0.000	0.000	0.000	0.000	0.000
bcsaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpwousu	0.000	0.000	0.000	0.000	0.000	0.000
bcloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bcsainde	0.000	0.000	0.000	0.000	0.000	0.000
bcluousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpcousu	0.000	0.000	0.000	0.000	0.000	0.000
bcsmaosu	0.000	0.000	0.000	0.000	0.000	0.000
bcludema	0.000	0.000	0.000	0.000	0.000	0.000
bcpwinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpcinde	0.000	0.000	0.000	0.000	0.000	0.000
bcpuousu	0.000	0.000	0.000	0.000	0.000	0.000
bcpudema	0.000	0.000	0.000	0.000	0.000	0.000
bcwainde	0.000	0.000	0.000	0.000	0.000	0.000
bcwaousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpousu	0.000	0.000	0.000	0.000	0.000	0.000
bcnpdema	0.000	0.000	0.000	0.000	0.000	0.000
bcopousu	0.000	0.000	0.000	0.000	0.000	0.000
bcopdema	0.000	0.000	0.000	0.000	0.000	0.000
bitiinde	0.000	0.000	0.000	0.000	0.000	0.000
bisaousu	0.000	0.000	0.000	0.000	0.000	0.000
bipwousu	0.000	0.000	0.000	0.000	0.000	0.000
biloaosu	0.000	0.000	0.000	0.000	0.000	0.000
bisainde	0.000	0.000	0.000	0.000	0.000	0.000
biluousu	0.000	0.000	0.000	0.000	0.000	0.000
bipcousu	0.000	0.000	0.000	0.000	0.000	0.000
bismaosu	0.000	0.000	0.000	0.000	0.000	0.000
biludema	0.000	0.000	0.000	0.000	0.000	0.000
bipwinde	0.000	0.000	0.000	0.000	0.000	0.000
bipcinde	0.000	0.000	0.000	0.000	0.000	0.000
bipuousu	0.000	0.000	0.000	0.000	0.000	0.000
bipudema	0.000	0.000	0.000	0.000	0.000	0.000
prtiinde	0.000	0.000	0.000	0.000	0.000	0.000
prpwousu	0.000	0.000	0.000	0.000	0.000	0.000
prpwinde	0.000	0.000	0.000	0.000	0.000	0.000
prpuousu	0.000	0.000	0.000	0.000	0.000	0.000
prpudema	0.000	0.000	0.000	0.000	0.000	0.000
prwainde	0.000	0.000	0.000	0.000	0.000	0.000
prwaousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpousu	0.000	0.000	0.000	0.000	0.000	0.000
prnpdema	0.000	0.000	0.000	0.000	0.000	0.000
propousu	0.000	0.000	0.000	0.000	0.000	0.000
propdema	0.000	0.000	0.000	0.000	0.000	0.000
cetiinde	0.000	0.000	0.000	0.000	0.000	0.000
cesaousu	0.000	0.000	0.000	0.000	0.000	0.000
cepwousu	0.000	0.000	0.000	0.000	0.000	0.000
celoaosu	0.000	0.000	0.000	0.000	0.000	0.000
cesainde	-0.088	0.000	0.000	0.000	0.000	0.000
celuousu	0.000	0.000	0.000	0.000	0.000	0.000
cepcousu	0.000	0.000	0.000	0.000	0.000	0.000
cesmaosu	0.110	0.000	0.000	0.000	0.000	0.000
celudema	0.000	0.000	0.000	0.000	0.000	0.000

	pcesmka	pcepuka	pcenpka	pceopka	patloka	patpuka
cepwinde	0.000	-0.057	0.000	0.000	0.000	0.000
cepcinde	0.000	-0.057	0.000	0.000	0.000	0.000
cepuousu	0.000	0.085	0.000	0.000	0.000	0.000
cepudema	0.000	0.000	-0.036	-0.019	0.000	0.000
cewainde	0.000	0.000	-0.009	-0.049	0.000	0.000
cewaousu	0.000	0.000	0.000	0.000	0.000	0.000
cenpousu	0.000	0.000	0.146	0.000	0.000	0.000
cenpdema	0.000	0.000	0.000	0.000	0.000	0.000
ceopousu	0.000	0.000	0.000	0.041	0.000	0.000
ceopdema	0.000	0.000	0.000	0.000	0.000	0.000
attiinde	0.000	0.000	0.000	0.000	-0.024	0.000
atpwousu	0.000	0.000	0.000	0.000	0.081	0.000
atpwinde	0.000	0.000	0.000	0.000	0.000	-0.052
atpuousu	0.000	0.000	0.000	0.000	0.000	0.078
atpudema	0.000	0.000	0.000	0.000	0.000	0.000
atwainde	0.000	0.000	0.000	0.000	0.000	0.000
atwaousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpousu	0.000	0.000	0.000	0.000	0.000	0.000
atnpdema	0.000	0.000	0.000	0.000	0.000	0.000
atopousu	0.000	0.000	0.000	0.000	0.000	0.000
atopdema	0.000	0.000	0.000	0.000	0.000	0.000
bclainde	0.000	0.000	0.000	0.000	0.000	0.000
bilainde	0.000	0.000	0.000	0.000	0.000	0.000
prlainde	0.000	0.000	0.000	0.000	0.000	0.000
celainde	-0.037	-0.014	-0.068	-0.036	0.000	0.000
atlainde	0.000	0.000	0.000	0.000	-0.065	-0.039
bceninde	0.000	0.000	0.000	0.000	0.000	0.000
bieninde	0.000	0.000	0.000	0.000	0.000	0.000
preninde	0.000	0.000	0.000	0.000	0.000	0.000
ceeninde	-0.011	-0.021	-0.124	-0.049	0.000	0.000
ateninde	0.000	0.000	0.000	0.000	-0.018	-0.045
bclokain	0.000	0.000	0.000	0.000	0.000	0.000
bcsmkain	0.000	0.000	0.000	0.000	0.000	0.000
bcpukain	0.000	0.000	0.000	0.000	0.000	0.000
bcnpkain	0.000	0.000	0.000	0.000	0.000	0.000
bcopkain	0.000	0.000	0.000	0.000	0.000	0.000
bilokain	0.000	0.000	0.000	0.000	0.000	0.000
bismkain	0.000	0.000	0.000	0.000	0.000	0.000
bipukain	0.000	0.000	0.000	0.000	0.000	0.000
prlokain	0.000	0.000	0.000	0.000	0.000	0.000
prpukain	0.000	0.000	0.000	0.000	0.000	0.000
prnpkain	0.000	0.000	0.000	0.000	0.000	0.000
propkain	0.000	0.000	0.000	0.000	0.000	0.000
celokain	0.000	0.000	0.000	0.000	0.000	0.000
cesmkain	0.361	0.000	0.000	0.000	0.000	0.000
cepukain	0.000	0.269	0.000	0.000	0.000	0.000
cenpkain	0.000	0.000	0.256	0.000	0.000	0.000
ceopkain	0.000	0.000	0.000	0.289	0.000	0.000
atlokain	0.000	0.000	0.000	0.000	0.318	0.000
atpukain	0.000	0.000	0.000	0.000	0.000	0.295
atnpkain	0.000	0.000	0.000	0.000	0.000	0.000
atopkain	0.000	0.000	0.000	0.000	0.000	0.000

	patnpka	patopka
bctiinde	0.000	0.000
bcsaousu	0.000	0.000
bcpwousu	0.000	0.000
bcloaosu	0.000	0.000
bcsainde	0.000	0.000
bcluousu	0.000	0.000
bcpcousu	0.000	0.000
bcsmaosu	0.000	0.000
bcludema	0.000	0.000
bcpwinde	0.000	0.000
bcpcinde	0.000	0.000
bcpuousu	0.000	0.000
bcpudema	0.000	0.000
bcwainde	0.000	0.000
bcwaousu	0.000	0.000
bcnpousu	0.000	0.000
bcnpdema	0.000	0.000
bcopousu	0.000	0.000
bcopdema	0.000	0.000
bitiinde	0.000	0.000
bisaousu	0.000	0.000
bipwousu	0.000	0.000
biloaosu	0.000	0.000
bisainde	0.000	0.000
biluousu	0.000	0.000
bipcousu	0.000	0.000
bismaosu	0.000	0.000
biludema	0.000	0.000
bipwinde	0.000	0.000
bipcinde	0.000	0.000
bipuousu	0.000	0.000
bipudema	0.000	0.000
prtiinde	0.000	0.000
prpwousu	0.000	0.000
prpwinde	0.000	0.000
prpuousu	0.000	0.000
prpudema	0.000	0.000
prwainde	0.000	0.000
prwaousu	0.000	0.000
prnpousu	0.000	0.000
prnpdema	0.000	0.000
propousu	0.000	0.000
propdema	0.000	0.000
cetiinde	0.000	0.000
cesaousu	0.000	0.000
cepwousu	0.000	0.000
celoaosu	0.000	0.000
cesainde	0.000	0.000
celuousu	0.000	0.000
cepcousu	0.000	0.000
cesmaosu	0.000	0.000
celudema	0.000	0.000

	patnpka	patopka
cepwinde	0.000	0.000
cepcinde	0.000	0.000
cepuousu	0.000	0.000
cepudema	0.000	0.000
cewainde	0.000	0.000
cewaousu	0.000	0.000
cenpousu	0.000	0.000
cenpdema	0.000	0.000
ceopousu	0.000	0.000
ceopdema	0.000	0.000
attiinde	0.000	0.000
atpwousu	0.000	0.000
atpwinde	0.000	0.000
atpuousu	0.000	0.000
atpudema	-0.031	-0.005
atwainde	-0.008	-0.049
atwaousu	0.000	0.000
atnpousu	0.131	0.000
atnpdema	0.000	0.000
atopousu	0.000	0.041
atopdema	0.000	0.000
bclainde	0.000	0.000
bilainde	0.000	0.000
prlainde	0.000	0.000
celainde	0.000	0.000
atlainde	-0.074	-0.023
bceninde	0.000	0.000
bieninde	0.000	0.000
preninde	0.000	0.000
ceeninde	0.000	0.000
ateninde	-0.124	-0.023
bclokain	0.000	0.000
bcsmkain	0.000	0.000
bcpukain	0.000	0.000
bcnpkain	0.000	0.000
bcopkain	0.000	0.000
bilokain	0.000	0.000
bismkain	0.000	0.000
bipukain	0.000	0.000
prlokain	0.000	0.000
prpukain	0.000	0.000
prnpkain	0.000	0.000
propkain	0.000	0.000
celokain	0.000	0.000
cesmkain	0.000	0.000
cepukain	0.000	0.000
cenpkain	0.000	0.000
ceopkain	0.000	0.000
atlokain	0.000	0.000
atpukain	0.000	0.000
atnpkain	0.282	0.000
atopkain	0.000	0.289